

Thoughts on Bidao Planning of the Shantou Rongjiang Basin

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Abstract: High-quality construction of Wanli Bidao is version 3.0 of Guangdong's water treatment. Based on the analysis of the Bidao basement in the Shantou Rongjiang Basin, we determined the current status of the Bidao construction, identified the existing problems, analyzed the theme characteristics, and refined the Bidao construction goals and overall layout. According to the existing problems and construction goals of the Bidao construction, the specific construction tasks of the Bidao were determined item by item to provide technical support for the Bidao construction in the Shantou Rongjiang Basin.

1 INTRODUCTION

Rongjiang is an important river along the east coast of Guangdong. It originated from Phoenix Mountain in Luhe County, Shanwei City. It flows from the southwest to the northeast, passing through Jieyang City and Shantou City, imports to the South China Sea via Shantou Port.

The concept of Bidao was proposed in June 2018 (Lie Ruiming, 2020). The connotation, classification and construction tasks of Bidao are very clear after two years development. The high-quality construction of Wanli Bidao is version 3.0 of Guangdong's water treatment (Ma Xiangming, 2020). Compared with the simpler water environment management in the past, the construction of Wanli Bidao has jumped out of the traditional model of water treatment, and transformed into a water treatment-based approach. It is implemented such as rural revitalization, global tourism, flood control, sponge city construction, characteristic waterways and construction of "four good rural roads" as a whole, water and shore co-governance, and finally realize the co-construction, co-governance and sharing of beautiful ecological environment (Li Junfei, 2020). The pilot Bidao has given birth to the vigorous development of the "water economy" in various places. The rivers and lakes have changed from the objects of money spent to the treasures of improving the ecological environment, enhancing the value of urban land, supporting industrial upgrading,

and driving rural revitalization. They have formed a series of distinctive waterfront economic belts, and carried out of Guangdong characteristics in practicing the ecological development concept of "green water and green mountains are golden mountains and silver mountains".

Through thorough study of the concept and connotation of Bidao, this paper analyzes and identifies the base of Bidao construction in the Shantou Rongjiang Basin, determines the goals and specific tasks of Bidao Construction, and helps the Shantou Rongjiang Basin build a comprehensive, diversification and demonstration eco-tourism axis integrating sports and leisure, sightseeing and recreation, and education and display.

2 BASE ANALYSIS

The Shantou Rongjiang has a total length of about 60km and a catchment area of 334.21km². It is a tidal section, starts from the junction of Shantou City and Jieyang City, and flows through Chaoyang, Jinping, and Haojiang District, and finally ends at Mayu Island and merges into the South China Sea. The Shantou Rongjiang is an important golden channel in eastern Guangdong.

2.1 Water Resources Status and Problems

The Rongjiang basin has abundant water resources, but the per capita water resources are relatively short. The main stream of Rongjiang was included in the tidal section before entering the Shantou city. So, the inbound water is difficult to use, only above the Chaoyang Wenzui sluice, Chaoshuixi draws water from the Nanhe to provide irrigation water for more than 6,667 hm² of farmland along the bank. It is a water-stressed area. The per capita water resource in the Rongjiang Basin is 1138 m³/person, which is lower than the internationally recognized water scarcity warning line of 1700 m³/person. Although the Rongjiang has abundant transit water, it is already salty water when it enters the country and cannot be used. Basically, water for drinking and irrigation in the basin comes from reservoir water and diversion from outside the basin.

2.2 Water Security Status and Problems

Natural disasters in the Rongjiang basin are serious, and the capacity of flood control and drainage needs to be enhanced. Rongjiang is an important flood control and drainage channel for Jieyang and Shantou city. Since Guangdong Province launched the special disaster prevention and mitigation action in 2003, the flood control capacity of this basin has greatly improved. But the Rongjiang dike still has some problems such as non-compliant sections and unclosed dikes, which still threaten the lives and property safety of the people. In addition, the Shantou Rongjiang is a tidal section, and the tidal water is irregular semi-diurnal. Once the waterlogged caused by heavy rain in the basin encounters the high tide water level of Rongjiang, it will cause waterlogging in the cities along the line, causing urban paralysis and major economic and property losses.

