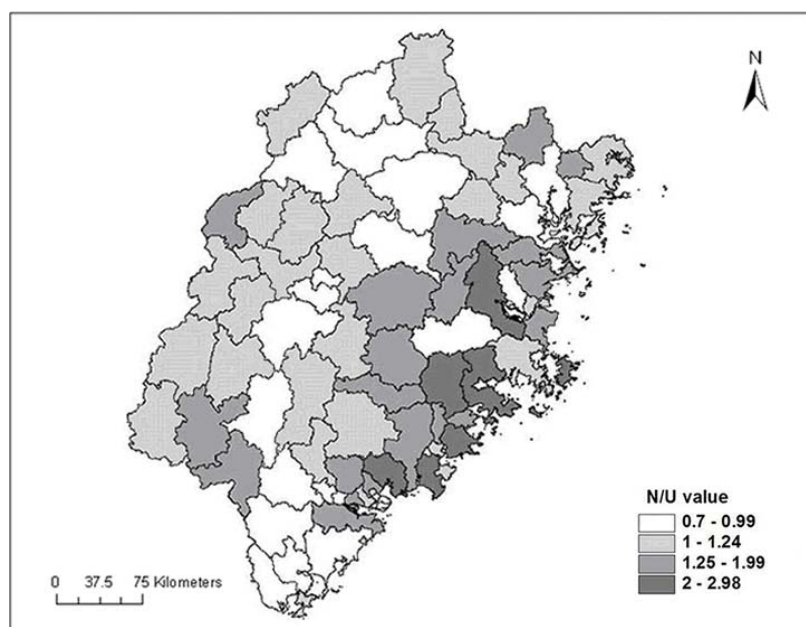


cated by Figure 2, the areas showing such a pronounced contrast are widespread in Fujian. These transformations have brought many urban elements to previously rural areas, thereby significantly affecting urbanization in the affected regions. They occupy therefore an important position in the general process of urbanization in China.

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



Source: Based on 2000 Census data.

The significance of this transformation in China's urbanization process has yet to be fully recognized, as illustrated by the case of Quanzhou. In fact, a well-known description of the process of rural transformation in China since the reform era is 'industrialization without urbanization' (Ma and Lin, 1993), implying that a transformation such as the one observed in Quanzhou has not contributed to China's urbanization process. For some, this constitutes what are referred to as 'world rules of urbanization', and is an abnormal process (Liao, 1995; Zhao, 2002). From the perspective of conventional urban definitions

and statistics concerning the final results of the rural-urban transformation usually achieved as a result of rural-urban administrative changes, the understanding of the rural-urban transformation described above appears to be fully justified.

However, a closer examination of the transformation process described above suggests that the accumulation of urban elements in the process of transformation from rural to urban was achieved before the official urban criteria were reached. The process of accumulation may not be significant for conventional urbanization patterns dominated by rural-urban migration, though it will become increasingly important if the unconventional rural-urban transformation is as widespread as the trends described above appear to suggest. Furthermore, conventional rural-urban definitions take a dichotomous approach, thus overlooking the fact that rural-urban distinctions are now increasingly blurred; the emergence and development of quasi-urban populations and areas are an important part of the urbanization process. We will therefore examine the transformation process in Fujian Province, especially the Quanzhou city-region, from a non-conventional perspective, so that the important role of *in situ* urbanization in China's urbanization process may be fully acknowledged.

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

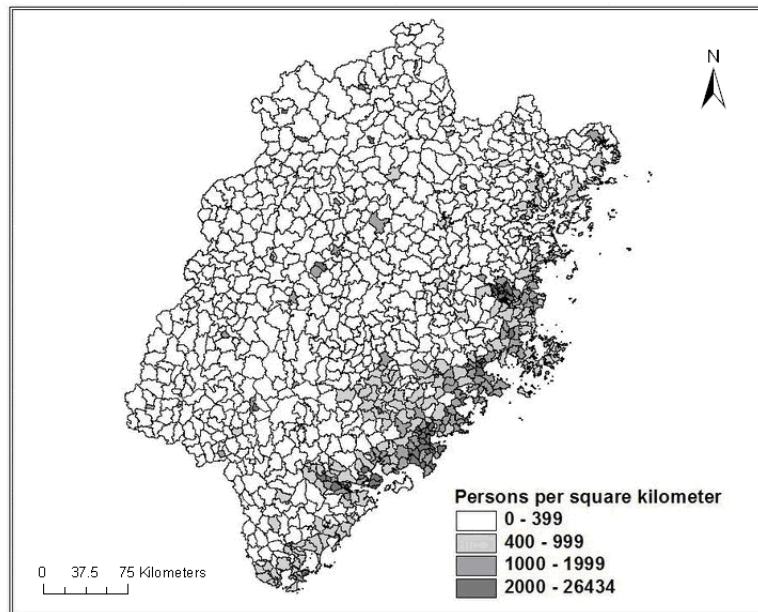
As Champion and Hugo (2004: 9) have noted,

“the fundamental distinction between urban and rural places is normally in terms of continuously built-up area, population density, and the economic and political functions carried out in those areas”.

The transformation of the economic and employment structure of Quanzhou has evidently contributed to an increase in the number of urban economic functions in the regions concerned, and even to an increase of political functions as a result of the emergence of an increasing number of newly designated cities and towns (Zhu, 1998; 2002). Yet this transformation is not the full story, as has often been perceived. These changes have also involved the accumulation of urban elements in the two other dimensions of urban functions, namely high population density and the development of continuously built-up areas.

