

**MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
SUMY NATIONAL AGRARIAN UNIVERSITY
ECONOMICS AND MANAGEMENT FACULTY**

Finance, Banking and Insurance Department

QUALIFICATION WORK

Second (Master's) level of higher education

on the topic: «**Public Property Management in the context of environmental protection - a case study of water resources management in county-level cities in China**»

Completed:

student of the specialty

073 "Management" (EP "Administrative Management")

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SUMY NATIONAL AGRARIAN UNIVERSITY

Faculty	Economics and management
Department	Finance, Banking and Insurance Department
Level of higher education	Second (Master's)
Specialty	073 "Management" (EP "Administrative Management")

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« _____ » 2023 p.

TASK on qualification work for student

Gao Debing

1. The topic: **Public Property Management in the context of environmental protection - a case study of water resources management in county-level cities in China**

2. Base of practical research:
Shandong Longkou City Water Conservancy Bureau

Supervisor Nataliia Maslak, Ph.D. in Economics, Associate Professor of the Finance, Banking and Insurance Department, SNAU

approved by order of the university dated _____ № 561/oc 23.02.2024 y

3. Deadline for submission of completed work by the student September, 5 2024

4. Input data to work:

educational and methodical manuals, monographs, textbooks on the subject of research, scientific publications, statistical information, information of Shandong Longkou City Water Conservancy Bureau.

5. Content of the settlement and explanatory note (list of issues to be developed):

- to investigate the theoretical and methodological aspects of public property management in the context of environmental protection (a case study of water resources management);
- analyze the current situation of the Longkou City water resources;
- analyze the difficulties and challenges of water resources management in Longkou City;
- justify directions for improving the management of water resources in the city of Lunkou;
- to improve water resources management planning;
- to develop measures to strengthen control over the handling of surface sources of drinking water supply;
- to propose tools for coordinating the maintenance and construction of water management facilities;
- to improve and propose training measures for water resources management personnel.

6. The date of issue of the task: **June, 19 2023**

CALENDAR PLAN

№	Name of stages of the qualification work	Date of performance project stages	Note
1	Defining the object, the subject of research, formulating the goal and tasks of the qualification work, preparation of the plan - schedule of work	June 2023	
2	Selection and analysis of literary sources, the preparation of the first theoretical chapter	September - October 2023	
3	Generalization of the theoretical material on the selected research topic and presentation of the draft version of the first chapter of the qualification work	November 2023	
4	Collection and processing of factual material, generalization of the analysis of the application of the researched question on the basis of practice (professional internship and pre-diploma practice)	December 2023	
5	Preparation of the theoretical part of the qualification work, generalization of the analytical part, defense of the report on pre-diploma practice	January 2024	
6	Designing directions for improvement of the investigated problem	January 2024	
7	Completion of the design part of the qualification work and submission of the preliminary version of the third chapter to the supervisor	January 2024	
8	Update of data for 2022, 2023 and refinement of the analytical and project chapter of the qualification work	March 2024	
9	Completion of the qualification work and its submission for preliminary defense and review	August 2024	
10	Verification of qualification work for authenticity (submission of work for plagiarism check to the department, to the department of quality of education)	August 28 2024	
11	Submission of completed work and related documents to the dean's office	September, 5 2024	
12	Defense of the qualification work	September 11-12, 2024	

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The qualifying work is admitted to the defense

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Svitlana Lukash

SUMMARY

Gao Debing Public Property Management in the context of environmental protection - a case study of water resources management in county-level cities in China

Master's qualification work in specialty 073 "Management", OP "Administrative Management", SNAU, Sumy-2024 - Manuscript.

With the acceleration of global climate change and urbanization process, water resources management has become an important factor affecting the regional sustainable development. As an important economic node in Shandong Province, the water resources management strategy and practice of Longkou City have a far-reaching impact on the sustainable development of regional ecology, economy and society.

