Investigation and Analysis on Current Management of Small and Medium-sized Rivers in Shandong Province

Huilin Jing1*, Xi Tian2, Xiayi Lu1, Xia Cheng1, Shicheng Zhu1 and Shupeng Zhou1

1Haihe River Huaihe River and Xiaoqinghe River Basin Water Conservancy Management and Service Center of Shandong Province, Jinan, Shandong Province, 250100, China

2Shuifa Technology Group Co., Ltd., Jinan, Shandong Province, 250100, China

Corresponding author’s e-mail: jinghuilin@shandong.cn

Abstract: 2020 is the last year of the 13th Five-Year Plan, and also the final year of building a well-off society in an all-round way. During the 13th Five-Year Plan, small and medium-sized rivers in this province have experienced large-scale treatment, playing an essential role in flood control and drainage, agricultural irrigation, disaster prevention and mitigation, and improvement of river ecological environment in addition to improving the currently weak water-conservancy infrastructure. However, local government still have problems in funding, land acquisition, segment-based management and treatment, project maintenance, and the balance between flood control and eco-system. Therefore, it is necessary to take effective measures and give the small and medium-sized rivers a greater role in flood control, drainage and eco-system apart from increasing investment in these fields.

1. Introduction
Since 2016, the super El Niño has led to the frequent concurrence of floods in China, which was rare for years. A great many flood control projects, such as river dikes and reservoirs, have withstood severe tests as they have been operating at a high-water level for a long time. In 2017, in order to further clarify the goals and tasks for the flood control projects, the Ministry of Water Resources, the National Development and Reform Commission and the Ministry of Finance jointly compiled the Plan of Accelerating Water-Conservancy Projects after the Disaster on the basis of the 13th Five-Year Plan for Water Conservancy Reform and Development. Aiming at completing the construction tasks by the end of the 13th Five-Year Plan, improving small water-conservancy projects, enhancing flood control and preventing disasters. In August 2019, “Lichma” swept off Shandong Province, causing excessive precipitation and heavy floods in many places in Shandong, breaking the meteorological records of Shandong. In October 2019, the Shandong provincial government proposed to take measures to mitigate flood and drought, and issued the Implementation Plan of Key Water-conservancy Projects in Shandong Province to upgrade and put in place water-conservancy infrastructures before the flood season of 2020.

2. Management of small and medium-sized rivers in Shandong Province in recent years
Shandong Province is located along the eastern coast of China and in the lower reaches of the Yellow River, which belongs to the Yellow River, Huaihe River and Haihe River basins. It is divided into Taiyi Mountain, Low Hilly Area of Jiaodong Peninsula, and the plain area of Northwest Shandong and
Southwest Shandong based on its topographical characteristics. Shandong Province is scattered with rivers and water systems, with an average density of 0.24 km/square kilometers for the river network. There are 1049 rivers with a basin area of over 50 square kilometers, including 23 rivers with a basin area of over 3,000 square kilometers, 255 rivers with a basin area of 200-3,000 square kilometers and 771 rivers with a basin area of 50-200 square kilometers.

2.1. Management of small and medium-sized rivers based on the Plan to Accelerate Construction of Weak Links of Water-conservancy Projects

According to the plan, by the end of the “13th Five-Year Plan”, the small and medium-sized river projects with a basin area of over 3,000 square kilometers and a basin area of 200-3,000 square kilometers in Shandong Province will be completed, involving 137 small and medium-sized rivers and 194 treatment projects, with a total planned investment of 8,646.43 million yuan. Among them, there are 9 small and medium-sized rivers (14 projects) with an area of more than 3,000 square kilometers and a planned investment of 4,310 million yuan. The river under control is more than 700 kilometers long. There were 50 small and medium-sized rivers (55 projects) covering a distance of 472 kilometers for treatment in the original plan, with a basin area of 200-3000 square kilometers and a planned investment of 1,324.63 million yuan. The newly-added projects of small and medium-sized rivers with a basin area of 200-3000 square kilometers involve 78 rivers (125 projects) covering a distance of 864 kilometers for treatment, with a planned investment of 3,011.8 million yuan, aiming at further improving the flood control capacity of small and medium-sized rivers.

