Developing greenways under a top-down institutional structure: a case study in the Pearl River Delta, China

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Introduction

Greenways are linear open spaces and networks of lands that are planned, designed and managed for ecological, scenic, recreational and cultural purposes (Little, 1990; Ahern, 1995; Fabos, 1995; Erickson, 2004; Jongman & Pungetti, 2004). Greenways are commonly structured by natural or human-made features such as rivers, ridgelines, railroads, canals or roads (Erickson, 2004). In the international greenway movement, greenways no longer had only a beautification and recreational function, but expanded to multiple objectives, such as habitat protection, flood hazard reduction, water quality improvement, historical preservation, education and interpretation (Searns, 1995; Tan, 2006). Moreover, the concept of greenways shows high compatibility with diverse forms, which is "a route which is good from an environmental point of view" (Turner, 1998).

In China, the modern greenway movement started in 2010, when Guangdong Provincial Government initiated a three-year political campaign to construct the Pearl River Delta (PRD) Greenway Network. In 2014, the PRD greenways had a total length of 8,909 kilometers, connecting all 46 districts/counties in the PRD metropolitan region. The PRD Greenway Network has been assumed to be a feasible and low-cost approach to tackling with Chinese urbanism issues. Consequently, it is becoming an influential model for the greenway development at the national scale. Eleven provinces in China have recently planned or implemented provincial greenways, and many cities are working on municipal greenways.

The development of greenways is beginning to stimulate the growth of greenway literature in China. Most of existing studies focus on early efforts and visions of greenway functions and benefits based on western experiences (Yu, Li, & Li, 2006). However, there is a lack of comprehensive profile of the rapidly developed greenways. Therefore, this paper will review the forms, functions and qualities of greenways based on a series of case studies.

The Emerging of Greenways in the PRD

The Pearl River Delta (PRD) metropolitan region is a delta area composed of nine municipalities in Guangdong Province. It is the leading economic region in China and accommodates over 57 million populations. After the economic reform in 1978, the PRD enjoyed a rapid development which is characterized by foreign-investment-induced urbanization, rural industrialization and polycentric spatial form (Xu & Li, 1990). However, environmental and social issues are less concerned than economic growth, especially at the regional level (Vogel, Savitch, Xu, Yeh, Wu, Sancton, Kantor, Newman, Tsukamoto, Cheung, Shen, Wu, & Zhang, 2010).

To coordinate regional relations, a series of regional plans have been developed since the 1990s by the provincial government. However, due to the conflicts of interest between province and municipalities, conventional regional plans had an ineffective influence on local planning activities, while most of the plans were only guidance to municipal master plans (Cai & Zhu, 2006). In 2010, the Guangdong Province Government issued a new version of the regional plan, *the Integration Plan of Urban-rural Planning in the Pearl River Delta (2009-2020)*. The greenway network turned out to be the most influential part.

The greenway network was the Provincial Priority Project. It has clear development agenda and evaluation system. Moreover, Yang Wang, the secretary of Guangdong Provincial Government, made an emphasis on the greenways by saying: "*It is necessary to see the greenway development as a kind of governing performance. ⋯ Greenway is a new test of the governing. If greenway fails, it means there are problems in their governing ability." (Yang Wang, February 2010)*

With the strong top-down political mobilization, a unique regional institutional structure was formed to develop greenways. There are three levels of greenway promotion and implementation, including the provincial, the municipal and diverse basic units (such as district, town, county and street/community office). The provincial governmental agencies were the primary promoter, and initiated the first regional greenway plan and supervised greenway development. The municipal governments were responsible for detailed greenway planning, organization and sometimes some financial support. The basic level authorities are responsible for implementing the plans and to maintain the greenways, which are the most important actor. The basic level authorities received top-down assignments and transform existing resources into greenway space. In many cases, they also provided the finance support for both implementation and maintenance.

The timeline was the key factor, which required the greenways to be "connected in one year, developed in two years, and facilitated in three years". Besides, the length-oriented assignment and evaluation system also helped to improve the efficiency of greenway development. For each year, there were clear assignments for each municipality, which were soon subcontracted to lower level authorities until the assignment reached the basic level units. Moreover, there was a kind of competition on greenway length at each level, as a special governing performance.

With both strong leadership and high efficiency, thousands of greenways were accomplished in a few years. However, considering the fragmented landscape, there are still some questions to be answered: 1) How do the greenways incorporate in the intensively developed metropolitan area? 2) Is there enough supporting landscape or natural views along the greenways? 3) How does the institution influence the space of the greenways? This paper will fill in the mentioned research gap by using Shenzhen and especially four districts as an in-depth case study. It aims at learning the forms, functions, and qualities of Chinese greenways, and also possible influence of institutional arrangements on the greenway.