Population size and density were already prominent urban issues in the coastal areas of Fujian Province well before the economic and employment transformation described above. As a mountainous province, the area of arable land in Fujian Province, mostly located in the coastal plains, makes up just 10-11% of the total land area, leading to dense settlements in the coastal region (Zhu, 1999). The high population densities observed in these settlements have been further enhanced by rapid population growth since the 1950s. As a result, villages with a population of 2,000 inhabitants are common in the coastal areas of Fujian Province, and the even larger *Piancun*, i.e. incorporated villages formed as a result of the expansion and connections linking these villages, had long been observed before the 1980s (Chen and Huang, 1991; Zhu, 1999). Rural settlements with a population size and density of an urban or quasi-urban area are therefore not unusual in these areas (Zhu, 2004). As indicated by Figure 3, several large areas in this region have a population density above 400 persons/km². In fact, at the time

Figure 3 – Population density of Fujian Province



Source: Based on 2000 Census data.

of the 2000 Census, the population density in the 27 coastal counties and municipalities was as high as 663 persons/km²; in Jinjiang, it even reached 2,279 persons/km², compared with an average population density of 1,000 persons/km² in the urbanized areas of the USA in 1990 (US Bureau of the Census, 1990, cited in Zhou and Shi, 1995), and 400 persons/km² as the density criterion for identifying urban territory in the US (Lang, 1986). Therefore, although many settlements in these areas are still considered to be predominantly rural, they have already accumulated urban elements in terms of population size and density. This key geo-demographic characteristic of the region is an important basis for *in situ* urbanization, thus reducing one of the fundamental distinctions between urban and rural areas in the coastal area of Fujian Province. To a large extent, this applies to the coastal area of China as a whole, since a preliminary estimate suggests that the rural population density of China's coastal zone has also reached a threshold of 400 persons/km² (McGranahan *et al.*, 2005).

So far the importance of high population density areas in China's urbanization process has not been paid sufficient attention, largely because of the view that the area with high population densities in the coastal region represents only a small proportion of China's land area. Indeed, the area of this coastal region in Fujian accounts for just 25% of the total area of Fujian Province. Yet very few observers have noted that although small in terms of surface area, coastal regions in both Fujian and China as a whole comprise the bulk of the population. In the case of the 27 coastal counties and municipalities of Fujian Province, their population accounts for 56% of the total population in Fujian Province, which suggests that *in situ* rural-urban transformation in this area will significantly affect the general process of urbanization in the province. In the case of China as a whole, Heilig's analysis (1997) shows that although the high population density (354 persons/km²) area accounts for just 30% of the country's land area, its population stands roughly at one billion, i.e. over 76% of China's total population. The trends observed in these high-density areas are evidently of critical importance for China as a whole.

Urban elements in terms of continuously built-up areas have also significantly increased during the process of rural-urban transformation. As noted elsewhere, after the initial stage of dispersed development at the bottom of the settlement hierarchy, some TVEs have tended to adopt more concentrated development patterns (Zhu, 2000), thus af-

fecting the process of urbanization in two ways. First of all, some TVEs in Fujian and in many other parts of China have tended to move to investment, industrial, and development zones, some of which are part of the built-up areas of designated towns or of their expansion. The inflow of foreign investment in rural areas since the late 1980s has further enhanced this trend. TVE development and foreign investment have also generated greater demand and provided capital for the development of public facilities, infrastructures, and service sectors (Zhu, 2004), all of which has contributed significantly to the development of urban elements in terms of 'continuously built-up areas', although these areas are located for the most part in small areas and towns. This has led to a further effect of *in situ* urbanization: the contribution to the development of an urban system with an increasing importance of the population of small urban centers, overshadowing the growth of large cities. This is evidenced in Fujian by the fact that during the period covered by the 1982-2000 Censuses, the increase of populations living in towns and the increase of populations in newly designated cities, which were transformed from towns, accounted respectively for 44.2% and 27.8% of the total increase of the population in 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.

2.2. The emergence and development of quasi-urban areas and populations

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

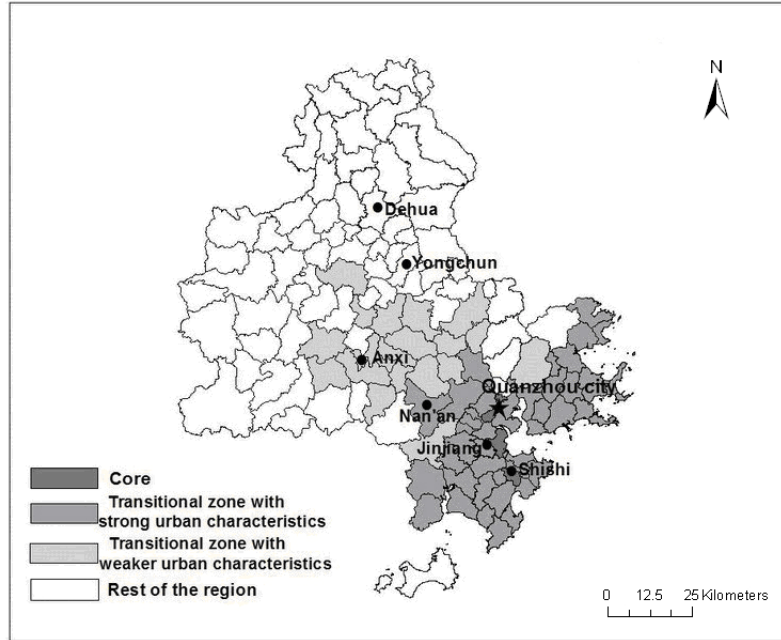
This analysis is based on the zonal approach used by Jones *et al.* (Jones *et al.*, 2000; Mamas *et al.*, 2001) in their study of several Asian mega-urban regions. They divided the mega-urban regions into three

zones: a metropolitan core, an inner zone, and an outer zone. While the core is completely urban, the inner zone has strong urban characteristics, and the outer zone is also heavily influenced by the urban core, though it has weaker urban characteristics. Adopting this approach, we will divide the Quanzhou city-region into four zones using the following criteria based on urban criteria used in the literature in both China and abroad (Lang, 1986; Zhou and Shi, 1995; Qadeer, 2004):

- Urban core: contiguous areas surrounding the city center with a population density exceeding 5,000 persons/km²;
- Transitional zone with strong urban characteristics: contiguous areas outside the core with a population density exceeding 1,000 persons/km² or a share of employment in agriculture below 30%;
- Transitional zone with weaker urban characteristics: contiguous areas outside the above zones with a population density exceeding 400 persons/km² and with a share of employment in agriculture below 60%;
- Remainder of the city-region: contiguous areas outside the above zones and still predominantly rural.