2.2. Management of small and medium-sized rivers based on The Implementation Plan for the Construction of Key Water-conservancy Projects in Shandong Province

In 2019, under the impacts of Lichma, a number of rivers in Shandong Province were exposed to the danger of flooding, especially in Xiaoqing River Basin. Damages on the bank of the tributary of the Xiaofu River flooded fields, villages and enterprises. In order to improve flood control and waterlogging capacity of water-conservancy projects and ensure safety, the Shandong Provincial People's Government issued the Implementation Plan for the Construction of Key Water-conservancy Projects in Shandong Province in October, 2019. The total investment of key water-conservancy projects in the province is estimated to be 132.338 billion yuan, including repair of damages, consolidation and upgrade of projects, as well as the construction of projects that channel water sources. The total investment in 2020 is 58.325 billion yuan. Centralized management of water-conservancy projects vulnerable to the typhoon mainly targeted the small and medium-sized rivers like the Xiaoqing River, five important waterways, ten backbone cross-city rivers, and 105 important river sections with hidden dangers of flood control.

By June 30, 2020, all 1643 key water-conservancy projects have been completed, with a total investment of 27.206 billion yuan. Among them, the Xiaoqing River flood control project cost 11.455 billion yuan, with the overall flood control capacity of the basin being significantly enhanced. All the damaged projects have been repaired, improving the disaster prevention and mitigation capabilities of these infrastructures. The cross-city backbone rivers and major urban river sections have met the Level 1 flood prevention standard while the other river sections are set at Level 2 flood prevention standard, effectively protecting the area from flooding and securing people’s life and properties.

3. Major Measures

3.1. Simplify the examination and approval procedures for in the preliminary stage

Endow officials at lower levels with the authority for approval of projects. Simplify the approval process. Procedures like site planning and flood impact assessment were removed. Also, the financial review and project approval were carried out together, with the approval of investment being granted in the preliminary stage. In the design report, there was a separate chapter on land acquisition and resettlement, which will not be submitted for approval. Changes of engineering design were based on
decisions made in meetings involving parties of interests, with the examination and approval procedures being completed afterwards.

3.2. Give full play to the role of the Shandong Provincial Key Water Conservancy Project Construction Joint Conference Office

The “1357” supervision and promotion mechanism was implemented. Also, the Shandong Provincial Key Water Conservancy Project Construction Joint Conference Office and the Xiaoqing River Emergency Flood Control Project Construction Office were integrated into the Shandong Provincial Key Water Conservancy Project Office, with three special teams responsible for supervision, coordination and promotion, and construction (quality and safety) being established. Five promotion mechanisms were set up for regular dispatch and notification, problem consultation and assessment, decision-making supervision, rapid information transmission, and notification and warning. Meanwhile, seven groups led by provincial officials were set up, responsible for full and detailed inspection and instruction.

3.3. Working at the front line

More than 100 key engineers were dispatched to the construction site to supervise key projects like drainage pump station, medium-sized reservoir and large sluice reinforcement project. They kept an eye on the projects 24 hours a day as well as on the construction progress while ensuring quality and safety. Each city and county have also established corresponding systems and working mechanisms to form a closed-loop supervision and promotion mechanism with the province, cities and counties working in close cooperation, thus ensuring the effective implementation of engineering construction.

3.4. Establishment of an institutional system combined with requirements of epidemic prevention and control

The outbreak of COVID-19 at the beginning of 2020 posed challenges to the progress of these projects. When the epidemic situation was initially controlled and the resumption of production was steadily promoted, the system incorporating project bidding, contract management, construction quality and safety supervision, reports and solutions to various problems, on-site supervision and service, epidemic prevention and control, assessment, reward and punishment was put in place to provide targeted and practical guidance and standards for engineering construction supervision.

3.5. Funding

Local governments and financial departments at all levels in our province gave strong supports to the construction of small and medium-sized river projects, and prioritized funds for the construction of key water conservancy projects. It was categorized into the agriculture-related funds, and arranged by the financial department at the provincial level. Funds for the Xiaoqing River and other cross-city backbone rivers were secured. Funds for other projects were distributed in accordance with the investment plan of key flood control and disaster reduction projects after the disaster in 2018 and other existing policies. Some of the new revenues in fiscal years at all levels were allocated to the construction of key water-conservancy projects. In case of fund shortage, local government bonds were issued to make up for the gap, thus effectively guaranteeing funds for project construction.