This qualification work aims to analyze the current situation of water resources management in Longkou City, identify its main challenges, and propose targeted management strategies. First of all, the basic situation of the water resources in Longkou city was reviewed, including the total amount, distribution and utilization status of the water resources. Through field research and data analysis, the achievements and existing problems in the water resources management were evaluated, and the challenges brought by climate change and urbanization to the water resources management in Longkou City were deeply discussed.

The study found that Longkou city has achieved remarkable results in water resources management, such as the promotion of water-saving irrigation technology and the improvement of sewage treatment rate, etc., but it still faces problems such as water resources shortage, water pollution, and water ecological damage. To solve these problems, this paper puts forward strategies such as strengthening water resources protection, improving the efficiency of water resources utilization, and strengthening regional cooperation and resource sharing. In addition, the paper discusses the importance of scientific and technological innovation, public participation and legal guarantee in water resources management. The research on water resources management in Longkou city is of great significance for promoting the sustainable utilization of regional water resources. Through the implementation of scientific and reasonable management strategies, Longkou City can make greater achievements in ensuring water resources security and promoting sustainable economic and social development. In the future, Longkou city should continue to strengthen the research and practice of water resources management, constantly innovate the management methods and methods, and contribute to the construction of a water resource-conserving society.

Key words: water resources management; sustainable development; challenges and strategies

АНОТАЦІЯ

Гао Дебін Управління громадською власністю в контексті захисту навколишнього середовища - приклад управління водними ресурсами в містах повітового рівня в Китаї.

Кваліфікаційна робота магістра зі спеціальності 073 «Менеджмент», ОП «Адміністративний менеджмент», СНАУ, Суми-2024 р. – Рукопис.

З прискоренням глобальної зміни клімату та процесу урбанізації управління водними ресурсами стало важливим фактором, що впливає на регіональний сталий розвиток. Будучи важливим економічним вузлом провінції Шаньдун, стратегія та практика управління водними ресурсами міста Лункоу мають далекосяжний вплив на сталий розвиток регіональної екології, економіки та суспільства.

В кваліфікаційній роботі проаналізована поточна ситуація з управлінням водними ресурсами в місті Лункоу, визначені основні проблеми та запропоновані цільові стратегії управління. Перш за все, було розглянуто базову ситуацію з водними ресурсами в місті Лункоу, включаючи загальну кількість, розподіл і статус використання водних ресурсів. За допомогою польових досліджень та аналізу даних було оцінено досягнення та існуючі проблеми в управлінні водними ресурсами, а також глибоко обговорено проблеми, пов'язані зі зміною клімату та урбанізацією в управлінні водними ресурсами в місті Лункоу.

Дослідження показало, що місто Лункоу досягло значних результатів у сфері управління водними ресурсами, наприклад, просування водозберігаючих технологій зрошення та підвищення рівня очищення стічних вод тощо, але воно все ще стикається з такими проблемами, як нестача водних ресурсів, забруднення води, та водно-екологічну шкоду. Для вирішення цих проблем у даному дослідженні пропонуються такі стратегії, як посилення охорони водних ресурсів, підвищення ефективності використання водних ресурсів, а також посилення регіонального співробітництва та спільного використання ресурсів. Крім того, в роботі обговорюється важливість наукових і технологічних інновацій, участі громадськості та правових гарантій в управлінні водними ресурсами. Дослідження з управління водними ресурсами в місті Лункоу мають велике значення для сприяння сталому використанню регіональних водних ресурсів. Завдяки впровадженню наукових і розумних стратегій управління місто Лункоу може досягти більших успіхів у забезпеченні безпеки водних ресурсів і сприянні сталому економічному та соціальному розвитку. У майбутньому місто Лункоу має продовжувати зміцнювати дослідження та практику управління водними ресурсами, постійно впроваджувати інновації в методи та методи управління та сприяти побудові суспільства, яке зберігає водні ресурси.