The results of the delineation for the Quanzhou city region are shown in Figure 4 and Table 1. One of the most important findings concerns the widespread area of the two transitional urban to quasi-urban zones in the city region and their significant share of the region's population. The area of the urban core accounts for just 0.7% of the region's total surface area. However, the area of the two transitional zones accounts respectively for 19.1% and 16% of the city-region's total area, and the combined area of the two transitional zones and the urban core is 3,888 km², thus accounting for 35.8% of the total area of the Quanzhou city-region. In terms of population, the important position of the two transitional urban to quasi-urban zones is even more significant. While the population of the urban core accounts for just 10.6% 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 respectively for 50.4% and 15.2% of the city-region's total population; 5.55 million (65.6%) of the population in the Quanzhou's city-region live in the two transitional zones and in the urban core. This is twice the urban population of 2.835 million in the Quanzhou city-region measured by conventional urban statistics provided by the 2000 Census, which suggests that apart from the urban population meeting the conventional urban criteria, there is a quasi-urban population of the same size that is not

Figure 4 – Quanzhou city-region and its zones



Sources: 2000 Census data; Quanzhou Statistical Yearbook (2000).

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

Zones	Area		Population	
	Km ²	% 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	1,736	16.0	1,105	15.2
Rest of the region	6,978	64.2	1,733	23.8
Total	10,866	100.0	7,283	100.0

Sources: 2000 Census data; Quanzhou Statistical Yearbook (2000).

covered by conventional statistics. Even stricter criteria are used 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, i.e. 1.6 times the urban population measured by conventional urban statistics. These results clearly suggest that conventional urban statistics provide an incomplete picture of the process of urbanization in Quanzhou, and are indicative of the significant role of transitional urban or quasi-urban zones in Quanzhou's spatial planning. A similar situation is apparent in other coastal areas of Fujian Province, albeit to a lesser extent. Clearly, the evolution of these transitional urban to quasi-urban zones needs to be closely monitored, and new planning approaches need to be developed to address this particular component of the process of urbanization.

3. Short-lived or long-lasting? The evolution of *in situ* urbanization in Quanzhou

As noted above, one key issue of *in situ* urbanization is whether it is merely a short-lived phenomenon or is instead a long-lasting trend. Evidence from Quanzhou appears to suggest that the latter is the case, and the evolution of *in situ* urbanization is an important factor shaping the future process of urbanization in China, at least in coastal areas.

Table 2, Figure 5 and Figure 6 show the development of TVEs, the major driving force of *in situ* urbanization in Quanzhou, and the distribution of their employees, in 1990 and 2004 respectively. Two trends can be identified based on the indications provided by the table and by comparing the two figures. First of all, the number of TVE employees has increased significantly. Despite long-standing doubts concerning the feasibility and desirability of TVE development and rural industrialization (for example see Kirkby, 1985: 230-244), TVE development has been sustained in Quanzhou. This is reflected in Table 2, which shows that during the 1990-2004 period, the number of TVE employees increased from 560,900 to 2,180,378, and TVE output value increased from 4,678.14 million Yuan to 295,844.82 million Yuan³. Although their development has once again accelerated since the late 1990s, TVEs still constitute the principal component of Quanzhou's economy, accounting for 50% of Quanzhou's employment and 80% of Quanzhou's economic output, which suggests that as the major driving force of *in situ* urbanization, TVEs as a whole have continued to develop.

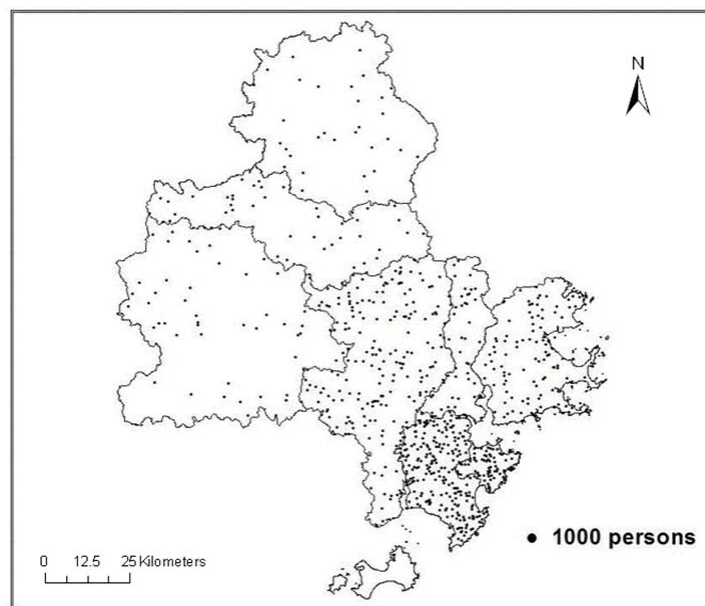
3. One US\$ was approximately 8.28 Yuan at the end of 2004.

