

## Action Planning of Regional Green Land in Pearl River Delta

### 1. Introduction

The Pearl River Delta region comprises cities such as Guangzhou, Shenzhen, Zhuhai, Foshan, Jiangmen, Dongguan, Zhongshan, Huzhou and Zhaoqing. The total population in 2008 stood at 42.3 million, 61% of the total population of Guangdong Province; the combined GDP was 29.476 billion RMB Yuan (or 434.3 US dollars), which accounted for 10% of the national GDP. With a total land area of 41698 square kilometers; an urbanization rate at 80.5%; an average population density of 863 persons per square kilometer; the region has become the most urbanized and most intensively developed area in the entire China. Its total built-up area has reached 8790 squared kilometers which accounts for 16% of the total land area of the region. (fig.1)

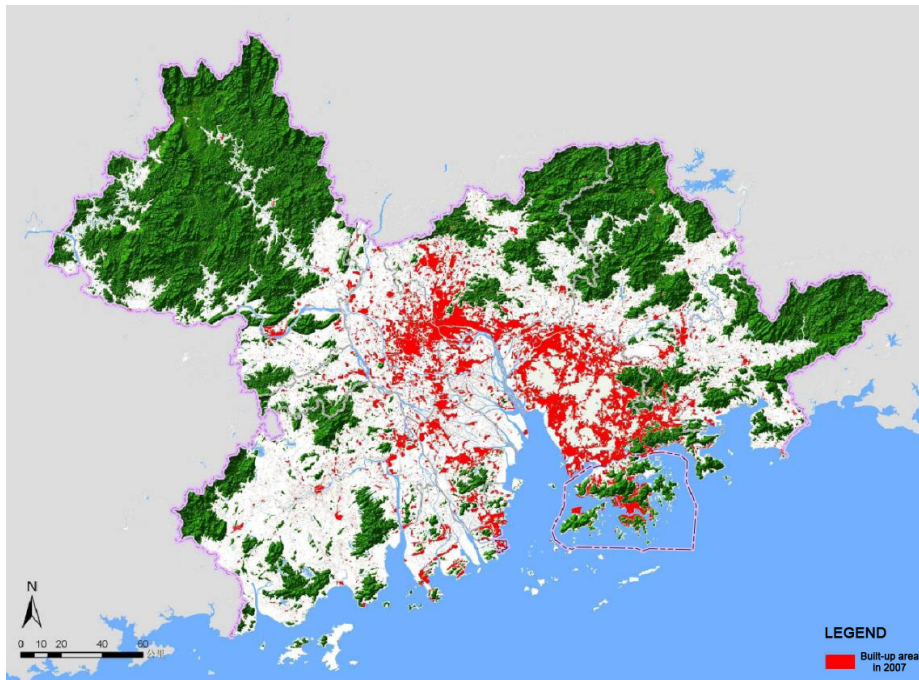


Figure 1: Built-up area in the Pearl River Delta (Source: Guidelines of the Greenway Network Master Plan in the Pearl River Delta)

Since 1979, the Pearl River Delta region has leaped in its social and economic development and has become one of the most vibrant and promising areas in the country. However, the long-standing problems still remain, such as the low land-use efficiency, the rapid and disordered urban sprawl<sup>a</sup>, substandard urban environment and the decreasing and encroaching of region green land area<sup>b</sup>, weak regional coordination mechanism etc.

Rapid urbanization in the area characterized by the traditional growth mode and disordered non-agricultural development has had a negative impact on the natural ecological environment. The resulted deterioration of the natural environment has greatly hindered the sustainable development of the region. Therefore, actions are needed to promote the transition

of economic mode and planning efforts should be made to build the green land and greenway network so as to improve ecological environment and the livability of cities.

By definition, regional green land in the research refers to those green open spaces indentified in the Pearl River Delta region which are subjected to permanently preservation and development restrictions and thus can help strengthen the local natural and cultural characteristics and improve the urban/rural environment.

The regional green land system comprises the ecological control areas and the greenway system. The former are those areas inside of the preservation boundaries as approved by the Guangdong Provincial Government; the greenway network comprises the ecological corridors and nodes specified in the Pearl Delta Green land System Planning which are mostly green open spaces which link the rural and urban areas and serve various functions such as eco-preservation, environmental protection, environmental education and recreation. Among them, the provincial greenways are those inter-city ones which are approved by the provincial government based on the application of the local government.

