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# Greenway System in Guangdong: The Past and Future

MA Xiangming

*Guangdong Urban & Rural Planning and Design Institute, Guangzhou 510290, Guangdong Province, China*

**Abstract:** Through reviewing the greenway system in Guangdong Province, China, this paper summarizes the role and significance of the greenway system development in the Pearl River Delta. The implementation of greenway system in the Pearl River Delta has shown an excellent collaboration between the technology and politicians. While promoting the development of the greenway in China, the development of the greenway system in the Pearl River Delta also made two milestones. The greenway system has significantly changed the supply of urban open space, provided accessibility to the countryside for city residences, and initiated the transformation of urban development patterns in the Pearl River Delta. Greenway system in Guangdong exhibits three trends of development: 1) integrating greenway with residences' health needs at road functional level; 2) making greenway compatible with the local historical and cultural background at context level; 3) matching greenway with the local natural environment characteristics at ecology level. **DOI:** 10.13813/j.cn11-5141/u.2019.0005-en

**Keywords:** greenway planning; sports and leisure; natural environment; history and culture; historic trail in south Guangdong; Guangdong Province

## 1 Overview of greenway construction in Guangdong Province

The concept of greenways was introduced into China as early as 1985, while the practice was commenced with the construction of the Pearl River Delta Greenway Network in 2009 [1]. By the end of 2012, the nine cities in the Pearl River Delta had completed the construction of 2 372 km of provincial greenway [2]. The construction of the greenway network in the Pearl River Delta has played a positive demonstration role, as evidenced by the launching of characteristic greenway planning and construction activities in more than ten provinces, municipalities and autonomous regions, such as Beijing, Zhejiang and Anhui since 2010. In 2016, the Ministry of Housing and Urban-Rural Development of the People's Republic of China promulgated the *Guidelines for Greenway Planning and Design* at the national level [3]. Looking back at history, Frederick Law Olmsted's practice of "Emerald Necklace" in Boston [4] marks the beginning of greenways in the world. Similarly, the greenway practice in the Pearl River Delta is of vital importance in promoting the greenway development in China.

In the context of the 2008 world financial crisis, the construction of the Pearl River Delta Greenway Network showed an example of seamless integration of technical and administrative forces in Guangdong Province. The Pearl River Delta Area actively participates in the global division of labor relying on its low cost and becomes a manufacturing base with world influence. However, the urban sprawl brought about by decentralized industrialization in the 1990s has aroused the concern of experts and scholars about the deterioration of the regional ecological environment. Based on the concept of ecologically sensitive area introduced into the Pearl River Delta Urban Agglomerations planning in 1994, Guangdong Province learned from the experience of the United Kingdom to formulate the *Guidelines for Planning of Regional Green Land* and proposed the concept of greenways in 2009 which introduced walkways or bike-ways in the ecological corridor for public use [5]. This technical concept was finally included in the agenda of the top decision-makers of the provincial government through cooperation with the Provincial Policy Research Office. In February 2010, *Greenway Network Planning Outlines of the Pearl River Delta* was approved by the Guangdong Provincial Government and was implemented immediately. This unique background has left two imprints in the greenway practice of Guangdong Province.

1) The imprint of North American's greenway ecological characteristic at the technical level

Literature [2] pointed out after comparison that the definition of greenways in Guangdong Province evolved from Charles Little's definition. Indeed, American's concept of greenways was referenced in the study and formulation of greenway technical guidelines and in the preparation of plans in Guangdong Province. By comparing the *Benchmark Technical Regulations of Regional Greenways in Guangdong*

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**First author:** MA Xiangming (1964–), male, from Nanxiong, Guangdong Province, Master's degree, senior planner, chief engineer, is mainly engaged in the research on urban planning. E-mail: gdxmma@qq.com

 

*Province* and the *Guidelines for Greenway Planning and Design* published by the Ministry of Housing and Urban-Rural Development of the People's Republic of China, we can make it clear that the Guangdong greenway shows an obvious ecological characteristic in terms of the concept and technical regulations [6].