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

Year	Number of TVEs	Number of TVE employees	Total output value (000s Yuan)
1990	62,625	560,900	4,678,140
1992	52,268	780,849	13,847,330
1993	67,258	1,018,948	31,060,990
1995	82,796	1,277,006	75,036,580
1996	93,750	1,346,954	103,079,060
2003	89,526	2,012,194	258,831,860
2004	103,910	2,180,378	295,844,820

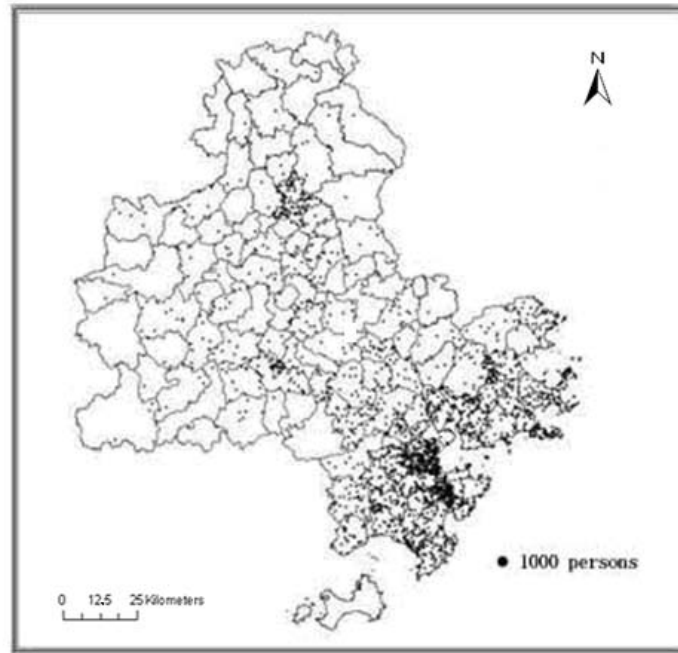
Source: Based on data from Quanzhou Statistical Yearbook (2005).

Figure 5 – The distribution of TVE employees in Quanzhou, 1990



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

Figure 6 – The distribution of TVE employees in Quanzhou, 2004



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

Secondly, the spatial distribution of TVE employees is still expanding. In 1990, most TVE employees were concentrated in rural areas in the vicinity of Quanzhou's urban core. However, 14 years later, their distribution had extended to more widespread areas, though they remained relatively concentrated in the area where TVEs originated in the early stages of their development. This spatial pattern of development is further confirmed by calculating the index of concentration (IC)⁴ using county-level figures concerning TVE employees and land

$$4. IC = 0.5 \sum_{i=1}^n / Xi - Yi /$$

where IC is the index of concentration; n is the number of county-level administrative units; X_i is the proportion of each unit's number of TVE employees to the total number of the city-region's TVE employees; and Y_i is the proportion of each unit's area to the total area of the city-region.

areas. The results show that the index of concentration was 0.45 for 1990 and 0.25 for 2004, which suggests that the development of TVEs at the end of the 1990-2004 period was spatially more dispersed than it was at the beginning of the period, and that centrifugal forces in favor of *in situ* urbanization still prevailed over centripetal forces in Quanzhou.

Analysis of the spatial distribution of Quanzhou's GDP and financial revenue is also consistent with the results outlined above. As Table 3 indicates, in the central urban districts the proportions of GDP and financial revenue accounted for less than 20% and 35% respectively of the total GDP and financial revenue in the 1990-2004 period, which suggests that over 80% of Quanzhou's GDP and 65% of its financial revenue were produced in the periphery of the city-region. Note also that the position of the central urban districts in the city-region has declined both in terms of GDP and in terms of financial revenue, despite some fluctuations. The process of *in situ* rural-urban transformation has thus not only transformed the employment structure of previously rural areas of Quanzhou, but has also been the chief source of Quanzhou's economic growth since the reform era, as well as the primary contributing factor to its new status as the number 1 economic powerhouse in Fujian. All of the above points suggest that there is still no indication that *in situ* urbanization will decline in the city-region of Quanzhou, thus further enhancing 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 returns to a more concentrated pattern, the legacy of long-term dispersed development will remain an important factor shaping the spatial pattern of Quanzhou's urbanization.

Table 3 – The proportion of GDP and financial revenue of central urban districts* in relation to the total GDP and financial revenue of the city-region, 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

*The central urban districts include the four urban districts directly under the administration of Quanzhou Municipality and located in or around the urban core.

Sources: Quanzhou Statistical Yearbook, various years.

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

Having examined the state and evolution of *in situ* urbanization in China's urbanization process, one issue is to define the exact nature of the mechanism that underlies these profound transformations, which are markedly different from conventional patterns of urbanization and at odds with conventional theories based on the experience of developed countries. In the Chinese context, there is a great temptation to attribute this transformation to various 'institutional factors', focusing in particular on the role of the *Hukou* system in preventing people from entering cities, especially large agglomerations, and policies promoting the development of TVEs (e.g. Zhao, 2002). The underlying argument is that China's *in situ* urbanization could only exist under unique institutional arrangements such as the *Hukou* system, and as soon as these institutional arrangements are removed, it will no longer persist. In addition to the deficiency of conventional urban statistics in covering *in situ* urbanization, this factor is another important reason why *in situ* urbanization has been neglected in urbanization studies and urban planning, since these institutional arrangements have been increasingly undermined by market-oriented reforms.

It is true that China's institutional factors, such as the *Hukou* system and other relevant policies, have contributed significantly to the process of *in situ* urbanization, which may explain why *in situ* urbanization is particularly developed in China. However, these factors only provide a partial explanation. Recent studies in some areas where *in situ* urbanization is well developed, including a study of the Quanzhou city-region, indicate that local people have little intention of moving to cities, and that this would still be the case even without the restrictions imposed by the *Hukou* system (Wang *et al.*, 2002; Zhu, 2002). Although the *Hukou* system still causes much inconvenience and implies many drawbacks for farmers moving to cities, it has become increasingly less so as China's reform and opening-up policies have been further implemented. However, the desire of people in the Quanzhou city-region to move to cities does not appear to have increased as a result. In a survey of 100 enterprises in Jinjiang Municipality and Huian County conducted in 2001, the majority of the 200 local employees (80%) answered negatively when asked whether they would migrate if there was

no restriction imposed by the *Hukou* system (Zhu, 2002). Still more recently, a study carried out in Southern Jiangsu by Shen and Ma (2005) identified a new process of '*de facto* urbanization from below', caused by the privatization of collectively owned TVEs and leading to the emergence and development of private enterprises and family workshops in 'urban villages', resembling the process of *in situ* rural-urban transformation observed in the 1980s in Quanzhou. In this case it is important to note that the demise of collectively owned TVEs, viewed as the legacy of the planned economy, far from preventing the emergence and development of 'urban villages', positively promoted the process, implying that this 'institutional factor' is not the fundamental cause of *in situ* urbanization. All of this suggests that in addition to 'institutional factors', more reasons need to be identified to account for the success of *situ* rural-urban transformation.