2.3 Water Environment Status and Problems

The water quality of water function area is not up to standard, and the water quality monitoring capacity is insufficient. According to the "Shantou Water Resources Bulletin", the annual average water quality of the Rongjiang Control Station is IV, and has not yet reached the water quality target of III. The number of monitoring sections on the main stream of Shantou Rongjiang is relatively lack, and there are no monitoring sections at the entrance of larger tributary

confluences. It is impossible to grasp the water quality of the tributaries and its influence to the main stream water quality.

The management of river sewage outlets is lacking, and some rivers are heavily polluted. The Rongjiang Basin's sewage outlet monitoring capabilities are weak, monitoring methods are lacking, law enforcement forces do not match the tasks, and some enterprises have illegal discharges, excessive discharges, and even illegal discharges. The urban and rural domestic sewage in the Rongjiang Basin has not been effectively collected and treated, and there is still a gap between the target sewage treatment rate of more than 93%. In addition, the imperfect treatment facilities of urban and rural domestic garbage have aggravated water pollution in the river basin and caused part of the water surface garbage to float.

2.4 Water Ecology Status and Problems

Ecological flow is insufficient in Rongjiang basin. The Shantou Rongjiang has a high degree of utilization of water resources, and the ecological flow of the main tributaries is seriously insufficient, especially during the dry season, which leads to the deterioration of the self-purification capacity of water bodies and aggravates water pollution.

The prevention and control of soil erosion needs to be strengthened. According to the results of the fourth remote sensing survey of soil erosion in Guangdong Province and combined with field surveys, the overall soil erosion in the Shantou Rongjiang Basin is slight, but it's the heaviest among the river basins in Shantou City.

The compensation mechanism for ecological protection of the Rongjiang basin has not yet been established. As a cross-border river, the establishment of ecological protection compensation mechanism is an important mean to mobilize the enthusiasm of all parties and protect the ecological environment.

2.5 Featured Resources and Recreation System Status and Problems

As shown in Figure 1, there are 12 characteristic natural ecological resources, 18 human and social resources, and 5 special industrial economic resources in Shantou Rongjiang Basin, each accounting for 38.7%, 38.3%, and 26.3% of the whole city. However, the waterfront space lacks local characteristics. It is specifically reflected in the lack of regional cultural elements in various supporting facilities such as paving, vegetation matching, garden construction

sketches, and lighting night scenes along the slow waterfront roads along the line.

Relying on the "Shantou Greenway Network Planning and Construction Implementation Plan", combined with the construction of beautiful rural demonstration villages, the current Shantou Greenway construction has begun to take effect. There are 3 greenways related to the Rongjiang Basin: Haojiang Queshi Scenic Area Greenway, Jinping Niutianyang Greenway from the west side of Queshi Bridge to Gate 4, and Jinping Seaside Greenway from Xidi Ferry to Huaqiao Park. The waterfront service facilities in the Rongjiang Basin are the scenic road system cabinets in the Niutianyang National Wetland Park and the Huanwan District. The water recreation facilities are mainly the Merchants Passenger Wharf to the Mayu Island Wharf, and the inner bay night cruise line. However, the landscape recreation system lacks connection. Each resource node is relatively isolated, has not yet formed an effective linkage. The waterfront slow-moving track, post, leisure dock and other recreational system facilities are relatively lacking, and have not yet formed an effective connection.