3.6. The problem reporting mechanism was established to ensure prompt clearance of problems in project construction

The problem reporting system was simplified from 4 levels to 2 levels, allowing problems encountered by the construction site to be directly reported to the corresponding office via telephone, email and other means, which will provide one-to-one and point-to-point services. Every Monday, the special office had a meeting, sorting out and solving problems in the project construction. For tough problems that hindered the construction of the project, special personnel were assigned to coordinate the schedule and solve the problem. A total of more than 500 construction problems have been solved,
including space limit at the entrance where the machines got stuck, shortage of epidemic prevention materials on the construction site, cross-construction with the re-navigation project, providing a strong guarantee for the rapid engineering construction and the quality and safety of projects.

3.7. Make a full use of information technologies
An information platform was developed for key water-conservancy projects to accurately report the real-time progress of key projects. Meanwhile, the unmanned aerial vehicles and manual on-site verification were combined to check the real progress of the projects from time to time. For projects that lagged behind, warnings in the form of on-site supervision, written notification and face-to-face meetings were adopted to promote efficiency. The reward and punishment system was established, and activities boosting mobility were held to ensure the timely completion and quality of engineering construction projects.

4. Experience and suggestions

4.1. Enhance management of preliminary work
In future project management, the local municipal water administrative departments should speed up preliminary works such as project design and relocation, improve the preliminary design and quality of the project, and avoid changes to the design. Also, it needs to strengthen coordination and communication, accelerate the progress of project review and approval by provincial and municipal water administrative departments, and ensure that the construction starts as soon as possible.

4.2. Strengthen supervision by third parties
Inspection, unannounced visits and supervision of the water-conservancy projects could help improve the management of project construction and maximize the benefits brought by the project.

4.3. Fund guarantee
It is suggested to increase the central funds support for public water-conservancy projects to relieve the pressure on local supporting facilities, boost local investment in water-conservancy construction, and make up shortcomings and ensure the smooth implementation of the project. The local government where the project is located needs to make clear the use of the fund when making the investment plan of key flood control and disaster reduction projects, so as to ensure that the funds are truly utilized for project construction.

4.4. Solve the problem of land use
It is suggested that the land including farmland, woodland and forest within the scope of river management should be confirmed, and the nature of the land should be clarified. It is recommended to enhance the coordination between higher authorities, ensure the normal function of the river, and protect the interests of people while ensuring the smooth construction of flood control and disaster reduction projects.

4.5. Establish an efficient inter-departmental contact and coordination mechanism
The water-conservancy department, finance department, land and other related departments are all responsible for the river management projects. The lack of communication and coordination would hinder the construction of the project. Therefore, the government should set up specialized agencies and a joint meeting system to study and solve existing problems, and promote the smooth progress of the project.

4.6. Treatment of the river system combining ecological and landscape effects
It is necessary to raise the governance standards, adopt comprehensive governance, adhere to the principles of scientific and unified planning, and listen to opinions and requirements from all sides to
carry out the construction of high-standard and high-quality of waterway projects featuring flood control, waterlogging removal and transportation. The projects not only meet people's needs, but also benefit nature by following the law of nature. By integrating the ecological, aesthetic and landscape attributes of the river, a “river of happiness” with ecological and aesthetic values is thus developed.

5. Conclusion
During the “13th Five-Year Plan”, measures such as dredging the river course, trimming dikes, rebuilding and expanding drainage culverts have been taken to eliminate potential hazard, improve the appearance of the river course and enhance the flood discharge and drainage capacity. During the “13th Five-Year Plan”, the small and medium-sized rivers in the Shandong Province were further improved, in particular via key water-conservancy projects that focused on exploration and innovation. These measures can be popularized and applied in the future river regulation projects.

References
[1] Zuli Wang. Information Office of Shandong Provincial People's Government, 2020. Press conference on construction of key water conservancy projects in Shandong Province. http://sdio.sdchina.com/online/860.html
[2] Jingjing Shi. (2012) Summary of middle and small rivers harness in Hunan Province. The People’s Yangtze. 18: 36-39.
[3] Li Huang. (2017) Study on village regulation of Middle and small rivers. Technical Supervision of water conservancy. 04:87-88+139
[4] Wei Zhang. (2012) Summary of middle and small rivers harness in Jiangsu Province. The People’s Yangtze. 18:19-21
[5] Lei Xie. (2020) Study on the method of defining the boundary of Middle and small rivers in Xinjiang. Water Planning and design. 03:22-26+158