Methods

Multi-research methods were used to collect data, including in-depth fieldwork, document collections, semi-structure interviews, questionnaires, and mapping. First, during 2013 and 2015, we conducted a series of semi-structured interviews with key actors of the PRD greenways, including governmental officials in the provincial and municipal government agencies, key planners and experts, and local community/village leaders. The contents of the interviews included the roles of key actors involved in the development of greenways and conventional regional planning, their relations with other actors, and their opinions on institutional arrangements and greenway planning.

Second, several periods of in-depth field trips were conducted to collect first-hand data, including 1) a three-day-200-kilometre riding in greenways from Guangzhou to Shenzhen, 2) overall field investigation in Shenzhen with over 3,000 photographs of 2,400 kilometre greenways, and 3) over 1,000 copies of questionnaires about using greenway in four sites of Guangzhou. Third, in order to visualize the distribution and features of greenways, we established a GIS database of the PRD greenways, in which Shenzhen is the core with detailed greenway attributions (e.g. the location, the pavement and the management agency).

Shenzhen Case Study

Greenways in Shenzhen

Shenzhen is a special case of post-reform urbanization and urbanism in China. Its population increased from 200,000 to over 10,000,000 within 40 years. Shenzhen developed over 40% of its land to support the rapid growth. The original landscape, which was primarily farmlands, forests, and ponds, are now removed and isolated by the intensively built-up urban areas. The remaining natural landscape has been protected by the Basic Ecological Control Line since 2005, which is almost all the existing landscape to support greenways.

During 2010 and 2015, over 2,400 kilometers have been implemented in Shenzhen, accounting for over 25% of the PRD greenways. According to the official plans, the greenways are classified as provincial greenways (13%), municipal greenways (38%) and community greenways (49%). The provincial greenways were planned in the provincial plans, as the framework of the greenway network. The rest were promoted as length-oriented assignments in the political campaign. In the end, 782 kilometers greenways were the "top-down" assignment, while more greenways were products of local planning and development in the inter-city competition.

Figure 1. Shenzhen greenways and ecological protected areas (Source: Shenzhen Greenway Map 2014 and Ecological Controlled Line 2013)

The Chinese greenway movement made an emphasis on new recreational spaces, such as the Shenzhen Bay Park, the Fenghuang Mountain Forest Park, Futian River Park and the Yantian Costal Greenways. Some of them were newly developed or opened in the greenway movement. Some of them were original public parks and now are connected by greenways. These spaces are

now well-received weekend and holiday recreational resources. They provide valuable public open spaces for outdoor activities (e.g. cycling, jogging and fishing), which are the mark of a new lifestyle in China.

However, only some 30% of the greenways are planned inside the Basic Ecological Control Lines. The others have been planned in urbanized areas utilizing transportation corridors (usually motorized road and sidewalks) as potential greenway space (fig.1). These urban greenways are usually products of urban beautification initiatives, which are combinations of sidewalk pavement, street trees and planted vegetation. They are commuting routes rather than recreational or ecological areas. However, the commuting function is rarely mentioned in existing literature, especially when there is potential damage to recreational and ecological values of greenways. Therefore, there is a need to profile the greenways in Shenzhen for an overall review.

