

Implementing the Fundamentals of Water Conservancy Development and Speeding up the Ecological Construction of the Yellow River in Jinan

Xin Zhen Li

Shandong Huanghe Shuncheng Water Conservancy and Hydropower Engineering Co., Ltd.
jnhhlxz@sina.com

Abstract:

President Xi inspected the Yellow River in Zhengzhou on September 17, 2019, and the Yellow River ecological civilization construction in Ningxia on June 8, 2020, and made important instructions on the construction of the Yellow River ecological civilization. President Xi put forward the general tone of water conservancy reform and development with the principle of "strengthening weak links of water conservancy projects and strengthening supervision of water conservancy industry". Ji'nan Yellow River will start from saving water, scientific development and utilization of the Yellow River water resources, constructs the overall development system of Yellow River ecological civilization and constructs green, ecological, civilized Jinan Yellow River.

Key words: *Ecological Construction of the Yellow River; Water Conservancy Development; Ecological civilization; Water conservancy projects*

1. The Requirements of the New Era

General Secretary Xi Jinping has a profound insight into our country's national conditions and water conditions, and clearly put forward the water management policy of "prioritizing water saving, spatial equilibrium, systematic governance, and two-hands pushing". General Secretary Xi Jinping inspected the Yellow River in Zhengzhou on September 17, 2019, and inspected the ecological civilization construction of the Yellow River in Ningxia on June 8, 2020, giving important instructions to the construction of the Yellow River ecological civilization. Minister E Jingping put forward the general keynote of the reform and development of water conservancy of "water conservancy projects to make up for shortcomings and strong supervision of water conservancy industry". It laid down clear new requirements for the development of the cause for Yellow River, and new requirements for the construction of the ecological civilization of the Yellow River in Jinan. With the development of reform and opening up, Jinan's economy has been developing vigorously, and the overall strength of Jinan has been greatly improved. The urban development of Jinan is limited by the mountainous areas in the south and the Yellow River in the north, forming the layout of being narrow in north-south direction and elongated in east-west direction.

In recent years, a development model of the city crossing the Yellow River northward has been proposed in order to accelerate the development of Jinan City, and a conversion zone for new and old functions has been established in Jiyang District. On the basis of the original Jinan Yellow

River Bridge, Jinan's cross-river traffic has started the construction of the Qilu Avenue Northward Extension Project, the Phoenix Road Northward Extension Project, and the Jiluo Road Tunnel. The Huanggang Road Tunnel and Jinan Bridge Second Bridge are also in active preparation to speed up the pace of Jinan City's northward crossing. The Jinan Yellow River will surely become the city river, and construction of ecological civilization will be carried out. On the premise of ensuring the security of urban protection, the Jinan Yellow River will be built into a steel wall of flood prevention, becoming the mother river of ecological civilization and a beautiful landscape in Jinan.

2. The Current Status of Yellow River Management in Jinan

2.1 The Management Level Continues to Improve, but there is Still a Big Gap with the Development of Jinan

After years of construction on the Yellow River in Jinan, the flood control capacity has been greatly improved, and the landscape has been improved to a certain extent, ensuring the continuous flow of the Yellow River and normal flooding. However, there is still a big gap to meeting the ecological civilization project standards, and continuous efforts of construction are needed to meet the requirements of Jinan for city river and landscape river.

2.2 The Water Demand for Daily Use, Production and Ecology is in Imbalance with the Water Resource Carrying Capacity and the Water Environment, and the Structural Conflicts between Water Demands is Prominent.

With the development of industry and agriculture in our country, especially the development of industry, water consumption is constantly increasing with economic development. However, the rainfall in the Yellow River Basin is limited. Conflicts between supply and demand are becoming increasingly prominent as demand for water increases continuously under the constraint of limited water resources.

2.3 The Phenomenon of Water Resources Wastage has not been Completely Rectified

Firstly, the agricultural water tank area is not matched, and irrigation is still extensive. Secondly, the meticulous and multipurpose use of industrial water has not been achieved. Thirdly, new technologies for water conservation and scientific water use need to be improved. With increasingly limited water resources, water-saving agriculture and industry must be developed.

In view of the current status and existing problems of the Yellow River in Jinan, practical water-saving and protection measures has to be implemented to achieve water saving, scientific water consumption, water resources protection, and acceleration of the construction of Jinan Yellow River's ecological civilization. Firstly, a flood control and protection system for the Yellow River is to be built, and secondly, the construction of an overall development system for the Yellow River's ecological civilization is needed.

