Research on comprehensive management planning of Xin kai river water system in Changchun

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Abstract. Due to the comprehensive management of Xin kai river water system in Changchun, the surrounding environment is changed, the river ecosystems is restored, the production and living conditions of residents and the living environment on both sides of the strait are improved, finally, the purpose of sustainable development of the environment, economy and society is achieved. Through the further governance of the river, the river ecological function and water circulatory system are gradually restored, the naturalness of the river and the overall ecological environment of the Xin kai river are improved, which can provide a better living space for Changchun City. The comprehensive management planning can provide reference for other similar engineering designs.

1. Introduction
According to the Notice of the State Council on Printing and Distributing the Prevention and Control of Water Pollution, China Fa [2015] No. 17, by 2020, the national general water environment quality has been improved in phased, and the severe water pollution is greatly reduced, and the water environment is stable and better. The Changchun municipal government has proposed the comprehensive management of the "full row, all segments and all round" of the Yi tong river, then the scope of governance is expanded to Xin kai river water system.

The Xin kai river is the largest tributary of the second Songhua river, there are two sides of the north and south. Its main tributary is the Yong chun river and Fu yu river. In order to make sure the water quality of Shan zui zi bridge on Xin kai river can meet the V-class and make sure the water quality of Yong chun river and Fu yu river can meet the surface water V-class, the Changchun government launched the comprehensive management project of Yi tong river. The comprehensive management project of Xin kai river water system belongs to project of Yi tong river. Aim at eliminating black odor, improving the quality of water comprehensively and guaranteeing ecological traffic, the comprehensive management project of Xin kai river water system mainly includes eight items such as side mud dredging, urban source governance, rural surface source pollution control, wetland construction, in situ ecological repair, Ba yi reservoir governance, emergency project and ecological hydrating project. The implementation of comprehensive management planning of Xin kai river water system can further improve the sewage collection rate, establish and improve the pipe network system, improve the flooding capacity of the river, solve the problem of black stink in the river, and repair water environment water ecology.
2. Problems in Xin kai river water system

The problems existing in Xin kai river water system are as follows:

1. The flood control standard is low, and the drainage pipe network system needs to be improved. At present, the flood control standard of Xin kai river is low, the flood control and drainage system requirements of “stored in upper, dredged in middle, discharged in lower, proper stored by utilization of rainwater” are not realized yet, so there is a hidden danger of flood control.

2. Water resource spatial allocation is uneven, the water conservancy infrastructure needs to be perfected. The Changchun city is a water resource shortage area. In recent years, the rainfall, surface water resource and groundwater resource in Changchun are present a significant reduction in trend. It is a common phenomenon that water resource allocation in the region is unbalance. Some rivers are rich in water, but some rivers have no ecological base flow. The utilization rate of rain floods is low, and the water supply system is not perfect yet.

3. Urban sewage treatment capacity and pipe network needs to be improved, rural sewage treatment facilities need to be strengthened. Some regional municipal drainage facilities in Changchun are still insufficient, the rain sewage supporting pipe network pipeline is not perfect, recycled water supporting pipe network, water conservancy projects and sewage treatment facilities in villages and towns are not covered, sewage is not full collected, Some low standard rain, sewage pipeline need to be upgraded.

4. The degradation of water ecosystem is serious, which seriously affect the river's self-purification capacity. Most of algae which living in in the rivers of Xin kai river is black algae, the plant carcasses and fallen leaves are silt up in the river, the water is seriously nutritious in some rivers and the rivers are covered by a lot of duckweed. The Water quality of Xin kai river is poor, and there are fewer plants in the shore and basically no aquatic plants in the river, which can not meet the needs of river ecosystem. The phenomenon of illegal rowing and falling of surrounding enterprises is serious, which seriously affects the quality of water environment.

5. The green space along the river revetment is unevenly distributed. The poor fluidity of river water makes self-purification and pollution holding capacity of water body lower than the pollution load generated by the pollution source. Especially in the summer, the lake of oxygen in water makes the water easy to be changed.
3. Comprehensive management planning of Xin kai river

The comprehensive management planning of Xin kai river including two major parts, the main river and tributaries. The total management area is 316.1km².