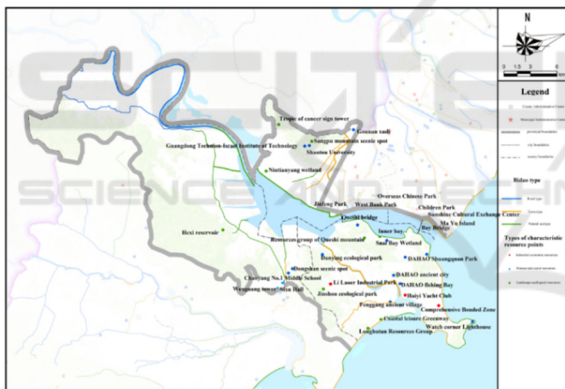


Figure 1: Distribution Map of Characteristic Resources in Rongjiang Basin.

2.6 Waterfront Economic Belt Status and Problems

The development of the waterfront economic belt still needs to be further explored. In 2007, Shantou put forward the strategic conception of the "Three Economic Belts" as Eastern Urban Economic Belt, Industrial Economic Belt, and Ecological Economic Belt. At present, the planning of the waterfront economic zone focuses on the coast and the main stream of the Rongjiang, the tributary parts lack corresponding planning. In addition, the construction of the economic zone is still in the planning stage and

needs to be implemented quickly.

3 GENERAL LAYOUT

The Rongjiang is a green ecological corridor in Shantou, with beautiful scenery and many historical sites along the bank. It is rich in tourism resources. From the analysis of Shantou's main characteristic resources, it can be seen that characteristic natural ecological resources and humanistic and social resources are most prominent in the Rongjiang Basin.

The Rongjiang Basin has the scarcest natural landscape, the inner-city bay. It has characteristic landscapes such as Mayu Island, Queshi Scenic Area, the promenade, and the light show of Times Square. "Shantou City Landscape Lighting Plan (2018-2030)" pointed out that the core area of the inner bay will be built into a world-class night tourist destination.

Therefore, the plan follows the theme characteristics of "human ecology River Bay", considers the city's humanities and water veins, fully combines the cultural characteristics of Chaozhou and the activity needs of citizens and tourists, aiming to create a comprehensive, diversified, and demonstration ecological tourism axis that integrating sports and leisure, sightseeing and recreation, education and display.

The pattern of the plan is "two rivers and two bridges of humanity show, one stream and one belt of natural beauty", as shown in Figure 2.

"Two Rivers" refers to Rongjiang and Haojiang. With Rongjiang and Haojiang as the water vein, relying on Niutianyang Wetland, Queshi Scenic Area, Danying Ecological Park, Chaoshan Historical and Cultural Expo Center, Dahao Ancient City, Fenggang Ancient Village and other surrounding natural and cultural resources, combining with local characteristic culture, the plan praises the long history and traditional culture of the Haojiang, and the natural ecology and beauty bay of the Rongjiang through the waterfront landscape design. "Two Rivers" focuses on creating one river and two banks, creating water landscape belt with clear themes and perfect supporting facilities.

"Two bridges" refers to the Queshi Bridge and the Bay Bridge. Relying on landmarks such as the Customs Museum History Exhibition Hall, Shantou Museum, Folk Museum, Customs Bell Tower near the bridge, combined with Xidi Park, 1860 Cultural and Creative Park, Small Park Opening Area, Zhongshan Park, Laoma Palace Theatre, Waterfront Promenade Park, Shipaotai Park, Tianhau Temple, Pearl Temple and other cultural attractions, the plan rationally

arranges multiple waterfront plazas, and integrates murals, scenery walls, cultural corridors, art sketches to comprehensively enhance the artistry and interaction of public water spaces , aiming to create a waterfront space full of popularity and vitality.

"One stream" refers to the Chaoshuixi. With water as its vein, it creates a rooted in the urban ecological corridor. With green as the bottom, it creates a recreational resort with a blend of water and scenery. With culture as its core, it creates a new Chaoyang

cultural travel line. "One stream" is built to create a "Tide Listening" theme.