Although this is not an issue that can be easily resolved, many observers have increasingly insisted that the current process of urbanization in developing countries differs in two significant respects from the process of urbanization undergone by developed countries, namely high population densities and improved transport and communication conditions. These are certainly among the 'non-institutional factors' that have contributed to the process of *in situ* rural-urban transformation in China. As noted above, the population densities of many regions in the coastal area of Fujian Province, especially Quanzhou, are as just as high as the densities observed in the urban areas of the West. Furthermore, villages in these areas are often connected by well-developed internal road networks, which are themselves connected to large cities, and relatively cheap transport such as motorcycles, buses and trucks is increasingly available and affordable for local people. Such conditions mean that spatial concentration is less important in these areas than it was when developed countries were undergoing a process of urbanization, thereby enabling *in situ* settlement changes involving a transformation of the economic and employment structure in Quanzhou and other areas with similar conditions.⁵

Since high population densities and improved transport conditions are not unique to China, we may logically infer that *in situ* rural-urban transformation will not be restricted to China, let alone Quanzhou. In

5. For a more detailed examination of the roles of population density and transport conditions in *in situ* urbanization, see Zhu (2004).

fact, evidence of a 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 the concept of extended metropolitan region (EMR), elaborated in the late 1980s, is the *in situ* transformation of quasi-urban settlements adjacent to some Asian mega-cities, and the increasingly important role of local non-agricultural activities in the process of rural-urban transformation (Ginsburg, 1991; McGee, 1991). Examining this type of phenomenon, McGee and Ginsburg defined the concept of 'settlement transition', which implies 'the urbanization of the countryside without massive rural-urban migration' in the Asian context (Ginsburg, 1991; McGee, 1991).

Insofar as the applicability of the *desakota* model and EMR paradigm is still limited since they have been identified for the most part in the areas surrounding Asia's mega-cities, Qadeer's recent work (Qadeer, 2000; 2004) on 'ruralopolises' and 'urbanization by implosion' further enhances the universal significance of the process of *in situ* rural-urban transformation. Using evidence drawn primarily 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/km², comparable to the population densities in exurbs of western cities such as Los Angeles, New York or Toronto (Qadeer, 2004). Referring to rural regions as 'ruralopolises', Qadeer (2000; 2004) observes that they cover most of rural Bangladesh, an area of 311,200 km² extending from West Bengal to the outskirts of Delhi in India, and the coastlines of Kerala and Orissa provinces with an area of 56,000 km² in Pakistan. The existence and evolution of these settlement patterns further suggest that even in areas that are still predominantly rural in economic, social and institutional terms without the influence of large cities, unprecedented high population density alone is "the transforming force that invests rural regions with urban spatial characteristics", thus causing 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 the process of *in situ* urbanization in Quanzhou to ‘extended metropolitan areas’ and ‘ruralopolises’, there appear to be many similarities among them. *In situ* urbanization is not an isolated, short-lived, and unique phenomenon in China, but is instead part of recent and profound changes in human settlement systems generated by new conditions, which did not exist in the past in developed countries when these were undergoing a process of urbanization. In the case of Quanzhou, these changes have been further stimulated by the independent roles of local communities in initiating rural development, a factor often neglected in conventional urbanization and regional development theories (Zhu, 2002). From this perspective, *in situ* urbanization will continue to evolve, and its past and future development will have important theoretical and planning implications that merit further analysis.

5. Environmental implications of *in situ* rural-urban transformation

As noted at the beginning of this paper, one of the most serious concerns implied by the question of *in situ* urbanization is the negative impact on the environment. The author’s field investigation in Quanzhou appears to corroborate this concern, since there is widespread evidence of a whole range of types of pollution. However, a conclusive assessment of these consequences appears to be more difficult than is often imagined, and a fairly complex picture emerges from the comparative analysis of environmental indicators outlined below for Quanzhou, Fuzhou, and Fujian Province as a whole.

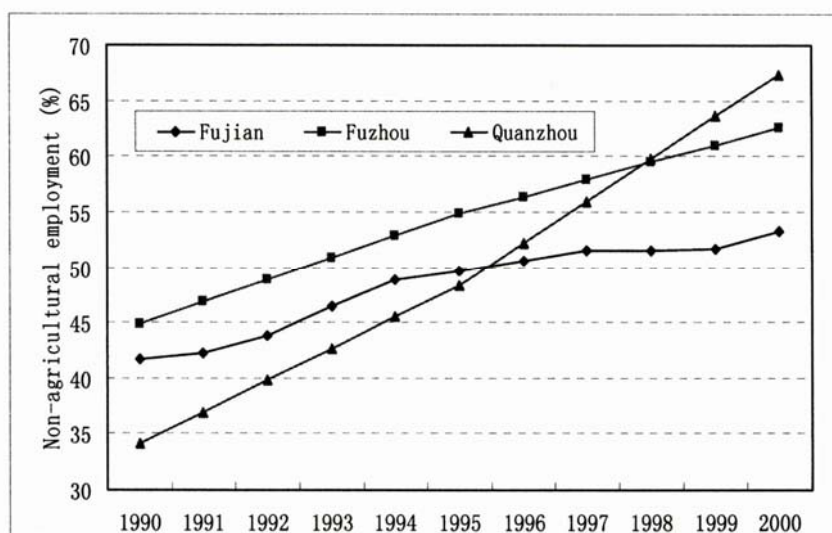
But before outlining the findings of the analysis, some data and methodology issues need to be addressed. First of all, any comparative analysis evidently requires a common benchmark. In the case of conventional urbanization patterns, the level of urbanization provides such a benchmark, so that environmental indicators of different areas can be compared to establish which performs better at the same level of urbanization. However, this is not reasonable in the case of *in situ* urbanization, since it is not adequately covered by conventional urban statistics, making it difficult to compare urban statistics in the areas with well-developed *in situ* urbanization with the statistics of areas