3. Constructing the Yellow River Protection Engineering System to Ensure Urban Safety

After years of construction on the Yellow River in Jinan, new embankments have recently been completed during the "12th Five-Year Plan" and "13th Five-Year Plan" period. The embankment roads have greatly improved the traffic on both sides of the Yellow River and the demand for flood prevention and emergency traffic. The basic reconstruction of critical levee sections has been completed, the steering has been repaired, the dike has been reinforced, and the engineering protection capability has been greatly improved. But to serve as the city river of Jinan, ecological civilization must be built.

4. Water Conservation, Scientific Development and Utilization of Water Resources of the Yellow River

4.1 Water Conservation

The total amount of water consumed is to be strictly controlled. Strengthen infrastructure construction, scientific and technological research, develop water-saving industrial and agricultural facilities, and prevent wasting water resources. Promote regional socio-economic development planning, urban development planning, and the construction of various industrial parks to carry out reasoning on water resource planning. To promote the establishment of economic and social development on the scale and layout compatible with the water resource carrying capacity right from the source. Strictly control the total amount of allowed water withdrawal.

4.2 Protecting Water Resources

To establish and improve the Yellow River water resources management and control indicator system based on the requirements of spatial equilibrium. Improving the total water consumption control indicators with administrative regions as unit to continue promoting the refinement of the Yellow River water distribution indicators within Jinan City, promoting the distribution of the Yellow River water volume across administrative regions, and clearly define the total water use control indicators.

5. Constructing the Overall Yellow River Ecological Civilization Development System

5.1 Overcoming the Current Traffic Bottleneck and Developing Flood-Proof Roads that Integrate Flood Control and Traffic

The embankment road of the Yellow River in Jinan has been constructed and rebuilt, and the traffic capacity and landscape have been greatly improved. However, the section from the Bang Bridge to the Yellow River Bridge on the south bank of the Yellow River has become the auxiliary road of the North Outer Ring of Jinan, and the traffic volume is very high. The current two-way two-lane design can no longer meet the current needs. In order to solve this problem, the width of this section of the embankment can be widened, designed into two-way four-lane, and simultaneously improve the standard of roads, which not only relieves the current traffic pressure, but also fulfill the needs of citizens to view the Yellow River.

5.2 Building the Silt Area into a Multifunctional Flood Control Project

Currently, the Yellow River embankment reinforcement project has been completed, and the forest shelter system in the silt-back area has basically been completed, which has played a great role in wind erosion prevention, sand-fixing, air purification, and water conservation. However, the construction standards are not high, the functions are specific, and the economic and landscape value of the trees are low, not realizing their value fully. Under the premise of their basic functions of flood control, the construction of parks should be carried out to build an ecological civilization project.

5.2.1 Building Pedestrian Paths

To build a pedestrian path for leisure and sightseeing for the citizens in the silted area using permeable and environmentally friendly materials. While strolling in the silted area, tourists get to view and learn about the Yellow River, and understand the huge role played by the Mother River in our country's economic development.

5.2.2 Developing Multifunctional Use in the Silt Area

On the premise of maintaining the integrity of the project and ensuring the flood control function, we have to further increase the varieties of trees and flowers, to achieve the objectives of strengthening the embankment, preventing wind erosion, improving sand-fixing, air purification, water conservation, and satisfying people's aesthetic needs. In practice, continuously optimize the proportion of nurseries, economic orchards, and flood-proof compatible forests in the silted area based on scientific and standardized project management with ecological engineering construction at the core of the project. We strive to create efficient ecological green industries and landscaping flood control with improved technology and product quality, and create a distinctive brand out of the Yellow River.

5.2.3 Slope Protection in Silt Areas

The Jinan section of the Yellow River, especially in the city section, has become a river in the city. The silted area is directly adjacent to the outer ring road, and the management of the slope in the silted area directly affects the urban landscape of Jinan. Currently, the slopes in the silted area are mainly planted with gebar grass and shrubs. As the weeds grow fast between the gebar grass and are large in number, they are difficult to remove. The shrubs planted are lacking in variety resulting in poor aesthetics, which affects the landscape of the project severely. Therefore, the slope management in the silted area needs

to be further improved.

5.2.3.1 Slope protection combining plant turf and shrubs. Plant-based slope protection is the most common kind of ecological slope protection technology and it has been promoted and applied in the Yellow River slope protection with plants playing their roles in soil and water conservation. This can achieve certain soil consolidation and soil erosion prevention purposes, and ensure that the local ecological environment will not be destroyed during the project construction, while simultaneously carry out certain landscape design to achieve the dual purposes of protecting the ecological environment and shaping the urban landscape. The problem is that the types of turf and trees are monolithic, without shaping and overgrown with weeds, which affects the urban landscape. We can plant lawns, flowers and shrubs with relatively developed root systems, and design them into different shapes. Flowers blooming in different seasons give Jinan city an additional beautiful landscape.