"One belt" refers to the Niutianyang water area, starting at Xidong gate and ending at the No. 7 gate. Combining Niutianyang Wetland with Mangrove Wetland, "One belt" aims to create a natural ecological landscape belt with Rongjiang Mangroves, Happy Pastoral, Ecological Fisheries, and Sunset Glows.

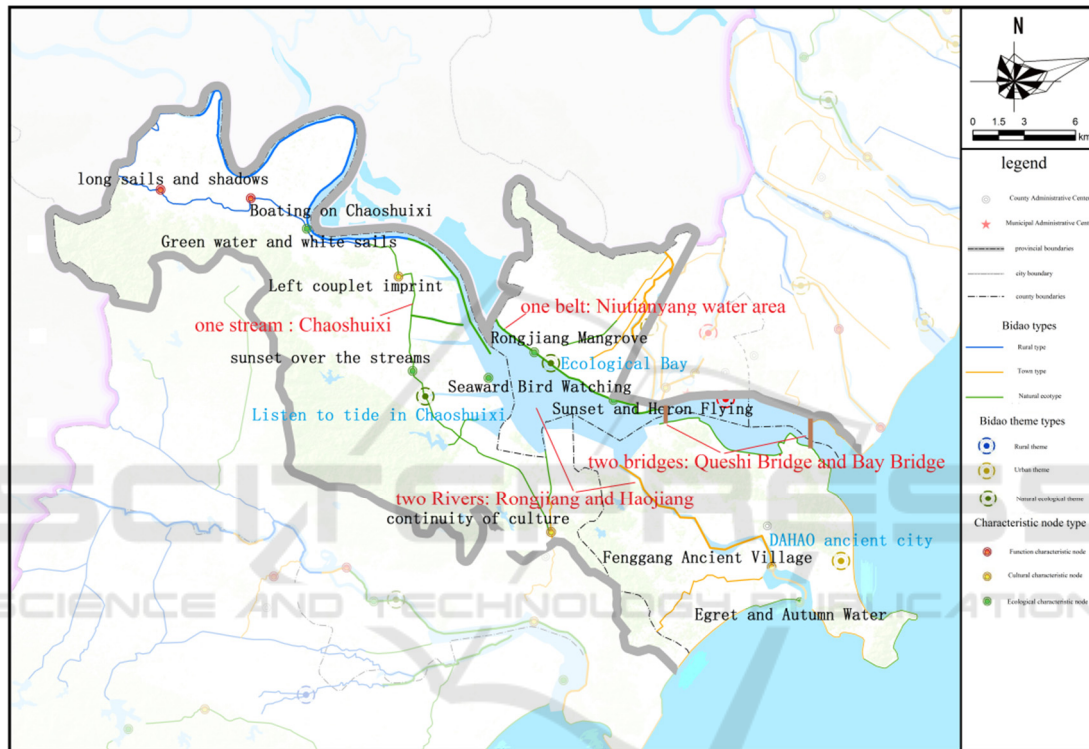


Figure 2: Planning Layout of Rongjiang Basin.

4 PLANNING TASK

In view of the current situation and problem analysis,

combined with the overall layout of the Bidao, we determine 6 categories and 30 specific tasks of the Bidao plan for the Shantou Rongjiang Basin, as shown in table 1.

Table 1: Bidao Planning Task List of Rongjiang Basin.