where conventional patterns of urbanization tend to be predominant. As an alternative, we will seek to compare environmental consequences with the level of non-agricultural employment as a benchmark. This appears to be a reasonable alternative, since transformations in the employment structure are the most important component of urbanization and the most significant result of *in situ* urbanization. Secondly, because of the lack of data, we are not able to conduct a spatially disaggregated analysis of the environmental consequences of *in situ* urbanization, and only those observed in Quanzhou as a whole can be analyzed. Thirdly, the environmental implications of *in situ* urbanization in Quanzhou are assessed by comparing indicators of Quanzhou with those of Fuzhou Municipality and Fujian Province respectively for several recent years when the share of non-agricultural sectors of employment in Quanzhou was the closest to those of Fuzhou and Fujian Province respectively. Although *in situ* urbanization also exists in the latter cases, it is less developed, and such comparisons may at the very least demonstrate whether an area with more developed *in situ* urbanization has more positive or more negative environmental consequences than those areas with a more conventional pattern of urbanization. The following analysis is founded on the assumptions outlined above.

Figure 7 indicates that as a latecomer, Quanzhou's share of non-agricultural sectors in employment has increased rapidly since the 1990s. It initially overtook Fujian Province as a whole between 1995 and 1996, before overtaking Fuzhou in 1998. Note that the share of non-agricultural sectors in employment in Quanzhou in 1995 was very close to Fujian Province in 1994, and that the share of non-agricultural sectors of employment in Quanzhou in 1998 was very close to Fuzhou in the same year. Therefore, in the following we will draw some comparisons between Quanzhou in 1995 and Fujian Province in 1994, and between Quanzhou and Fuzhou for the same year (1998), based on a range of environmental indicators.

The results of the analysis are rather surprising. Contrary to commonly held views, Figure 8 shows that all three major environmental indicators indicate that Quanzhou generated far less pollution both in terms of per non-agricultural employment and in terms of per 10,000 Yuan GDP than the provincial average when the share of non-agricultural employment was roughly 48.5% for Fujian Province as a whole in 1994 and for Quanzhou in 1995. The situation is more com-

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



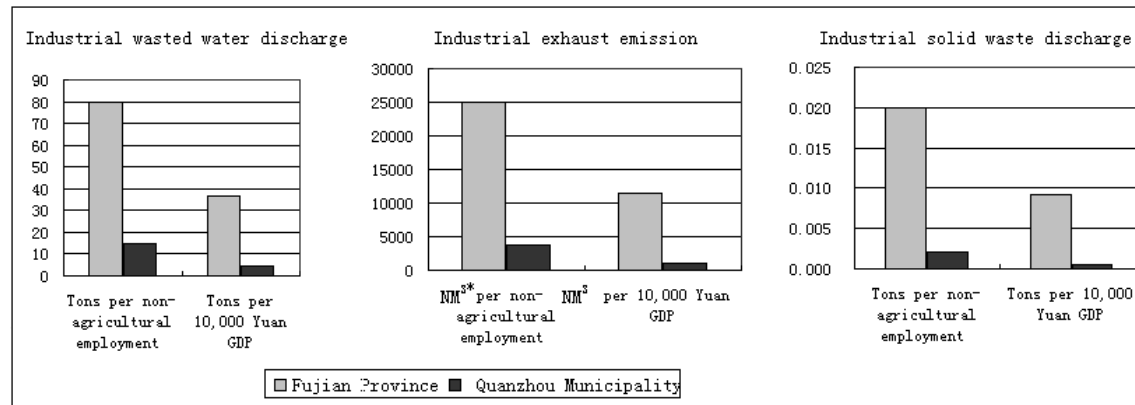
Source: Based on data drawn from the 1990 and 2000 Censuses and the 1995 micro-Census.

Figures for the years between the censuses are interpolated.

plex in the case of the comparison between Quanzhou and Fuzhou in 1998 (see Figure 9). However, there is still no clear indication that pollution in Quanzhou is more serious than in Fuzhou. In fact, on a per non-agricultural employment basis, Quanzhou's performance was still better both in terms of industrial waste water discharge and in terms of industrial exhaust emissions, although the differences between the two were far less significant than the differences between Quanzhou and Fujian Province. However, in terms of industrial solid waste discharge, Quanzhou produced far 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 respectively 37 times and 49 times higher than the same indicators in Fuzhou. This is the only indication from our analysis that is consistent with commonly held views.