5.2.3.2 Geotechnical materials are used for soil consolidation and plant-based slope protection.

Geotechnical materials are geosynthetic materials widely used in geotechnical engineering today. It is a general term for polymer products. Geotechnical materials are divided into several categories: geotextile, geomembrane, geogrid, drainage board, composite geomembrane, geonet, geocell, and bentonite waterproof blanket etc. This material not only has good porosity and flexibility, the space and height are also more suitable for the growth of herbaceous plants, and can be filled with the soil and sand required for plant growth according to needs, and the roots of plants can pass through various meshes to grow adequately underground. The root system of plants closely connects the net mat, turf and the soil surface to form a relatively stable surface for ecological protection.

5.3 Build Critical Levee Sections into a Platform for Flood Prevention and Water Treatment

The main function of the critical levee sections is to resist the erosion of water flow and protect the foundation of the dangerous engineering. The root stone platform can adopt the new-type gabion ecological grid structure, which better realizes the judicious combination of the engineering structure and the ecological environment compared with some traditional rigid structures. With its own advantages, it has become the preferred structural type for protecting riverbeds, controlling landslides, preventing debris flows, and preventing rock falling while taking into account environmental protection.

5.4. Building a Base for Cultural Propaganda and Education

5.4.1 Building Yellow River Culture Exhibition Hall

Luokou is located at the middle section of the Yellow River in Jinan, close to the urban area of Jinan, and is the first destination for people visiting the Yellow River. It is possible to build a Jinan Yellow River Culture Exhibition Hall, which is a comprehensive exhibition hall with films, pictures, real objects, and stories. It introduces the history of the Yellow River, several large-scale construction processes after the founding of the People's Republic of China, the current features of the Yellow River, and the contributions of the Yellow River. By visiting the Yellow River Culture Exhibition Hall, visitors can better understand the Yellow River, improve their understanding and awareness on the protection of the Yellow River's water resources, and promote the construction of the Yellow River's ecological civilization.

5.4.2 Yellow River Culture Square

To construct the Yellow River Culture Square at a location with convenient transportations and more crowds for visitors to understand the culture of the Yellow River. Through stories of Yellow River, sculptures, and text introductions etc, people can learn about the Yellow River and increase their awareness of consciously loving and protecting the Yellow River.

5.4.3 Building a Base for Yellow River Anti-Corruption Education and Circuit Courts Etc

To cooperate with municipal and district commission for discipline inspection, Public Security Bureau, Procuratorate, Courts and other departments to carry out anti-corruption education and publicity of typical cases to improve people's ability to learn, understand and enforce laws, and to increase people's awareness and actions in protecting the Yellow River.

6. Conclusion

A development model of the city crossing the Yellow River northward has been proposed in order to accelerate the development of Jinan City, and a conversion zone for new and old functions has been established in Jiyang District. Ji'nan Yellow River will start from saving water, scientific development and utilization of the Yellow River water resources, constructs the overall development system of Yellow River ecological civilization and constructs green, ecological, civilized Jinan Yellow River. The Jinan Yellow River will surely become the city river, and construction of ecological civilization will be carried out. On the premise of ensuring the security of urban protection, the Jinan Yellow River will be built into a steel wall of flood prevention, becoming the mother river of ecological civilization and a beautiful landscape in Jinan.

References

- [1] Liu Haide. *New Development Philosophy Research series - Green Development*[M]. Nanjing: Jiangsu People's Publishing House, 2016.
- [2] Zhang Yunfei. *Achievements and Experiences in China's Ecological Civilization Construction since Reform and Opening up* [J]. *National Governance*, 2018(48): 24-33.
- [3] Zhou Yueshan. *Analysis of Ecological and Environmental Protection under the New Situation* [J]. *China Comprehensive utilization of Resources*, 2019, 37(08): 170-172.
- [4] Zhang Kun. *Urban River Regulation and Ecological Environment Protection* [J]. *Environment and Development*, 2008, 30(10): 204, 206.
- [5] Yang Yanting, Yang Xiaopeng. *Discussion on Urban River Regulation and Ecological Environment Protection* [J]. *Friends of Farmers Getting Rich*, 2018(11):79.
- [6] Dong Xin. *Discussion on Urban River Regulation and Ecological Environment Protection* [J]. *Chemical Industry Management*, 2018(15): 23.