2) The imprint of the government promotion in the implementation stage

The government played a key role in the construction of the massive Pearl River Delta Greenway Network, which was completed in only three years. Guangdong Provincial Government's directive of "focusing on the implementation and ranking based on the outcomes" has maximized the government's ability of resource organization and mobilization in the greenway network construction. Although the construction is highly efficient, there are still many problems [6]. For example, the greenway construction throughout Guangdong focused on highlights and neglected the whole and emphasized quantity but ignored quality. In addition, the understanding of the greenway was limited to non-motorized transportation system [7]. The built greenways lacked diversity, and the greenway consisting of many common roads cannot guarantee the specificity of walking and cycling [8]. Therefore, Literature [2] pointed out that although the Pearl River Delta greenways were conceptually derived from the United States, they were actually more like United States' trails after they were built [9].

The completion of the greenway network has added a new landscape to the Pearl River Delta Area. In 2012, the Pearl River Delta Greenway Network won the Dubai International Award for Best Practices to improve the living environment [9], highlighting its important role in improving urban human habitats.

## 2 Significance of greenway practice in Guangdong Province

### 2.1 Adding a new supply mode of urban open space and providing accessibility to the countryside for city residents

Constant gathering of population in cities leads to spatial congestion, which adversely influences residents both physically and psychologically. The construction of open spaces such as parks and green spaces has become a measure to moderate urban aggregation. However, under China's institutional arrangements, the supply of urban parks and green spaces has always been achieved by converting agricultural land into non-agricultural construction land and converting rural collective-owned land into state-owned construction land. Therefore, the construction of parks and green spaces is not only expensive due to costly land acquisition but also problematic since it involves the resettlement of villagers and the land use quota set by the land administration department [5]. The proposal of greenway construction is an innovation in the supply of urban open space in China. It breaks the limitation that urban parks and green spaces can only be built on urban non-agricultural land and expands the supply of urban open space to vast rural areas outside the city.

With the adjacency between the countryside and the city and inspired by the human nature to be close to nature, we find that outskirt space provides opportunities for residents to be exposed to a more natural environment. Raymond Unwin in the UK fully realized the importance of undeveloped land in suburban areas to residents and proposed that the undeveloped open land in suburban areas could be transformed into open space by increasing recreational facilities, thus conceptualizing the "Green Belt" in London [10]. However, China's land management system differs significantly from that in the UK, resulting in the separation and estrangement between urban and rural areas. Under the unified sign, the greenway provides residents with a safe and reliable access to the countryside. The improvement of accessibility and openness makes the green space around the city an integral part of the urban open space. At the same time, the greenway network provides opportunities for rural leisure tourism to develop by connecting urban and rural landscape resources and points of interest and provides a path for the two-way communication between urban and rural areas [5].

### 2.2 Transforming the green space from decentralized layout to distributed layout through greenway connections

Urban resources are limited. When the total green space is fixed, the centralized and decentralized layouts of green spaces have completely different effects. The decentralized layout is more conducive to the residents' daily use, but the green spaces' forms and functions tend to be single because of the small size, thus affecting the user experience. The green space planning in China has been emphasizing the combination of "spot, line and area" for the green space layout, in which the "spot" refers to parks, while the "line" is not clearly defined.

In the field of computer science, the distributed computer system achieves the coordination of processors with different functions and resource sharing by distributing the tasks processed by the central processor to corresponding processors. Its key is to connecting distributed computers into a system. The first true greenway was built in Boston, USA in 1867 by Olmsted—the "Emerald Necklace" project, which linked four parks together [2] and transformed the four scattered parks to a distributed park system. The greenway plays an important role just like the communication path in a distributed computer system, which connects different nodes to realize the inter-working and sharing of node resources.

Therefore, if the "spot" in the green space layout principle of combining "spot, line and area" is compared to a park, the greenway is the "line". By connecting green spaces with the greenway, we can upgrade the scattered parks to a distributed park system.

## 2.3 Green space being no longer an urban embellishment

Urban parks and green spaces have historically been regarded as a good medicine to treat the "disease" of urbanization. This understanding has made city governments strengthen the construction of parks and green spaces. On the other hand, the understanding of parks and green spaces being a "placebo" of urban problems [11] has led to the popularity of artistic garden design in parks and green spaces. It has become the tradition of park and green space design to cultivate residents with the art of gardens and the beauty of landscapes. The forms and functions of Chinese parks are deeply influenced by the first generation of urban parks–Beijing Royal Gardens and Suzhou Private Gardens. They are manifested by the principle of varying sceneries with changing view-points highlighted in the design of parks and green spaces and the common method of using winding and rugged paths to organize tourists to experience the designed beautiful scenery.

