

The application of water conservancy project in the comprehensive management of water environment in Taihu Lake Basin

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Abstract: After the outbreak of cyanobacterial water pollution crisis in Taihu Lake Basin, it not only affected the normal life and production activities of local residents, but also attracted extensive attention from the media at home and abroad. When the governments at all levels from the central to the local level attach great importance to the comprehensive water environment management in the Taihu basin, they start from the perspectives of land, science and technology, farmers, water conservancy, construction and environmental protection, and put forward a large number of engineering and non-engineering measures. Therefore, on the basis of clarifying the significance of water conservancy project construction and the current situation of water environment management in Taihu Lake basin, this paper deeply discusses how to apply water conservancy project in the comprehensive water environment management of Taihu Lake basin, and makes a comparative analysis of the benefits obtained from it. The final results show that hydraulic engineering plays an active role in the comprehensive treatment of water environment.

Key words: Hydraulic engineering; Taihu Lake basin; Water resources; The comprehensive control

1. Introduction

In the construction and development of modern society, water conservancy project, as a component of national economic infrastructure, plays an irreplaceable important role in ecological protection, flood control safety, economic promotion and water resources utilization. Speeding UP the reform OF water conservancy construction management system, understanding the existing problems in the system reform, and deeply discussing the main causes and solutions of related problems are helpful to ensure the long-term development of water conservancy construction projects and truly achieve the goal of sustainable recycling of water resources. At the same time, water conservancy as the basic condition of national economic and social development, on the one hand, to ensure that water conservancy construction has stable investment channels, and social and economic coordination, fully meet the social development of different periods of water conservancy project requirements, which is an effective and important requirement for long-term social and economic development; On the other hand, we should increase the investment intensity of water conservancy projects, establish a reasonable investment structure of water conservancy infrastructure, strengthen the management and maintenance intensity of existing water conservancy projects, and fully demonstrate the economic benefits and social effects of water conservancy projects. In addition, the water conservancy project in the development of social construction, has the advantages and the elimination of these two basic functions, as an effective carrier of water conservancy economic steady development, according to the application of functional properties, water conservancy investment structure related to soil and water conservation, water supply engineering, reservoir engineering, irrigation, flood control engineering, such as content, so the construction units and the investment required in accordance with the requirements for application in various fields, Targeted construction management.[1.2]

To understand the main reasons for the water pollution crisis in Wuxi City, it can be seen from the surface that the pollution caused by the outbreak and death of cyanobacteria invaded the water intake of the water source, resulting in the abnormal smell of the tap water needed for life and production, which could not be used normally. From the perspective of biology, cyanobacterial

crisis is directly related to the changes of water flow, pressure, direction, water level, water temperature and other parameters in Taihu Lake basin, but the most important reason is the eutrophication of Taihu Lake water. According to the analysis of documents compiled by the Taihu Lake Basin Administration of the Water Resources Department, as excessive pollutants are discharged into the Taihu Lake Basin, the water body rises from mid-trophication to eutrophication, and the bay areas in the west and north of the lake can even reach heavy eutrophication, which provides convenient conditions for the outbreak of cyanobacterial crisis. From a practical point of view, to solve the eutrophication problem of water environment in Taihu Lake basin, the most important thing is to deal with the pollution sources, but this needs long-term continuous governance and optimization, which is difficult to achieve immediate results in a short time. Therefore, the objectives of comprehensive water environment management in Taihu Lake Basin are as follows: Through comprehensive governance and slashing emissions of various pollutants in 2012 effectively restrain aggravating trend of lake eutrophication, around 2020 by continuous comprehensive governance, safeguard regional economic coordinated development and environmental protection, to achieve III taihu lake water body water quality standard, the local can restore ecological virtuous circle, people can live in harmony with nature.[3.4]