Ключові слова: управління водними ресурсами; сталий розвиток; виклики та стратегії.

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INTRODUCTION

Relevance of the topic. At present, the global environmental protection problem is becoming more and more prominent. All countries are strengthening environmental protection and introducing environmental protection policies and measures. Water resources is one of the important parts of public property. The water resources management of Longkou city has been closely concerned, and there are many difficulties and challenges. The practical research and exploration of Longkou urban water resources management can provide reference ways, opinions and experiences for the theory and practice in this field, and promote the sustainable utilization of water resources and environmental protection.

Longkou city as grassroots administrative areas, the distribution of water resources, the future development trend, water pollution and protection, water allocation optimization degree, management system is effective, water conservancy project quantity and operation, laws and regulations, government propaganda and residents consciousness of diversification, unbalanced characteristics. Water resources management needs to start from the all-round, comprehensive use of technology, economic, legal, administrative and other means, comprehensive planning, overall planning, comprehensive utilization, emphasis on benefits. Give full play to the various functions of water resources; pay attention to protecting water resources, protect natural vegetation, plant trees and grass, conserve water, prevent soil and soil erosion, improve ecological environment, and strengthen prevention and control of water pollution, protect and improve water quality, and practice water conservation. To realize the sustainable utilization of water resources and the sustainable development of social economy.

The goal and tasks of the research. The goal of this work is to the research aims to provide actionable recommendations for policymakers and public administrators to enhance the management of water resources in a way that balances public ownership with robust environmental protection.

To achieve this goal, the author set the following tasks:

- to investigate the theoretical and methodological aspects of public property

management in the context of environmental protection (a case study of water resources management);

- analyze the current current situation of the Longkou City water resources;
- analyze the difficulties and challenges of water resources management in Longkou City;
- justify directions for improving the management of water resources in the city of Lunkou;
- to improve water resources management planning;
- to develop measures to strengthen control over the handling of surface sources of drinking water supply;
- to propose tools for coordinating the maintenance and construction of water management facilities;
- to improve and propose training measures for water resources management personnel.

The object of the research is public property management in county-level cities in China, with a specific focus on water resources.

The subject of the research is the methods, policies, and practices of managing public water resources within the framework of environmental protection, examining how these approaches impact sustainability and resource efficiency in county-level cities in China.

The following ***research methods*** were used when writing the paper: comparative analysis (this method was used to compare different water management policies and practices across county-level cities in China, assessing their effectiveness in achieving environmental protection goals); case study analysis (a detailed case study of specific county-level cities was conducted to examine real-life examples of water resource management and the challenges faced in balancing public property management with environmental sustainability); statistical analysis (data on water usage, pollution levels, and resource efficiency were gathered and analyzed to identify trends and correlations in the management of public water resources); document analysis (relevant government policies, environmental regulations, and public property management guidelines were

reviewed to understand the legal and institutional framework governing water resource management in China); expert interviews (interviews with government officials, environmental experts, and local stakeholders were conducted to gain insights into the practical challenges and opportunities in managing water resources while ensuring environmental protection); field observation (on-site visits to county-level cities were made to observe water management practices firsthand, allowing for an assessment of how policies are implemented in practice and their environmental impact).

The scientific novelty of the results. The terms for determining its scientific novelty and submitting it for protection are as follows:

received further development: the study analyzes the impact of technological innovations and best management practices on improving water quality, reducing waste, and enhancing the overall sustainability of water resources. Ultimately, the research aims to provide actionable recommendations for policymakers and public administrators to enhance the management of water resources in a way that balances public ownership with robust environmental protection.

The practical significance of the obtained results lies in replenishing the theoretical base in matters of water resources management in county-level cities in China (Longkou city). This study investigates how public property management practices can be aligned with environmental protection goals to ensure sustainable water resource management in county-level cities in China. It explores the current frameworks and policies governing water resources, assessing their effectiveness in promoting both public ownership and environmental sustainability. The research examines the roles of local government authorities, community stakeholders, and private entities in managing and protecting water resources within these urban areas. Case studies from selected county-level cities illustrate the challenges and successes in integrating environmental protection measures with public property management strategies.