The greenway advocates the fitness and recreational use of green spaces. It encourages the urban green space design to focus more on the fluency and continuity of human activities and further promotes physical activities through the smooth connection of non-motorized paths. Because of the greenway, green spaces are more closely integrated into the residents' daily life. Urban green spaces not only bring people aesthetic visual enjoyment and improve the urban ecological environment but also promote the health of residents by encouraging physical activities. Ecological protection is no longer a grandiose narration that is not related to the public but to provide useful and accessible space for them.

## 2.4 Switching to a new urban development mode

### 2.4.1 Life and ecological landscape becoming the infrastructure for urban development

Since the 1980s, Guangdong Province has been dominated by export-oriented economy in its economic development. It is oriented to promote urban growth by meeting the needs of investors with infrastructure constructions and industrial park developments, showing the obvious characteristic of "planning for growth" [12]. The impact of the world financial crisis has seriously challenged the export-oriented low-cost expansion mode. The greenway construction reflects that meeting the investment demand is no longer the first priority in urban development, which returns to the city's original mission of serving residents.

The greenway network is a linear corridor with comprehensive functions that integrates ecology, landscape and residents. It is not a traditional production-oriented infrastructure. The use of landscape as a medium to intervene in cities should be understood in the context of continuous transformation of industrial cities [11]. The Guangdong Provincial Government mentions the construction of the Pearl River Delta Greenway Network and the Rail Transit Network of Pearl River Delta in the same breath and treats them as the two focuses to enhance regional competitiveness. The new landscape displayed by the greenway has become the infrastructure of urban development, marking the transformation of the urban development mode in Guangdong Province.

### 2.4.2 The combination of top-down and bottom-up modes being a new exploration of regional governance

The establishment of the Pearl River Delta Economic Zone in 1994 ushered in the history of Guangdong Province's management of regional development. However, both the 1994 edition of the *Modernization Construction Plan of the Pearl River Delta Economic Zone* and the *Reform and Development Plan Outlines of Pearl River Delta Region (2008–2020)* showed that the government-led management of regional development is a top-down mode. The idea to build a greenway network in the Pearl River Delta was promoted by the joint report of the Policy Research Office of the Guangdong Provincial Government and the Department of Housing and Urban-Rural Development of Guangdong Province, which is also a top-down product. However, the foundation of the decision to build the greenway network came from the local practice to promote self-driving tours in Zengcheng City. The mutual support between the upper and lower levels in the decision-making process demonstrated the change of regional governance in the Pearl River Delta.

The planning of the greenway network in the Pearl River Delta is a product that combined the efforts of the upper and lower levels. Specifically, the province determined the general route direction. Each city detailed its own route segment, and the province integrated all segments into a network. This interaction between the upper and lower levels provided an opportunity for local governments to integrate local resources and characteristics into the whole under the overall framework. The construction of the greenway network is also a product of such interactions. Specifically, the province provided the plan and technical guidance, and the cities were responsible for constructions, which was promoted by the province through on-site supervision and the publication of progress reports [13].

The organizational mode and work method of "interactions between the province and local governments and coordination of the upper and lower levels" were formed in the planning and construction of the Pearl River Delta Greenway Network. It not only ensured the integrity of the greenway concept in the Pearl River Delta but also made a breakthrough in the problems in previous regional planning, such as low participation of local governments and difficult implementation of the concept. The work mode of "interactions between the province and local governments and coordination of the upper and lower levels" has raised the awareness of local governments and the public and formed vibrant local knowledge. It showed quite different results in the construction of the greenway network compared with other government-led constructions and promoted the public's awareness of the

 

public space's quality and the improvement of the level of social institutions [14]. After three years of implementation and assessment, the construction of the Pearl River Delta greenway has not come to an end. For example, Guangzhou is upgrading and renovating the greenway. The outdoor activities of the public are active, and greenway related activities organized by social welfare organizations start to emerge. These positive results have a far-reaching impact on the future regional development and management of the Pearl River Delta, as manifested by the "Guangzhou-Shenzhen Sci-tech Corridor Planning" launched in 2017.