To facilitate the implementation of the greenway planning, the provincial government has put forward various regulations such as the Working Guide for Greenway Development in the Pearl River Delta (2009.12), Guidelines of the Greenway Master plan (2009.01), Guidelines for the Greenway Management (2009.05), Technical Code for the Greenway Construction (2009.02).

## **2. Zoning and Planning of Regional Green land**

### **2.1. Criteria of Zoning**

The major factors considered in the zoning include resource availability, policy requirement and local needs etc.

#### **(1) Resource availability**

The zoning of regional green land should first take into consideration resource conditions, such as natural ecological condition, urban form and road system etc.

The planning should take advantage of natural elements such as rivers, valley, mountains and connect the representative historical settlements, traditional street blocks and cultural heritages; make use of existing roads or obsolete railway tracks as trails for pedestrian and bicyclists. The green land should be in proximity with cities and thus accessible to residents.

The major natural elements include rivers, mountains, farmlands, gardens and coasts. Generally, they represent biodiversity, unique landscape and ideal destination for recreation. The routing of greenways should prioritize these areas.

The Pearl River Delta is surrounded by mountains in three sides and the sea in one direction while the inland river reach comprises multiple water bodies such as the Xijiang, Beijiang and Dongjiang rivers. With the dense, interconnected water ways, the region boasts a unique South China landscape characterized by fish ponds, farmland and gardens. Hence, priority should be given to the waterfront areas in the zoning. (Fig.2)



Figure 2: Ecological resources in the Pearl River Delta (Source: Guidelines of the Greenway Network Master Plan in the Pearl River Delta)

The current natural reserves, scenic resorts and forest gardens should be included and linked in the zoning of the regional green land and greenway system.

The broad rural farmland is an important ecological basis and green space in the Pearl River Delta besides the mountains and rivers. In 2008, farmland accounts for 77% of the total land area in the Delta, out of which 58% is used for the growing of major crops. The abundant rural resource offers opportunity for eco-tourism.

Hence, the regional green land planning has incorporated the vast peri-city farmland area as well as the coastal scenic areas including the beaches; islands and the 8 mouths with connect the Pearl River to the sea.

The cultural elements mainly comprise heritage and relic sites, historical villages. The Pearl River Delta is an important origin of Lingnan Cultural and modern revolution. It boasted various relic sites, folk architecture, modern and contemporary buildings (Fig.3). The zoning of green land and the routing of greenway should link these cultural elements.

## (2) Planning policies

Upper level plans and regulations are important factors in the zoning, such as the Plan for the Coordinated Development of Pearl River Delta Urban Cluster, Land-use Planning of Guangdong Province (2006-2020), Guideline for the Pearl River Delta Environmental Protection (2004-2020), Revised Planning of Pearl River Delta Intercity Railway System, Planning of the Main Functional Area of Guangdong Province etc.



Figure 3: Cultural resources in the Pearl River Delta (Source: Guidelines of the Greenway Network Master Plan in the Pearl River Delta)

These plans put forward policies and regulations for regional development in terms of regional development objective, development scale, urban system, ecological and environmental protection, regional transportation system etc. The zoning of the regional green land should be based on these plans so as to identify the constraints thus coordinate the regional green land zoning with the rural-urban built-up area, regional ecological system and the transportation network planning.

### (3) Local appeal

A preliminary plan of the Pearl River Delta greenway network is made based on the natural resource condition and policy requirements and suggestions are made by city authorities. Meetings are convened between and inside of the three major metropolitan areas, namely the Guangzhou-Fushan-Zhaoqing; Shenzhen-Dongguan-Huizhou; Zhujiang-Zhongshan-Jiangmen areas.

Field surveys are made on the routing of the greenway and public opinions are solicited. The regional green land and greenway plan is then made which comprises 4410 square kilometers of ecological preservation area, a general greenway system with 6 main routes, 4 connecting routes, 22 branches. The eco-preservation area stands for 8% of the total regional area with a total greenway length of about 2140 kilometers.

## 2.2. Making of the regional green land planning

The green land planning comprises two levels, the regional level and the city/county level. The two levels are made simultaneously in a coordinated manner and are integrated with the land-use planning, main functional area planning etc. The making of the plan is organized by the provincial urban planning authority.