The main river of Xin kai river include the Xin kai river, Yong chun river and Fu yu river, the drainage area is 249.8km², the total length of river management is 43.721km. The management length of Xin kai river, Yong chun river and Fu yu river are 19.324km, 16.986km and 7.794km. The water ecological maintenance project of Xin kai main river is 43.7km, the total land area is approximately 190.44 hectares. The total length of the Yong chun River area is about 32.8km, the planned area is about 109.93 hectares, of which the green land landscape area is about 97.94 hectares. The total length of the Fu yu River area is about 10.9km, the planned area is about 80.51 hectares, of which the green land landscape area is about 65.63 hectares. The water ecological management project of Xin kai main river include squeeze project and ecological management project. The sewage treatment plant construction project of Xin kai river is the new construction project of fang cao street sewage treatment plant, southern sewage treatment plant bidding project and southern emergency super magnetic purification station project. The area of the ecological management is 313 hectares, the ecological management area of Xin kai river, Yong chun river and Fu yu river are 150 hectares, 23 hectares, 140 hectares.

The tributary flood control project of Xin kai river includes river protection project of Xing long gou and Da liu gou. There are earthwork project (including the dredging, 77.8906 million m³), river bank protection project (5.668km), drainage culvert projects (4 seats), water drop projects (3 seats), culvert projects (3 seats), Da liu tun reservoir Project, temporary project, environmental protection project, soil and water conservation project and so on. The total land area of water ecological maintenance project of Xin kai tributary river is 34.45 hectares, Xinglong reservoir and Da liu reservoir watershed greening project include Xinglong community park (58268m²) and river greening projects (84888m²). The land area of Da sui reservoir watershed greening project is 73,271m², the land area of lei jia gou watershed greening project is 73,271m², the land area of Da sui gou watershed greening project is 73,271m². The water ecological management project of Xin kai Tributary River include squeezed project and ecological management project. The Sedimentation project includes wastewater sewage main line (5.62km), sewage treatment integrated equipment (2 seats), Ying bin pipeline (1300m), and so on. The ecological management projects include water motivation improvement projects, such as solar aeration, floating fountain aeration, underwater flowering machine.

The water quality regulation of Yong chun River and Fu yu river are shown in figure 2 and figure 3.

![Figure 2. The water quality regulation of Yong chun River](image-url)
4. Social and environmental benefit analysis

This project acts as an important measure in response to the national "water pollution control action plan", in accordance with people and natural harmony concepts to govern the river, we shall pay more attention to environmental engineering construction under the premise of ensuring flood control.

The implementation of the project has good social benefits. The implementation of the project can bring booming and vitality to the city, and can improve urban ecological environment quality. Compared with other northern cities, it has a certain advantage. By carrying out a wide variety of activities, there are further understanding of Changchun, and it truly play the role of bridges, links, and improve the taste and popularity of Changchun.

The implementation of the project is conducive to enhancing culture connotation of Changchun, which is conducive to the development of health and human environment to higher levels. After the implementation of this project, the Xin kai river water system turns to a new water system with clear water, green trees, beautiful scenery, fresh air and so on, which can bring vitality to real estate industry, accelerate the pace of municipal construction on both sides of the strait, and make the real estate value continue to rise. At the same time, it also pulled the rapid development of other related industrial economies in Changchun and surrounding areas. Due to the construction of cultural landscape sections, a beautiful social landscape is added to the city, and it can promote local transportation, construction, building materials, decorative decoration, gardening, catering and entertainment and other industries. Therefore, the implementation of this project can drive the synchronous development of the surrounding relevant industries and promote regional economic prosperity.

5. Conclusion

Due to the comprehensive management planning of Xin kai river water system in Changchun, the surrounding environment is changed, the river ecosystems is restored, the production and living conditions of residents and the living environment on both sides of the strait are improved, finally, the purpose of sustainable development of the environment, economy and society is achieved. Through the further governance of the river, the river ecological function and water circulatory system are gradually restored, the naturalness of the river and the overall ecological environment of the Xin kai river are improved, which can provide a better living space for Changchun City. The construction of the project has improved the city grade, and it Objective promotes the development of local tourism, expands the visibility of Changchun. By reasonable construction, the environmental benefits and social benefits are gotten to the maximum level.

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