## 3 Development trend of greenways in Guangdong Province

After the vigorous construction from 2010 to 2012, the development of greenways in Guangdong Province presents three new trends: 1) integrating greenways with residents' health needs at the functional level; 2) making greenways compatible with local historical and cultural background at the context level; 3) matching greenways with the local natural environment characteristics at the ecology level.

### 3.1 Integrating greenways with residents' health needs at the functional level

Modern cities are highly dependent on motorized transportation, which leads to sub-health problems caused by inactivity such as obesity. After the 1960s, developed countries turned their attention to public health issues [15] in urban planning. In 1996, the US National Recreation and Park Association (NRPA) promulgated *Park, Recreation, Open Space and Greenway Guidelines*, advocated adding sports facilities to parks and classified greenways and trails into one category [16].

More and more Chinese people are flocking to cities in the process of urbanization. Among the emerging affluent urban residents in China, the growth rate of overweight and obesity is higher than that in developed countries [17]. The rise of marathons in Chinese cities shows that a growing number of residents are gaining interest in outdoor sports. Among the greenways built in the Pearl River Delta, the most popular ones are those suitable for cycling and running, such as Shenzhen Bay Greenway, Guangzhou Bio-island and Higher Education Mega Center Greenway. Guangzhou built jogging tracks as a way to upgrade the existing greenways and launched the "Golden Route" plan in 2017 to build a special 30-km-long jogging track on both sides of the Pearl River [18]. This reflects that the greenway in the Pearl River Delta Area gives more prominence to the function of sports and leisure.

### 3.2 Making greenways compatible with local historical and cultural background at the context level

After the completion of the Pearl River Delta Greenway Network, Guangdong Province immediately deployed the extension of the greenway network to the peripheral areas. In May 2012, the *Master Plan of the Greenway Network in Guangdong Province* (*2011–2015*) [19], compiled by the Department of Housing and Urban-Rural Development of Guangdong Province, was promulgated and implemented. However, the Guangdong Provincial Government determined in 2013 that the delimitation of the ecological control line should be used to promote the regional ecological system. After that, it was no longer urgent at the policy level to promote the construction of the regional ecological network through the provincial greenway network, leading to the tepid situation of the greenway construction outside the Pearl River Delta. This situation was unexpectedly changed in 2015 by the proposal to activate and utilize South China Historic Trail in Guangdong.

South China Historic Trail in Guangdong is the collective name of historic governmental and non-governmental post roads in Guangdong Province built before the year of 1913. Because Guangdong Province is located in the south of the "Five Ridges" in China, its military, economic and cultural ties with the Central China are mainly embodied in the historic trails, the remains of which have become a series of historic sites. So far, 171 historic trail sites have been discovered in Guangdong Province [20]. These cultural ruins bear various historical events and are mostly distributed in remote poverty-stricken rural areas. With the restoration and utilization of the historic trail as an opportunity, historical villages and natural resources along the trail can be connected to gain advantage together with the development of rural tourism, thus achieving the goal of historical and cultural restoration, rural habitat improvement and targeted poverty alleviation.

As a new form of greenway in Guangdong Province, South China Historic Trail is characterized by a linear cultural trail, which has gone beyond the scope of the previous experience in the greenway construction in the Pearl River Delta. South China Historic Trail reactivated greenway projects in Guangdong and aroused the enthusiasm of the builders. Through historical research, design, construction and communication with project organizers, Zhuhai City summarized the technical methods to restore the historic trail. Ruyuan Yao Autonomous County has found a way to reproduce the aura of the historic trail with perennial coreopsis. Nanxiong City explored the organizational form of the slow track of the historic trail and suggested that two trails with different characteristics should be arranged along the linear cultural heritage corridor of the historic trail. One is the trail with historical and cultural experience which is a restoration of the historic trail remains with strict respect for history, and the other is the trail with new outdoor sports and leisure (see Figure 2). The two trails, with one being static and the other dynamic, meet different needs and enable visitors to experience both nature and humanity at the same time.