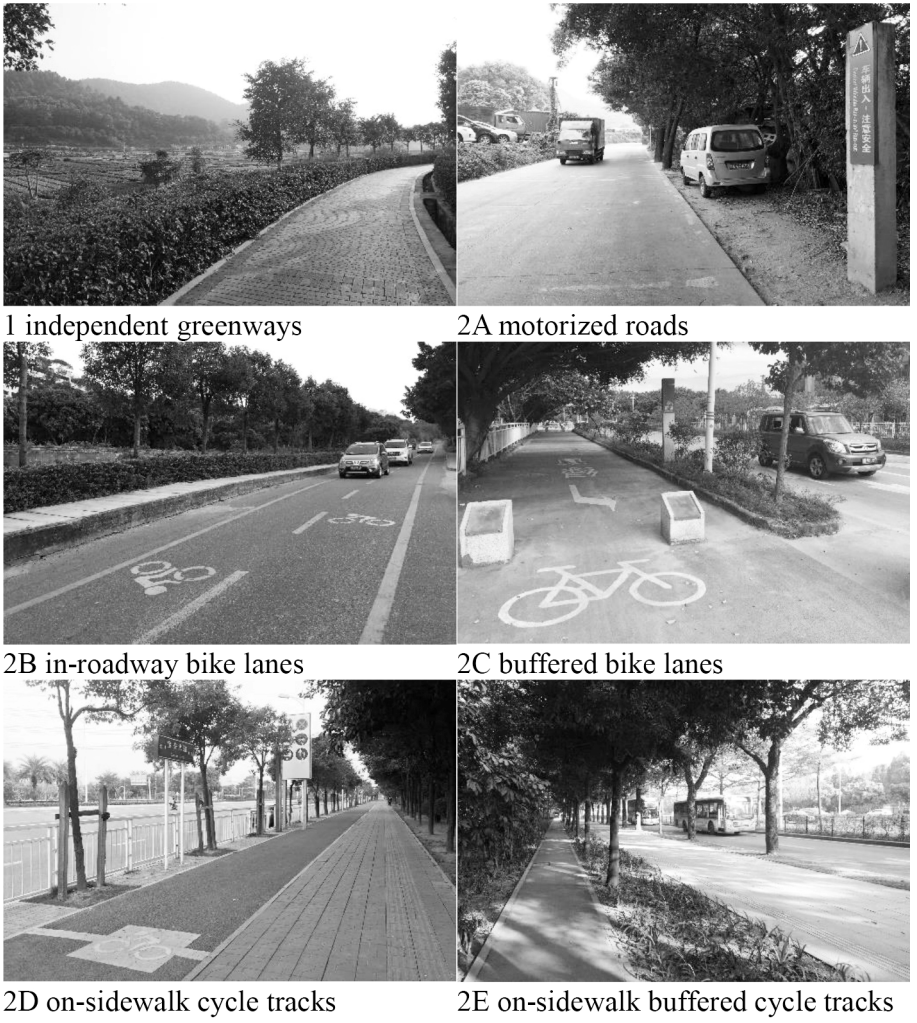
Greenways relying on road system

Based on our field investigation, in Shenzhen there are two types of greenways, which are 1) independent greenways and 2) in-roadway or on-sidewalk greenways. Independent greenways are non-motorized routes pass through existing parks or undeveloped areas that are traffic free. There are some supporting landscape and open spaces (e.g. forest, riverside and farmland) along them, but less population density. In-roadway and on-sidewalk greenways are urbanized routes in or along motorized roads, as a part of the road system. Considering the intensively built-up environment, there is insufficient natural environment along them, but only planted vegetation.

Moreover, considering the diverse condition of non-motorization, these greenways could be further subdivided as greenways on: 2a) motorized roads, 2b) in-roadway bike lanes, 2c) buffered bike lanes, 2d) on-sidewalk cycle tracks, 2e) on-sidewalk buffered cycle tracks (see fig.2). Some greenways cannot provide safe pedestrian or cycling space, while vehicle-pedestrian mixed traffic still dominated, such as 2a) greenways on motorized roads and 2b) motorized road with bike lanes. Some are actually sidewalks along motorized roads, such as 2d) sidewalks without buffered bike lanes, 2e) sidewalks with buffered bike lanes. In general, these greenways neither provide access to natural environment nor recreational benefits. They are traffic space planned as bike lanes, while coherence, safety and comfort of cycling need to be strengthened.

We chose four administrative districts of Shenzhen, including Futian, Baoan, Guangmin and Dapeng Districts, as further in-depth investigated area to test the proposed typology. There are in total 764 kilometers greenways,

accounting for some 1/3 of Shenzhen greenways and 1/10 of the PRD greenway. The result (table.1) shows that independent greenways only account for 8%. However, the on-sidewalk greenways are the majority, accounting for over 70% of greenways in investigated districts. It means that most of the greenways are distributed along motorized roads. Considering the interference of motorized traffic, there might be more benefits in daily commute and urban beautification, and less improvement in recreational or environmental resources.