(1) Content of the regional plan

Based on Coordinated Development of Pearl River Delta Urban Cluster, the plan sets out the spatial structure and layout of the green land, identifies the regional green land preservation area and provincial level greenway; the plan also puts forward quantitative regulations for green land area, green land ratio, density of provincial level greenway and these regulations are then broken down to various cities and counties as restrictive index; the plan identifies the general administrative area and joint administrative area by the province and cities, administrative policies and requirements so as to promote green land preservation and provincial greenway construction; the plan also provides guidelines for city/county level green land planning so as to facilitate the realization of regional green land planning as well as the zoning and administration of the city/county green land planning; further, the plan offers the general framework, construction standard, coordinating measures and the implementation procedures of the provincial greenway system so as to ensure its realization. (Fig.4)

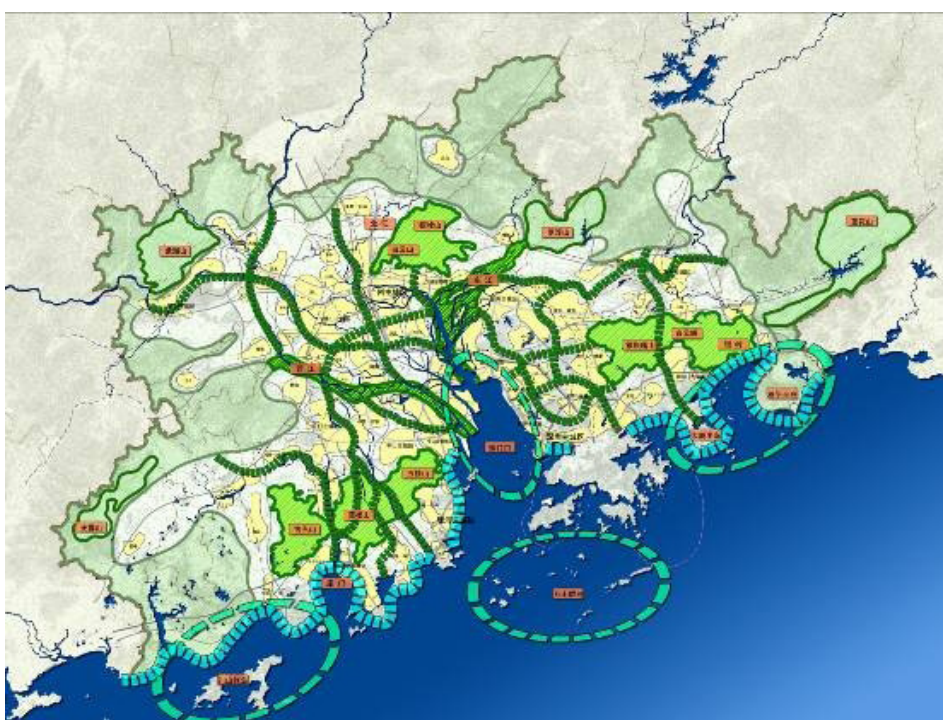


Figure 4: Ecological Structure Plan in the Pearl River Delta (Source: Plan of the Concentrate Urban Areas in the Pearl River Delta)

(2) Content of the city/county level plan

In accordance with the Regional Green land Plan of the Pearl River Delta, the plan specifies the green land index and layout requirements, draws the preservation boundary for the regional green land and provincial level greenway so as to locate the preservation area into various sites; the cities/counties set out green land regulation policies in accordance with their own local conditions so as to facilitate effective protection; the plan also puts forward managerial measures to strengthen green land preservation in the province-city joint regulatory areas and implementation measure to ensure its realization.

### 2.3. Plan approval

#### (1) Approval of the Regional Green land Planning

Before submitting for approval, the draft plan should first be publicized by the Provincial Department for Housing and Urban-Rural Planning to solicit public opinion and then review by expert panels and related departments; after the review, the plan should be publicized on major provincial media and government websites for public opinions; the plan may then be submitted by the Provincial Department for Housing and Urban-Rural Planning to the provincial government for approval; within 30 days after the approval, the plan should be published on major provincial media and government websites. The approved plan should be integrated into the Coordinated Development of Pearl River Delta Urban Cluster as a specialized plan and its main conclusions should be implemented as compulsory elements.

#### (2) Approval of the city/county green land planning

City/county green land planning is organized by the local government. Before submitting for approval, the draft plan should first be publicized by the local government to solicit opinions of other departments and the public and then reviewed by provincial urban planning authorities. Once it passes the review, the plan should be published on major local media and government websites to solicit public opinion.