As indicated in Literature [21], a greenway was a book on the relationship between human and land. It needs to bring different content into this relationship in different regional

 

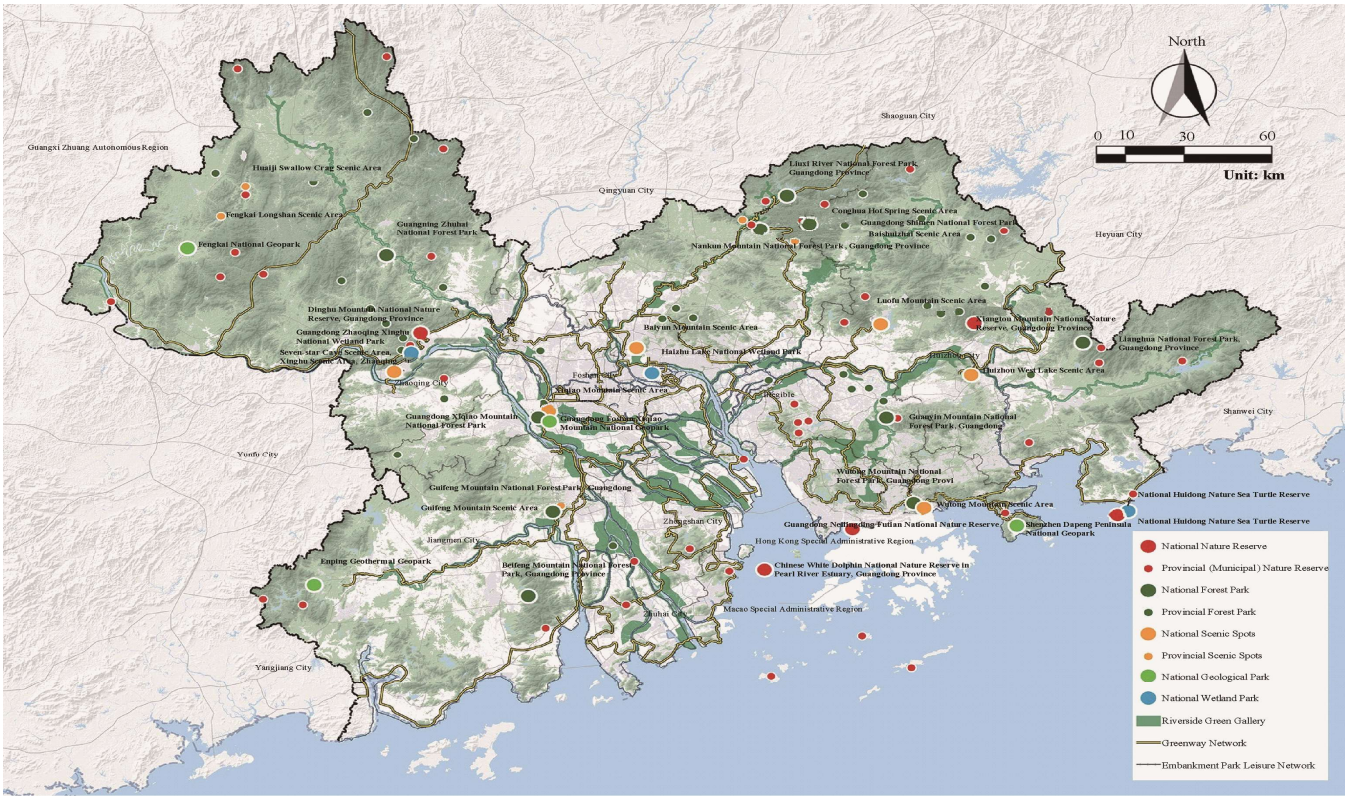


**Figure 1** Greenway and park system in Pearl River Delta Area

Data source: Literature [22].

environment. In cities where people live, nature is a scarce element. Therefore, the greenway can attract people and remain active as long as it links people with nature well. In the peripheral areas where people do not live, however, the natural environment is generally good, and the greenway needs to create unique content by linking people with history, so as to attract people who do not live there.

### 3.3 Matching greenways with the local natural environment characteristics at the ecology level

The greenway, as a linear space, is of great value because it connects blocks. Therefore, when laying out the Pearl River Delta Greenway Network in 2010, the project team put great effort into searching for the track to achieve the connection between green blocks. When carrying out the whole area planning of Pearl River Delta in 2014, the project team found that in the seemingly disordered and chaotic megalopolis of the Pearl River Delta, there was actually an order of natural interconnection—river system. Based on this finding, the project team put forward the idea that the layout of the greenway network in the Pearl River Delta should follow the river system (see Figure 1).