1 independent greenways 2A motorized roads

2B in-roadway bike lanes 2C buffered bike lanes

2D on-sidewalk cycle tracks 2E on-sidewalk buffered cycle tracks

Figure 2. Typical greenway spaces in Shenzhen

Table 1. The composition of greenways in investigated districts

	independent greenways (km)	in-roadway and on-sidewalk greenways (km)				
		a)	b)	c)	d)	e)
Provincial Greenway	48	11	2	4	106	7
Municipal Greenway	3	0	0	0	126	44
Community Greenway	12	38	27	48	266	21
In total	63	49	28	52	498	73

Discussion and Conclusion

This paper introduces the background and institutional relations of the PRD greenways. Then it concludes 6 types of the greenways based on a series fieldwork in the PRD, and case studies in Shenzhen. This research further examines the proposed typology with data in 4 investigated districts. The result shows that many PRD greenways are highly interrelated with the traffic network. The commuting function, rather than recreational and ecological, are more obvious in most greenways in the investigated cases. As a result of the top-down decision making, greenways show both the efficiency of the system and drawbacks of the rapid development.

It is a unique phenomenon in the international greenway movement, and also increasing rapidly in China. There are some similar key factors, including the worldwide greenway movement, the fragmented local landscape, the institutional arrangement and the need for non-motorized traffic in the PRD. The fragmented landscape determined that there is limited natural space in the metropolitan area, especially in the core areas. Greenways require either existing green corridor or newly reclaimed landscape to pass through. Each option is overlooked in the tight schedule, when ecological and environmental initiatives might need long-term efforts. Meanwhile, quality of space was less concerned in the length-oriented assignment and evaluation. The local actors tended to maximize the length and minimize the cost of the investment and land resources. Therefore, decision makers chose the common “green” “way”, the streets with well-developed greening, as greenway spaces.

The increasing commuting greenways also reflect an urgent need for improvement in non-motorized traffic. For a long time, motorized traffic, rather than walking or cycling system, have been a dominated method to organize urban functions. The development of greenways are responses to both the defective non-motorized traffic system, and the rising awareness of green traffic. It may explain that some greenways have similarities with cycling tracks in the Europe. But even if the broad greenway concept can be expanded

to cycling routes, the PRD greenways still have many to learn in safe, comfort and efficient cycling space design. More research on recreation, ecology and environment are also needed for long-term greenway uses.

References

Ahern, J. (1995). Greenways as a planning strategy. Landscape and Urban Planning, 33 (1–3): 131-155. doi - 10.1016/0169-2046(95)02039-V.

Cai, Y. & Zhu, G. (2006). Insight into the development of the coordinated development planning of extended metropolitan region in Pearl River Delta from the perspective of implementation. City Planning Review, 30 (6): 9-14.

Erickson, D. L. (2004). The relationship of historic city form and contemporary greenway implementation: a comparison of Milwaukee, Wisconsin (USA) and Ottawa, Ontario (Canada). Landscape and Urban Planning, 68 (2–3): 199-221. doi - 10.1016/S0169-2046(03)00160-9.

Fabos, J. G. (1995). Introduction and overview: the greenway movement, uses and potentials of greenways. Landscape and Urban Planning, 33 (1–3): 1-13. doi - 10.1016/0169-2046(95)02035-R.

Jongman, R. H. & Pungetti, G. (2004). Introduction: ecological networks and greenways. In R. H. Jongman and G. Pungetti (Eds.), Ecological Networks and Greenways: Concept, Design, Implementation (pp.1-6). Cambridge: Cambridge University Press.

Little, C. E. (1990). Greenways for America. Baltimore: Johns Hopkins University Press.

Searns, R. M. (1995). The evolution of greenways as an adaptive urban landscape form. Landscape and Urban Planning, 33 (1–3): 65-80. doi - 10.1016/0169-2046(94)02014-7.

Tan, K. W. (2006). A greenway network for Singapore. Landscape and Urban Planning, 76 (1–4): 45-66. doi - 10.1016/j.landurbplan.2004.09.040.

Turner, T. (1998). Landscape Planning and Environmental Impact Design. London - Bristol, PA: UCL Press.

Vogel, R. K., Savitch, H. V., Xu, J., Yeh, A. G. O., Wu, W., Sancton, A., Kantor, P., Newman, P., Tsukamoto, T., Cheung, P. T. Y., Shen, J., Wu, F. & Zhang, F. (2010). Governing global city regions in China and the West. Progress in Planning, 73 (1): 1-75. doi - 10.1016/j.progress.2009.12.001.

Xu, X. & Li, S. (1990). China's open door policy and urbanization in the Pearl River Delta region. International Journal of Urban and Regional Research, 14 (1): 49-69. doi - 10.1111/j.1468-2427.1990.tb00820.x.

Yu, K., Li, D. & Li, N. (2006). The evolution of Greenways in China. Landscape and Urban Planning, 76 (1–4): 223-239. doi - 10.1016/j.landurbplan.2004.09.034.