City/county green land planning should be submitted by the local government to the provincial government for approval; within 30 days after the approval, the plan should be published on major local media and government websites, for joint regulatory areas, the plan should be published on major provincial media and government websites. Also, the plan should be submitted to and registered by the provincial urban planning authority with 60 days after the approval. The major conclusion of the plan, such as the ecological



Figure 5: Plan of the Regional Greenway Network (Guangzhou section) in the Pearl River Delta (Source: Greenway Network Plan of Guangzhou City)

preservation boundary and the regulatory index system should be incorporated into the urban master plan as compulsory guideline for future planning and the must-have content when the provincial urban planning authority reviews the master plan of a city. (Fig.5)

### **3. Regulation of the regional green land**

Strict control should be practiced in the regional green land areas and greenways.

The supervision and regulation of the regional green land comprise different levels and categories. Various administrative authorities such as construction, land-use, environmental protection, reform and development, agriculture, forestry, water resource, ocean and fishery departments, along with the local governments, are jointly in charge of the regional green land supervision and regulation in accordance with the related laws, regulations and codes.

Jointly administrative areas are supervised by the provincial construction authority and the local government; an annual report is to be published on major provincial and municipal level newspapers.

General administrative areas are supervised by the local governments; specific measures are to be tailored and adopted according to local conditions.

Provincial greenways are to be jointly constructed by the province and cities. Local government files application to the provincial government; after approval, the greenway can be constructed in accordance with the construction standard set by the provincial construction authority; upon completion, it is to be inspected by the provincial construction authority; once accepted, it is maintained and administrated by the local government and regularly inspected by the provincial construction authority.

With 12 months after the approval of the city/country green land planning, the local government should identify the ecological regulation boundary by setting landmarks.

Within the boundary various activities are prohibited such as the blocking of waterways, soil extracting and quarrying, disposal of sewage, exhaust gas, noise and solid waste, tree cutting, hunting wild animals etc, except for the construction of necessary national, provincial and municipal level facilities.

Within the boundary, the Floor Area Ratio (FAR) of any given hectare of land for tourist facility development should not exceed 0.2; the paved floor ratio should not exceed 10% while the floor area for food and reception should be no more than 20% of the total floor area of the tourist facility.

For the existing buildings within the ecological boundary, if they are legitimate and bear no negative impact on ecological preservation, they may be retained but are not to be modified expanded or rebuilt, the use rights of the land may be reclaimed when leasing period expires; for those having a negative impact, they should be converted to low resource and environment consumption uses such as research and development, ecological agriculture, cultural tourism, creative industry etc, the ones can not be converted should be relocated.

The existing rural settlements in the ecological boundary should be relocated and built uniformly. For those have to be rebuilt on-site, the size of land use and built-up area should not be increased.

### **4. Construction of the regional greenway**

Greenway is a linear green open space which is usually built along natural or man-made corridors such as riverside, valley, mountain ridge, scenic road etc, it provides recreational routes for pedestrian and bicyclist and connects major parks, natural reserves, scenic spots, historical sites and urban/rural settlements.



#### 4.1. Types of regional greenway

The major three types are ecological greenway, suburb greenway, and urban greenway.

##### (1) Ecological greenway

This type refers to those greenways located mainly in rural areas for ecological and bio-diversity preservation and natural sight-seeing purposes. With a total length of 348 kilometers, the ecological greenway connects ecological resources such as mountains, forests, water reservoirs etc; it serves not only as wildlife habitats and migration corridor, but ideal destination for activities such as scientific education, recreation, sports and outdoor exploration. It provides an ecological space for urban and rural residents to understand, contact and enjoy nature; therefore, it is conducive to the preservation of local landscape features, ecological equilibrium and security.

##### (2) Suburb greenway

This type refers to those greenways located in the suburban area so as to reinforce urban-rural ecological connection and to satisfy the recreational needs of urban residents. They are mainly located in the interim area with a total length of 884 kilometers. Suburban greenway connects ecological recreational spots such as forest parks, holiday resorts, scenic areas, wild parks etc, which provides not only spaces for sports events, agricultural experiencing activities, festival and local cultural event, picnics, but also recreational spaces for urban residents to enjoy urban conveniences and rural landscape and recreation. Furthermore, they can effectively prevent the disordered urban sprawl, improve the landscape quality of urban areas and the peripherals, restore the local agriculture of rural area and reshape the rural landscape

##### (3) Urban greenway

This type refers to those greenways located in the urban area which aim to improve urban environment and serve as amenities to facilitate outdoor activities of urban residents. They are mainly located in various urban central areas with a total length of 458 kilometers. Urban greenways provide spaces for restaurants, shopping, cultural exhibition, recreation, sight-seeing and sports so as to create a green, quiet, convenient recreational space for urban residents in the hustle and bustles of cities thus improve the living standard of the urban residents, add to the land value of it surroundings, promote urban commercial development and the revitalization of old urban districts, enhance urban vitality and attractiveness,