Approbation of the results of the qualification work. The provisions of the qualification work were presented by the author at two scientific conferences: the twelfth international science and practice Conference «Enterprise economics: modern problems

of theory and practice» (Odesa, September 8, 2023); the II International Scientific and Practical Conference (Sumy, November 16, 2023).

Publications. The results of the scientific research are reflected in two scientific works.

Structure and scope of work. The qualification work consists of an introduction, three sections, conclusions, a list of used sources from 58 names, appendixes. The main text is laid out on 55 pages of computer text, the work contains 0 tables, 0 figure, 2 appendixes.

CHAPTER 1

THE THEORETICAL AND METHODOLOGICAL ASPECTS OF PUBLIC PROPERTY MANAGEMENT IN THE CONTEXT OF ENVIRONMENTAL PROTECTION (A CASE STUDY OF WATER RESOURCES MANAGEMENT)

Scientific research on public property management in the context of environmental protection often examines how effective governance can ensure the sustainable use of natural resources, with a particular focus on water resources in county-level cities in China.

One area of study explores the challenges and opportunities associated with balancing economic development and environmental protection in water resource management.

Researchers analyze the role of local government policies in promoting sustainable water management practices, highlighting how regulations and incentives can influence the behavior of various stakeholders.

The impact of public participation in water resource management is also a key research focus, as community involvement is essential for ensuring that management practices align with environmental protection goals.

Studies often assess the effectiveness of technological innovations in water management, such as smart water monitoring systems, in improving resource efficiency and reducing environmental impact.

1. Background of water resources management research in Longkou city

Another important aspect of this research is understanding the interplay between public property management and environmental legislation, particularly how legal frameworks in China support or hinder sustainable water resource management at the county level.

In recent years, the global environmental problems have become increasingly serious. Climate change, marine pollution, biodiversity reduction, water pollution and other problems have brought great threats to human beings. To meet these challenges,

countries around the world have intensified their efforts in environmental protection and sustainable development. However, environmental protection work is never an isolated task, but needs the full support and cooperation of the whole society, in which the management of water resources and public property is becoming more and more important.

Water resources belong to the public property shared by all citizens, mainly including the surface water and groundwater in rivers, lakes and seas. The utilization of water resources must be based on the protection of water resources to ensure its sustainable utilization. It is the task of the whole society to manage water resources well and realize the virtuous cycle of environmental protection and economic development.

1.1 First, the formulation, improvement and implementation of water resources laws and regulations need to be further strengthened. The government shall establish a sound management system, delimit the scope of water resources management, and carry out scientific and reasonable use planning and dispatch of water resources, so as to ensure the integrity, safety and sustainability of water resources. Strengthen the penalties for violations in water resources management. At the same time, a sound public reporting mechanism should be established and improved to encourage the whole society to report violations, and urge them to be corrected.

To improve the laws and regulations on water resources, we need to start from many aspects to ensure the comprehensiveness, systematization, pertinence and effectiveness of the legal system. At the same time, it is also necessary to strengthen the publicity, education and popularization of laws and regulations, and improve the public's awareness of the rule of law and water resources protection. The improvement process should strengthen the connection and coordination between laws and regulations to avoid legal conflicts and gaps; According to the characteristics and actual situation of water resources, targeted local laws and policies should be formulated to meet the needs of different regions; Formulate and improve the legal system for water resources planning and allocation, clarify the allocation, use and protection requirements, strengthen the scientificity, rationality and fairness of water resources planning and allocation, ensure the sustainable utilization of water resources, establish water resources monitoring and