Located in the abdomen of the Yangtze River Delta region, the Taihu Basin covers an overall area of 36,900 square kilometers, with a relatively dense population and a gradually rising level of economic development. Since the 1990s, the economic development in the Taihu Lake Basin has been growing faster and faster, and the number of pollutants discharged has continued to rise. Although Shanghai, Zhejiang, Jiangsu and other regions have strengthened the treatment of water pollution, the deterioration of water environment has not been effectively curbed. The outbreak of cyanobacterial water pollution crisis at the end of May 2007 has not only affected the normal life and work of the surrounding residents, but also aroused widespread concern of the society. According to the State Council leading comrades of the important instructions and conference spirit, the National Development and Reform Commission and relevant departments in communication, launched the comprehensive control of water environment of taihu lake watershed overall plan of work, after more than half a year after the on-the-spot investigation and problem analysis, staff deeply discusses the governance of the taihu lake basin in recent decades, The investment of comprehensive water environment control of Taihu Lake Project in the 15th period is shown in Table 1 below. Finally, on the basis of learning from international lake control schemes, more than ten special research reports have been completed.

Table 1. Investment completion of comprehensive water environment treatment of Taihu Lake Project during the 15th period

Project type	Planned Project (unit)	Proportion of completed projects %	Proportion of projects under construction %	The planned investment is 100 million yuan	Complete investment of 100 million yuan	Percentage completed %
Town sewage treatment plant	93	83.9	16.1	107.3	107.1	99.8
Urban garbage disposal	13	76.9	23.1	12.6	13.2	103.4
Industrial point source management	87	97.7	2.3	1.1	1.4	122.7
Lakeside zone and ecological restoration	4	75.0	25	20.8	6.6	31.5
River and lake dredging project	7	57.1	42.9	39.8	15.5	39.0
Ecological demonstration project	14	85.7	14.3	23.0	15.0	65.2
Protection of drinking water sources	12	83.3	16.7	14.0	6.3	45.0
Prevention and treatment of special industries	8	100	0	0、9	2.0	219.6
Capacity building for environmental management	17	58.0	41.2	0.6	1.8	301.7
Summary by administrative region						
Jiangsu province	176	89	11	132.3	90.2	68.0
Zhejiang province	75	79	21	84.8	77.2	91.0
Shanghai	4	100.0	0	3	1.5	50.0
A combined	255	86.3	13.7	220.1	168.9	76.7

Since the comprehensive treatment of water environment in Taihu Lake basin is a long-term and complex task, this paper mainly studies the application of water conservancy projects in the comprehensive treatment of water environment in Taihu Lake basin, so as to provide effective basis for subsequent environmental treatment and protection.

2. Method

2.1 Uninterrupted water diversion and drainage

According to the accumulated experience of water conservancy project construction management, it is necessary to integrate the study of pollution incidents and long-term development goals when comprehensively controlling the water environment of Taihu Lake Basin. Among them, Meiliang Lake PUMP STATION HAS not only improved the quality of water in the basin, but also really achieved the goal of comprehensive water environment management. Meiliang Lake Pumping Station, as an important part of the comprehensive water environment treatment project, aims to use power to pump water from Meiliang Lake into Wuli Lake and Wuxi city, so as to improve the water environment of the three areas. According to the practice investigation and research, Meiliang Lake pump station pumping 90 days, by pulling the water body of Meiliang Lake, let the water from the outer Taihu Lake into Meiliang Lake, Meiliang Lake water quality can be improved by one category on the basis of the current situation. Combined with the results shown in Figure 1 below, it can be seen that COD_{mn} can decrease by 3%, TP can decrease by 11%, and TN can decrease by 16%. After the outbreak of Wuxi water crisis, Meilianghu Pump station was officially started at the end of May 2007, and the daily flow was basically controlled between 30m³/s and 40m³/s. After testing the water quality in some areas of Meiliang Lake, it was found that the average dissolved oxygen in the waters of Sanshan Mountain and the south Lake area of Meiliang Lake could reach 7.6mg/L, which met the requirements of class I water standards. Permanganate index can reach 6.9mg/L, meet the requirements of class iv water standard; The average nitrogen and oxygen can reach 0.29mg/L, which meets the requirements of class ii water standards; The total phosphorus can reach 0.144mg/L, which meets the requirements of Class V water standard, and the actual decrease range reaches 43.8%. [3.4]