Figure 6: Categorization of the Regional Greenway Network in the Pearl River Delta (Source: Guidelines of the Greenway Network Master Plan in the Pearl River Delta)



stimulate urban consumption and increase urban employment. (Fig.6)

#### 4.2. Construction regulation in regional greenways

Table 1 shows the construction regulation and requirements for various facility and amenities in regional greenway development including transportation facilities, administrative facilities, commercial facilities, recreational facilities, scientific & educational facilities, security facilities, environment sanitary facilities and other facilities. (Fig.7)



Figure 7: Plan of the Inter-city Service Areas of the Greenway Network in the Pearl River Delta (Source: Guidelines of the Greenway Network Master Plan in the Pearl River Delta)

Table 1 Construction regulation in regional greenways

Construction allowed		
Type of facility	Basic items	Other allowed items
transportation facilities	Low-speed pathway (pedestrian lane, bicycle lane, general low-speed lane) Interchange transit facility (bridge, ferry dock) Parking facility (public parking lot, taxi stops, bus stop etc.)	Boat riding lane, over-water walkway, tourist boat dock, shuttle bus stop (lots)
administrative facilities	Administrative centre, tourist service centre	—
commercial facilities	Kiosk, bicycle rental, eatery	Mobile vending counter, outdoor coffee, outdoor sports gear shop
recreational facilities	Cultural and sports field (children's playground, public exercising field, basketball field), rest spot	Park, outdoor camping, picnic, fishing, golf exercise, grass skiing, horse-riding, manege performance, recreational sports centre, sports club, swimming, water racing, rafting, rock climbing, bungee jumping, cross-country
scientific & educational	Science promotion facility, interpreting facility, exhibition facility	Educational column, commemoration building, exhibition building, birds and wild life observation, meteorological

<i>facilities</i>		<i>observation, geological observation, ecological landscape observation, ancient trees and rare plants species observation</i>
<i>security facilities</i>	<i>Security and fire extinction, first-aids, safety precaution, barrier-free facility</i>	<i>Medical care, water rescue, watch-out tower</i>
<i>environment sanitary facilities</i>	<i>Toilet, garbage can, sewage collection</i>	<i>Ecological and environmental-friendly sewage treatment facility, fix-point sewage interception facility</i>
<i>other facilities</i>	—	<i>Lighting, water supply, sewage disposal, power supply and telecommunication, state, provincial or municipal road and transportation facility and public amenity</i>

(Source: Compiled by author)

### 4.3. Construction standard of regional greenway

Basic Technical code for the Construction of Regional Greenway in the Pearl River Delta sets out specifications for the construction of the green corridor system, low-speed pathway system, transit interchange system, service facility system, visual identity system. (Table 2)

Table 2: Construction standard of regional greenway (provincial level) of the Pearl River Delta

<b>System</b>	<b>Elements</b>	<b>Standards</b>
<i>Green corridor system</i>	<i>Green buffer</i>	<i>(1) width of ecological, suburban greenway</i>
	<i>Green isolation belt</i>	<i>(1) width (2) clearance</i>
<i>Slow-speed pathway system</i>	<i>Walkway</i>	<i>(1) minimum width (2) paving (3) sloping (4) barrier-free</i>
	<i>Bicycle lane</i>	<i>(1) width (2) sloping</i>
	<i>General slow-speed pathway</i>	<i>(1) width</i>
<i>Transit interchange facility</i>	<i>Linking facility</i>	<i>(1) links to rail, road and parking (2) integration of greenway with urban bridges and tunnels</i>
	<i>Parking</i>	<i>(1) public parking lot (2) taxi stops (3) bus stops</i>
<i>Service facility system</i>	<i>Administrative facilities</i>	<i>(1) administrative facilities including the administrative center (2) tourist service center</i>
	<i>Commercial system facility</i>	<i>(1) commercial service facility (2) souvenir shop, photo shop, convenience store, outdoor tourist gear shop, vendor machine, mobile kiosk (3) bicycle rental (4) snack store, fast food, beverage stop, outdoor coffee etc.</i>
	<i>Recreational facility</i>	<i>(1) Recreational facility (2) Sports and cultural activity (3) Rest place</i>
	<i>Scientific &amp; educational facility</i>	<i>(1) Scientific &amp; educational facility (2) Means of promotion (3) Interpreting facility (4) Exhibition facility</i>
	<i>Security facility</i>	<i>(1) Security points (2) Fire prevention and extinction facility (3) First aids (4) Railing facility (5) Barrier-free facility</i>
	<i>Environmental sanitary facility</i>	<i>(1) Toilets (2) Garbage cans</i>
<i>Visual identity system</i>	<i>Information sign</i>	<i>(1) location (2) standard (3) spacing</i>
	<i>Road sign</i>	<i>(1) text content (2) location (3) material</i>
	<i>Regulation sign</i>	<i>(1) content (2) material (3) spacing</i>