The results of this analysis suggest that the environmental implications of *in situ* urbanization are more complex than is commonly imagined. While we have not found any clear evidence that *in situ*

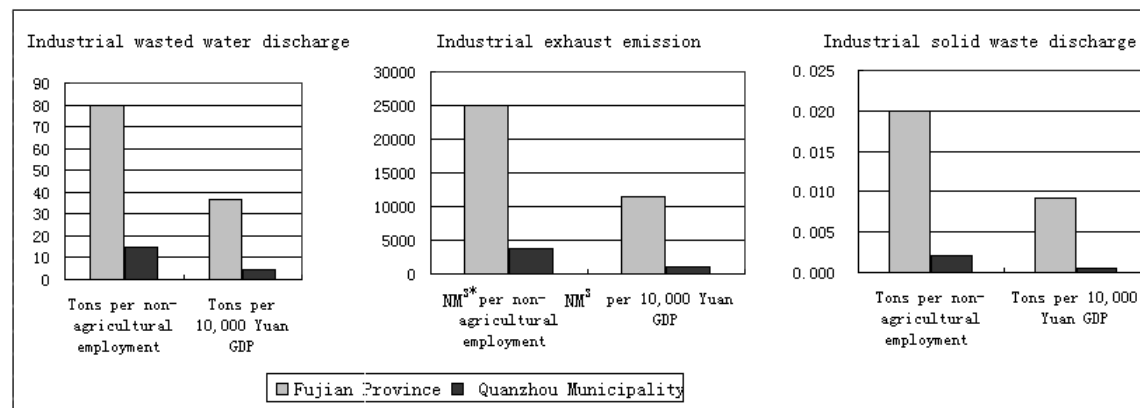
Figure 8 – Selected environmental indicators, Fujian Province (1994) and Quanzhou Municipality (1995)



* NM³ stands for standardized cubic meter.

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

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

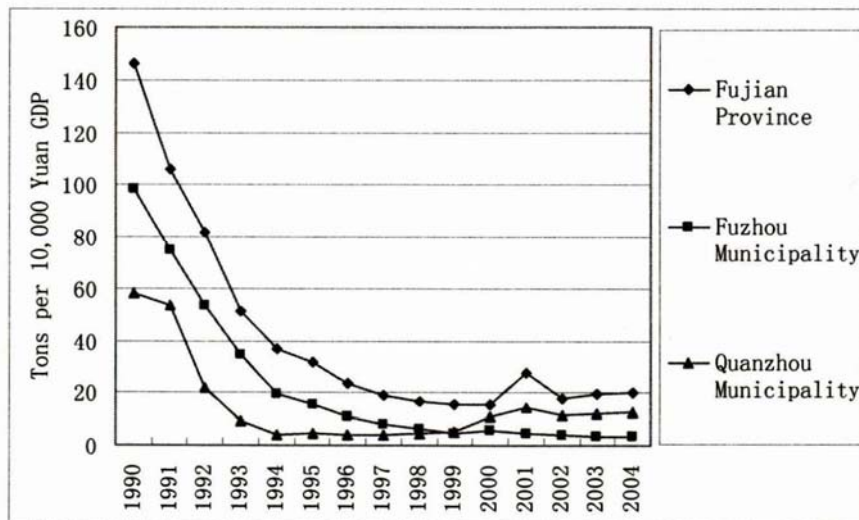


* NM³ stands for standardized cubic meter.

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

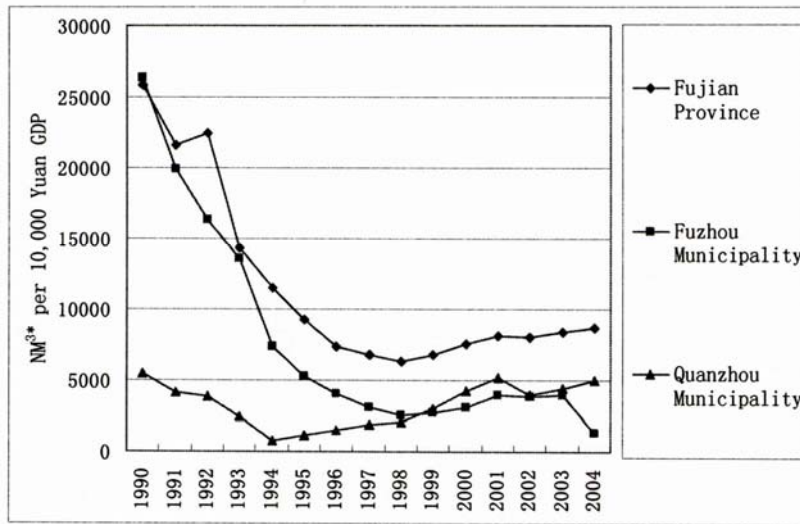
urbanization in Quanzhou has a more negative impact on the environment than more conventional urbanization patterns, we cannot draw the opposite conclusion that the effects of *in situ* urbanization on the environment are more positive than more conventional patterns of urbanization. This is not merely because different conclusions can be drawn depending on which environmental indicators are used, as in the case of Fuzhou, but also because these indicators are not stable and are still in the process of changing. As can be seen from Figures 10 to 12, in addition to an already higher level of industrial solid waste discharge, Quanzhou has also overtaken Fuzhou in terms of industrial waste water discharges and industrial exhaust emissions per 10,000 Yuan GDP since 2000, and in the long run it may have a more serious negative environmental impact than Fuzhou on all three criteria. This trend will need to be closely monitored, since it will have a significant environmental impact given Quanzhou's status as the number 1 economic powerhouse in Fujian. Besides, Quanzhou's data may tend to underestimate the negative environmental impact of *in situ* urbanization, since companies in Quanzhou are much more dispersed and environmental

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



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

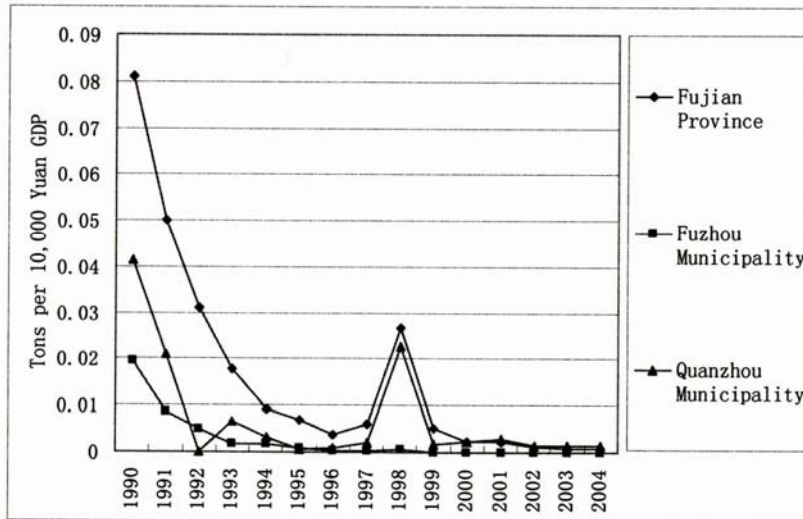
Figure 11 – Industrial exhaust emissions, Fujian Province, Fuzhou Municipality and Quanzhou Municipality, 1990-2004



* NM³ stands for standardized cubic meter.