In 2008, the World Bank put forward the concept of "Nature-Based Solution" (NBS) to solve environmental problems and pointed out that people needed to understand the relationship between man and nature in a more systematical manner [23]. The "Nature-Based Solution" takes ecological

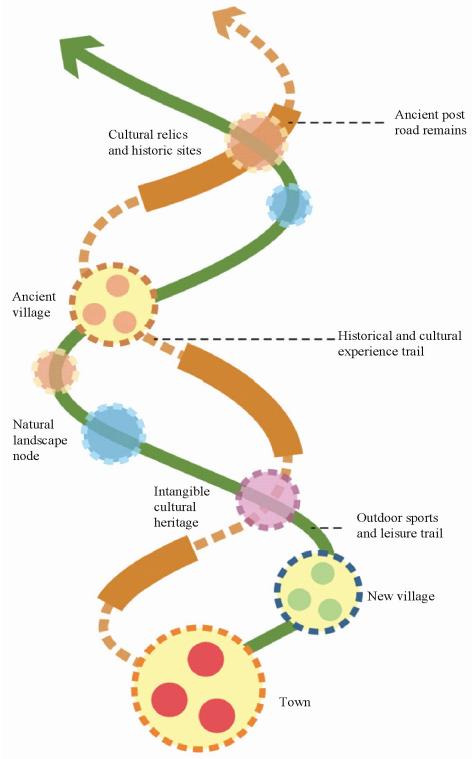


**Figure 2** Conceptual layout of dual-trail system of ancient post road corridor

Data source: Literature [6].

environment protection as its premise and organically integrates artificial management methods with land and marine landscapes. In 2015, the EU incorporated "Nature-Based Solution" into the "Horizon 2020" Scientific Research Program [24], because such an innovative concept has great potential in improving the relationship between man and nature and creating sustainable competitiveness.

The Pearl River Delta is a composite delta formed by the sedimentation of many river channels in the estuaries of the Xijiang River, Beijiang River and Dongjiang River. The river network serves as the material exchange channel between the land and the sea in the Pearl River Delta, and it connects the vast natural elements such as mountains, plains and oceans. The river network also functions as the birthplace of town settlements. Nowadays, the crisscrossing river network is still the growing thread of the metropolitan area of Pearl River Delta and the natural corridor connecting with nature. The river network is a part of the natural ecological process of the Pearl River Delta and a natural passageway for the sea and land breezes to blow into the metropolitan area. The Pearl River Delta features high city density and hot and humid climate. The difference in the heat capacity ratios of land and water forms convective wind on the waterfront, making the waterfront the most comfortable place in the city. In order to improve the livable level of the Pearl River Delta, we should make the waterfront an important framework of urban outdoor sports and cultural leisure. To this end, combining the greenway network with the water network can not only build the water network to be the framework of urban life and outdoor sports but also provide a natural channel for the connection between urban residents and nature.

## 4 Conclusion

The key reason for the greenway in Guangdong Province to be the first to blossom and bear fruits is that its functions and roles have been expanded. The greenway network's various functions make it unique in the eyes of politicians, technicians and residents, thus uniting the power to promote the greenway practice. Although the government-led construction mode has exerted an influence on the form of the greenway built in the Pearl River Delta, the construction of the greenway has changed the supply of urban open space, provided accessibility to the countryside for city residents, and initiated the transformation of urban development patterns in the Pearl River Delta. The subsequent vigorous development of greenways in China shows that the construction of greenways is of great significance to the improvement of urban livability in China.

Although the greenway construction in Guangdong Province has been relatively slow from the peak, it has never ceased and shows three new trends. In the Pearl River Delta Area, the greenway is further integrated with the health needs of the public at the functional level. In the peripheral areas of eastern, western and northern Guangdong, South China Historic Trail connects historical villages and natural characteristic resources along the route, combining the restoration of historical and cultural routes and the revitalization of rural areas, which enriches the connotation of greenways. The success of waterfront greenways in the Pearl River Delta has led to a new trend of combining greenways with the natural environment at the ecology level. The emergence of these new functions, connotations and forms has enriched the greenway practice of Guangdong, and its effectiveness should undergo further observations and tests.

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