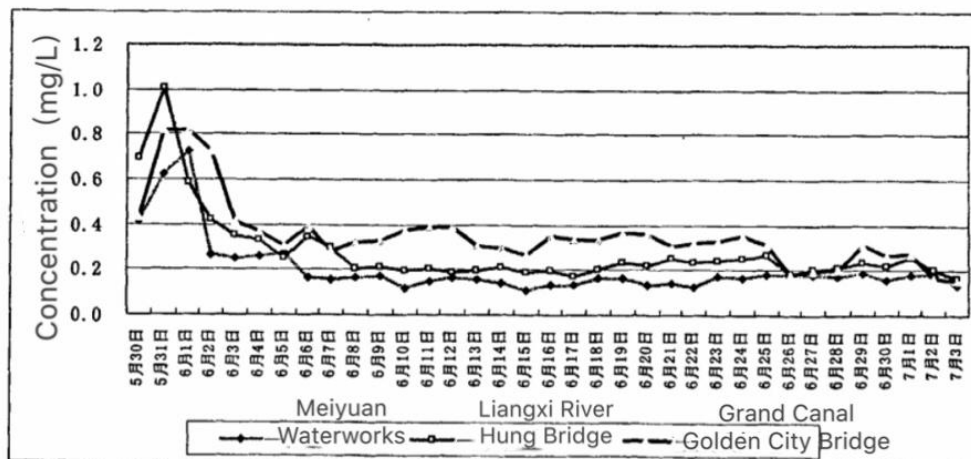


Fig. 1 Test results of Meiliang Lake Pump Station

2.2 Renovation project of Zouma Tang

In order to better meet the needs of water environment and resources in the Taihu Lake basin and its surrounding areas, China began to implement the water transfer experiment of Wangyu River "diverting the river from the Taihu Lake to the Taihu Lake" in 2002. This experiment refers to the transfer of billions of water from the Yangtze River to the Taihu Lake basin to alleviate the shortage of resources in the Taihu Lake and its surrounding areas. Although the experiment solved the water problem, it also raised the water level along the Wangyu River, which blocked the normal flow of water to the east in the west bank for a long time, and consequently caused environmental degradation and limited economic development in the area. In order to effectively solve the problem of drainage outlet in Wangyu River and southwest area, the local government put forward the Zouma Tang renovation project. Zouma Tang is located on the west bank of Wangyu River Chengxiyu high section abdomen, south and south of the Sunan Canal, the north will enter the

northwest canal, a total of 69 kilometers. After completing the construction of Zouma Tang Project, it can effectively solve the problem of stagnant water flow in southwest China caused by "diverting the river and the economy too", and create favorable conditions for the subsequent project.

2.3 New trench and extension dredging

New ditch river as the connecting the Yangtze river and taihu lake basin in wuxi city one of the important channel to improve the water environment quality in this area, channel construction should begin from the river, to the south in wujin and jiangyin junction, and then divided into two, a three mountain port access to the grand canal, again through the interchange through to wujin duty, and the other to reach the port of cross river, along the caohejing SiHe his mouth It joins the Wumu River into the Grand Canal, intersecting with the Grand Canal and connecting to Taihu Lake. This construction scheme can effectively connect the Yangtze River and Taihu Lake, ensuring that the flood water in Wuxi area is quickly discharged into the Yangtze River, and in a typical year, the water can be re-channeled into the western part of the city, effectively improving the local water environment. At the same time, water can also be diverted into Meiliang Lake to effectively improve the water quality of Meiliang Lake. According to the analysis of water diversion and drainage of meiliang lake pump station, it is helpful to improve the water environment capacity of meiliang lake by speeding up the water flow speed and enhancing the self-purification ability of the lake.

2.4 Comprehensive management of urban river courses

River water body is an important part of ensuring water environmental capacity. At present, the water quality of most rivers in Wuxi City is lower than the Class V standard because the sewage capacity has been exceeding the standard for a long time. At the same time, because the rivers and lakes are connected, most of the pollutants are brought to the Taihu Lake basin, resulting in the corresponding lower and lower water environment quality. Therefore, how to control the river is also an effective measure to improve the water environment quality of the Taihu Lake basin. On the one hand, the silt inside the river should be removed to reduce the overall amount of pollutants; On the other hand, according to the river treatment scheme, create favorable conditions for the sewage interception on both sides of the river, such as sending the sewage on both sides of the river to the sewage treatment plant for effective treatment, reduce the excessive discharge of unnecessary pollutants, can effectively improve the water quality of most of the river, avoid secondary pollution caused by sludge to the water body.