<i>System</i>	<i>Elements</i>	<i>Standards</i>
	<i>Caution sign</i>	<i>(1) location (2) size and content</i>

*(Source: Compiled by author)*

## 5. Conclusion

The pearl delta region has witness a miracle of economic development and has become one of the densest and most urbanized metropolitan areas in China. At the same time, it has been challenged by problems such as ecological deterioration, environmental pollution and disordered urban development. The crowing high-rise buildings, indifferent neighborliness make the people long for the garden life-style. To solve these problems, Guangdong Province has begun a series of effective explorations since 1994.

In 1994, Guangdong was the first province to have identified Ecological Sensitive Areas, which is aimed at the non-built-up areas in the province from the perspective of spatial restriction. In 2001, it pioneered the concept o Regional Green land, aimed to practice permanent protection and development restriction over green open spaces which bear important natural, cultural and regional significance. In 2006, the legal status of the regional green land was establish through provincial regulations and since, regional green land planning has become and integral part of the urban-rural planning in Guangdong. The aim of the plan is to defend the bottom-line for natural ecology in the Pearl River delta through strict supervision and regulation. In 2009, greenway construction was proposed as a measure to realize the ideology of optimizing development through ecological preservation. After 15 years of exploration and practices, Guangdong has achieved evident results in establish a greenway network which bears multiple functions such as ecological and environmental protection, education and recreation etc. It represents a major step forward towards the objective of creating a fine living environment, enhancing urban-rural environment, coordinating the development of the Pearl River Delta.

Over the years, Guangdong has put forward the planning guideline and construction standards for the greenway network planning, which have effectively guided the greenway development of various cities. A development mode of greenway network has been initially established, characterized by the guidance of the province, construction and implementation by local governments, co-ordination and assistance by related departments and social sectors. Up to December 2010, a total length 2372 kilometers of greenway has be established by Pearl River Delta cities. As the first example of establishing a complete and systematic ecological protection scheme on the regional level, the experience of the Pearl River Delta can be drawn upon and extended to other regions.

## Reference:

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[4] Department of Housing and Urban Rural Construction Guangdong Province. Administrative Stipulation on the Planning of the Regional Green land in the Pearl River Delta, (2010.05) Guangzhou, Guangdong

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**Note:**

a. Over the past 20 years, the land area used for construction grew by an annual rate of 11%. Based on the current scale of urban development, it is estimated that by 2020, the land area used for construction will exceed 30% of the total land area, out of which, the land are used for manufacturing may go beyond the ceiling of a reasonable top line; in 2008. The average output of the land area used for construction stood at 350 million Yuan per square kilometers, far below the average of those in developed urban areas in the world.

b. The crude mode of construction has resulted in the disorder of urban residential, industrial and agricultural areas. The regional green land has become increasingly fragmented thus the urban image needs to be improved. With the deterioration of the living environment, leisure spaces, clean air and water have become scarcity; environmental facilities are relatively lagged behind. In 2008, the rates of residential sewage and solid waste treatment stood at 55.9% and 63.9%, far below the average of those in developed urban areas in the world.

c. According to the Coordinated Development of Pearl River Delta Urban Cluster (2004-2020), the resident population in the region by 2020 is projected at 65 million. The plan also identified an urban spatial structure comprises one ridge, three belts and five axis, a three-level urban center system of regional center, municipal center and local center. At the same time, based on the natural ecological structure and urban/rural development conditions, the plan has established a regional green land framework and an ecological structure of one ring, one belt, three cores and networked corridors by using the mountains and rivers in the region as the backbone.

d. Based on the actual condition of its natural resource, environment, and social development, the Planning of the Main Functional Area of Guangdong Province has classified the land area of the province into four major functionary areas, namely, the optimal development area (which amounts to 10.89% of the total land area of the province), main development area (49.25%), restricted development area (34.00%) and development prohibited area (5.86%).

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