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.

surveillance is more difficult; its environmental pollution tends therefore to be more underreported than in other cases such as Fuzhou. What all of this suggests is that although a comparative assessment of Quanzhou's environmental problems has so far remained inconclusive, there is no doubt that these issues remain one of the major concerns for the future development of Quanzhou.

6. Concluding remarks: Planning and environmental implications of *in situ* rural-urban transformation and policy recommendations

The significance and ongoing evolution of *in situ* urbanization, and the complex environmental consequences of this process, pose a significant challenge to conventional practices of urban planning. In fact, many of the issues related to *in situ* urbanization are not caused by urbanization patterns per se, but are instead the result of the inadequacy of conventional planning practices for dealing with this new form of settlement transformation. The significance of this new pattern of urbanization is by no means restricted to Fujian Province. While the growth of a number of major mega-cities in China, such as Shanghai and Guangzhou, has increasingly become the focus of urban development in China, one of the most important components is precisely the *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 centers is observed almost on a daily basis by Chinese urban planners in many rapidly developing coastal regions. It remains nonetheless a largely unresolved issue. Clearly, a new planning framework that goes beyond the city-centered, 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 this framework.

A planning framework of this kind could be conceived at two levels in order to incorporate different dimensions of *in situ* rural-urban transformation commonly neglected by conventional practices of urban planning. At the regional level, an integrated rural-urban planning approach needs to be adopted to accommodate the reality of a blurred rural-urban divide. Currently *in situ* urbanization is not adequately reflected by conventional urban statistics, and above all it is for the most

part not covered by the Urban Planning Act of the PRC, since the Urban Planning Act regulates urban planning only at the levels of designated towns and above. The quasi-urban areas and their populations examined in this paper are thus usually only viewed as a background for core urban areas in planning practices, and too little attention is paid to their needs in terms of infrastructures, public utilities, and their spatial relationship with the urban cores. In order to rectify this situation, a new Urban-Rural Planning Act is required to replace the current Urban Planning Act, and the basic planning unit needs to be changed from the city to the city-region, encompassing both the city core and the surrounding rural and quasi-rural areas that come under its influence. On this basis, a settlement system stretching from the urban core to the bottom of the 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 process of regional planning. A first step has already been taken to deal with this issue in China, since a draft Urban-Rural Planning Act was recently laid before the Standing Committee of the National People's Congress. However, there still remains much to be done to develop more technical details in order that these measures may become operational in real planning practices.

The second level of the new planning framework concerns a more detailed approach to the planning of quasi-urban areas and populations resulting from *in situ* rural-urban transformation. An approach such as this should be suitable for quasi-urban or even rural settings, by introducing and adapting urban elements accumulated in the process of *in situ* rural-urban transformation. Over three decades ago, Friedmann and Douglass (1975: 40) suggested the idea of "agropolis" or "city in the fields", arguing that "instead of encouraging the drift of rural people to cities by investing in cities", this 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 features of *in situ* rural-urban transformation, and can be taken as a basis for the planning of quasi-urban areas and populations. However, the limits of this approach, such as the limited importance it gives to non-agricultural development, will need to be avoided.

Unlike the conventional city-centered, dichotomous planning approach that pays little attention to rural residential systems since these tend to be 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 these areas. Rather than anticipating a migration of the majority of their residents to existing large cities and the disappearance of most settlements, this particular planning approach will focus instead on the adjustment of settlements within the existing systems, with a significant proportion of the existing residents remaining in the system, and a relative concentration of people and industries moving short distances to some growing settlements within the systems. As part of this process some sub-centers will develop on the basis of market towns, and seats of towns and townships, and even some big villages. These will constitute important parts of the overall residential system of the city region, and some of them will be closely connected both geographically and functionally with the development of the urban core, and should be taken into account in future development plans of the urban core. Since arable land is a precious asset 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 by way of complementing the already well developed non-agricultural activities. At the macro-level, the population and settlements under such residential systems are obviously more dispersed compared with traditional residential systems dominated by core cities, and their spatial structure bears some similarities to the recent polycentric urban form observed in developed countries.

At a micro-level, the development of such residential systems should be directed towards more a concentrated development process to make use of scale and agglomeration economies by way of ensuring greater efficiency in the administration of enterprises, land and infrastructure uses, and control of environmental issues. Such concentration has already begun, but there is still much potential, since rapid economic growth has increasingly reduced the constraints caused by the lack of capital for both the government and enterprises, which has prevented small enterprises from entering 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 these purposes. Apart from quasi-urban settlements 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 infrastructures and public utilities on the basis of the adjustment of industrial and settlement distribution towards relatively greater concentration in central villages.

The inconclusive assessment of the environmental impact of *in situ* urbanization reflects the complexity of the issues, and suggests that the discussion of such issues ought to extend beyond the spatial pattern of *in situ* urbanization that has often been taken as the main focus of discussion. 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 greater efficiency in environmental protection and management, as noted above, the economic benefits of *in situ* urbanization should not be neglected, since they provide much needed funding for environmental protection and management. Early government intervention in terms of the adjustment of economic structure and environmental regulations may also help to prevent an increase of negative environmental effects. All of this suggests that it is important for Quanzhou to seek a holistic and balanced approach in its future development, so that it may further benefit from *in situ* urbanization in terms of economic development while simultaneously minimizing any negative effects in economic and environmental terms.

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