3. Result analysis

On the basis of clarifying the current situation of comprehensive water environment management in Taihu Lake Basin, the rational use of various water conservancy projects proposed in this paper has finally achieved the following effects: First, the function of the ecosystem is becoming stronger and stronger. For example, the amount of lake water increased by 4.86 billion cubic meters after the implementation of the project to divert the river from the Pacific. Under the current water quality conditions, the COD increased by 17.2% and the water environmental capacity of ammonia nitrogen increased by 29.1%.

Secondly, the amount of pollutants is reduced. On the one hand, the local government has put forward measures such as stopping heavy polluting enterprises from continuing to operate, reducing the amount of fertilizer application, and removing purse seines. The specific statistics are shown in Table 2 below. On the other hand, the reduction ability of pollutants can be effectively improved under the guidance of measures such as strengthening the construction of urban sewage treatment plants and implementing clean projects of animal husbandry. The specific statistical results are shown in Table 3 below:[6.7]

Table 2 Statistical results of emissions of eliminated pollutants

The serial number	The project	The amount eliminated in 2012 compared with 2005				The amount eliminated in 2020 compared with 2012			
		CD D	Ammonia nitrogen	Total phosphorus	Total nitrogen	CD D	Ammonia nitrogen	Total phosphorus	Total nitrogen
1	Elimination of industrial pollution sources	3.5	0.25	-	0.375	-	-	-	-
2	Fertilizer applied reduction	-	0.42	0.167	1.1	-	0.84	0.23	2.2
3	Seine demolition	-	-	0.002	0.02	-	-	-	-
	A combined	3.5	0.67	0.17	1.50	-	0.84	0.23	2.2

Table 3 Comparison results of pollutant reduction ability

The serial number	Project	CDD	Ammonia nitrogen	Total phosphorus	Total nitrogen
1	Sewage treatment plant construction	84.67	8.72	0.45	11.41
2	Waste disposal and disposal	20.31	2.72	0.15	2.85
3	Agricultural non-point source management	8.42	0.69	0.55	1.47
4	A combined	113.40	12.13	1.15	15.73

Finally, after the adjustment of industrial structure, the proportion of heavily polluting industries is getting lower and lower, and the pollutant discharge standards are becoming more and more strict. The water environmental capacity of Taihu Lake Basin is improved. The specific results are shown in Table 4 below. The result of this study proves that the reasonable construction of water conservancy project in the comprehensive water environment control of Taihu Lake basin is an effective countermeasure to solve the problem of water environment pollution.[8.9]

Table 4 Comparison results of comprehensive capabilities

In the level of	Pollutants		CDD	NH-N	TP	TN
In 2005	Base year emissions		85.03	9.18	1.04	14.16
In 2012	Projected total emissions		119.36	11.82	1.27	17.93
	Control emissions		72	7.03	0.82	10.84
	Amount to be reduced		47.36	4.79	0.45	7.09
	Cutting ability	Cutting ability	51.82	5.01	0.50	7.37
		Ecosystem function	Enhanced ability to reduce pollutants			
		Adjustment of industrial structure	Reduction of pollutant discharge			
In 2020	Projected total emissions		159.67	14.92	1.54	22.34
	Allowable emission rate		52.43	3.80	0.49	5.86
	Amount to be reduced		107.24	11.12	1.05	16.48
	Cutting ability	Urban sewage treatment plant construction, garbage treatment, livestock and poultry breeding clean engineering	113.40	12.13	1.15	15.73
		Ecosystem function	Enhanced ability to reduce pollutants			
		Adjustment of industrial structure	Reduction of pollutant discharge			
		The Great River Diversion Project	Water environmental capacity (pollutant holding capacity) increased			

4. Conclusion

To sum up, in the economic construction and development of new era, our country water environment of taihu lake watershed comprehensive treatment, and still will comprehensively implement the scientific outlook on development, adhere to the comprehensive management and scientific management, pay attention to adjust the industrial structure and industrial layout, continue to strengthen industrial point source, rural non-point source, urban sewage, endogenous pollution control efforts, pay attention to improve the level of ecological restoration, Strive to form a benign circulation system of watershed ecosystem. Only in this way can we provide basic guarantee for the economic and social development of the watershed.[10]

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