Sub-item	Existing problems	Construction tasks
Water resources	Relative shortage of per capita water resources	Promote the Hanjiang-Rongjiang-Lianjiang water system connection project
Water safety	flood control and drainage capacity needs to be enhanced	Chaoyang Jinguanwei Mianbei Seawall Reinforcement Project
		Sanyuwei Seawall Reinforcement Project
		Reinforcement of 600m from Chaoyang Sanyuwei Seawall to City Defense Project
		Reinforcement of the seawall from Wutianwen dike to Leikou Bridge in

Sub-item	Existing problems	Construction tasks
		Haojiang District
		Standard Upgrading and Reconstruction Project of Seawall of Nanbin Road, Haojiang District
		Niutianyang No. 2, No. 5, No. 6 and No. 7 drainage ditches renovation project
		Wunangou Waterlogging Area Remediation Project
		Newly built power stations as Tuolian, Li'an, Dongsha, Longhuguan, and Huangcuowei
		Reconstruction Sluices as Juding, Chaowei, Dayan, Yanzui, Chaocheng, Xigang, Xitangwai, Hexi
		Xilu River, Hexi River, Lianggang River treatment project
		Reinforcement projects of 4 small reservoirs as Lingjiao, Shuijiling, Dajiaoxia, Dongkeng, Haojiang District
Water environment	Water quality is not up to standard	water environment management of Main stream and Hexi River, Xilu River, Dagang River, Xigang River, Tuoji River
	Insufficient water quality monitoring capabilities	Treatment of 5 cases of black and odorous water bodies
	Lack of management of sewage outlets into the river	Supplement water quality monitoring points at Chaoshuixi
		New sewage treatment plants as Jinping West District, Guanbu Town, Hexi Town, Xilu Town and Jinzao Town
Water ecology	Insufficient protection of ecological flow	Carry out the cleanup of the forbidden areas in the waters of the Haojiang Qingzhou Salt Field Section and Majiao Street Section
		Residential environment improvement project for a total of 112 villages in the 4 towns as Jinzao, Guanbu, Xilu and Hexi
	The prevention and control of soil erosion needs to be strengthened	Prepare a plan for determining and guaranteeing the ecological flow of rivers and lakes in the Rongjiang Basin
Landscape and Recreation System	Waterfront space lacks local characteristics	Ecological Transformation of Hard Banks in the Basin
		Hexi Reservoir Water Conservation Forest Construction Project
Waterfront Economic Belt	The development of the Waterfront Economic Belt needs to be further explored	Construction of Shantou Mangrove Ecological Wetland Park and preparation of watershed wetland protection plan
		Actively promote the establishment of river basin ecological compensation mechanism
Landscape and Recreation System	The recreational system lacks connection	Create Niutianyang Wetland Park "Rongjiang Mangrove", "Seaward Bird Watching", "Sunset and Heron Flying" landscape nodes
		Create Chaoshuixi landscape nodes such as "continuity of culture", "sunset over the streams", and "Green water and white sails"
Waterfront Economic Belt	The development of the Waterfront Economic Belt needs to be further explored	Create Haojiang River landscape nodes such as "Egret and Autumn Water" and "Fenggang Ancient Village"
		Create slow-moving trails throughout the basin, with 4 integrated post stations and 33 convenient post stations
		Create the Rongjiang Inner Bay Bidao + Smart Tourism Industrial Economic Belt
		Create the Bidao on the south bank of the Rongjiang + agricultural tourism industry economic belt
Waterfront Economic Belt	The development of the Waterfront Economic Belt needs to be further explored	Create the Chaoshuixi Bidao + cultural tourism + rural revitalization industrial economic belt
		Create the Haojiang Bidao + Emerging and Vigorous Industrial Economic Belt

5 CONCLUSION

On the basis of in-depth study of the concept and connotation of Bidao, we analyzed and identified the base of Bidao construction in the Shantou Rongjiang Basin, determined the theme and characteristics of the Shantou Rongjiang Bidao, and extracted the goals and layout of the Shantou Rongjiang Bidao construction.

According to the existing problems and construction goals of the Shantou Rongjiang Bidao, the specific construction tasks are determined to guide the construction of the Shantou Rongjiang Bidao. The plan will help the Shantou Rongjiang Basin to build a comprehensive, diversified, and exemplary eco-tourism axis, which integrates sports and leisure, sightseeing and recreation, education and display. Therefore, the plan has a strong guiding significance.

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