evaluation system, regularly evaluate and supervise the use and protection of water resources; define the objectives, tasks and measures of water environment protection, strengthen the legal requirements on water pollution prevention, water ecological restoration and water and soil conservation, increase the punishment for illegal acts, establish a public participation mechanism for water resources protection and treatment, and encourage the public to actively participate in water resources protection; Improve the legal system of water resources management and supervision, clarify the responsibilities and authority of governments at all levels and relevant departments, strengthen the informatization and intelligent level of water resources management and supervision, improve the efficiency and accuracy of management and supervision, establish the assessment mechanism of water resources management and supervision, conduct regular assessment and evaluation of the work of governments and relevant departments; clarify the legal responsibility and investigation mechanism for illegal water resources activities, increase the punishment for illegal acts, establish the reporting and reward mechanism for the illegal water resources activities, and encourage the public to actively report illegal acts.

1.2 Secondly, strengthen the supervision and protection of water resources. Strengthening the supervision and protection of water resources is a crucial task, involving environmental protection, sustainable development and the future survival of human beings. Through the laws and regulations of water resources management and protection, the use right, management right and protection responsibility of water resources shall be defined, the development and utilization of water resources shall be standardized, and the illegal exploitation, pollution and destruction of water resources shall be severely punished. The water resources supervision system shall be established, including water resources monitoring, evaluation, early warning and emergency management, and through real-time monitoring and evaluation of water resources, water resources problems shall be timely found and solved to ensure the sustainable utilization of water resources; Promoting water-saving technologies and measures, Reduce water consumption, Improve the efficiency of water resources utilization, for instance, Promoting water-saving irrigation, rainwater collection and utilization, and water-saving

appliances, Encourage enterprises and individuals to take water-saving actions; Strengthen the protection of water sources, Prevent water source pollution; Through ecological restoration measures, For example, wetland protection, river ecological management, etc, Improving the water ecological environment, Improve the quality of water resources; By means of publicity, education and popular science activities, To raise the public's awareness and attention to water resources protection; To strengthen cooperation and exchanges with other countries and regions, Learn from the advanced water resources management experience and technical means, Jointly address the global water challenge.

The government and social organizations should strengthen the supervision of water resources, establish a sound inspection system, and find out and deal with problems in time. At the same time, we should strengthen the protection of water resources and crack down on illegal occupation, theft and destruction by the public. In this process, we need sincere cooperation and cooperation from all parties to make the protection of water resources the responsibility of the whole society, deeply rooted in the people's hearts.

1.3 Finally, guide the whole society to develop environmental protection awareness and strengthen environmental protection education. Guiding the whole society to develop the environmental awareness of water resources and strengthen environmental protection education is the key to protect and improve the environmental quality of water resources and realize sustainable development. Through various channels and media, such as schools, communities and media, let the public understand the seriousness of water resources environmental problems, the importance of environmental protection and the responsibility and role of individuals in environmental protection; organize various forms of water resources environmental education activities, such as environmental protection lectures, exhibitions and practical activities, so that the public can enhance environmental awareness and practical ability through personal participation; Encourage the public to adopt green lifestyles, Such as reducing the use of disposable products, water conservation, the use of environmentally friendly products, sorting garbage recycling, Through every little action of our daily life, Contribute to water resources and environmental protection; Utilizing the media resources, Such as television, radio,

newspapers, the Internet, etc., Extensive publicizing water resources environmental protection concepts and practice cases, To form a good atmosphere for the whole society to pay attention to environmental protection and participate in environmental protection; Organize environmental protection volunteer activities, Let the public, through participation in environmental practices, Understand deeply about the importance and urgency of environmental protection work, At the same time, cultivate the public's sense of responsibility and mission of environmental protection; Integrating water resources and environmental education into the national education system, Cultivate students' awareness of environmental protection from childhood, Let them develop the good habits of protecting the environment from childhood.

In short, strengthening water resources management is an important means to ensure the sustainable development of water resources. The government and all sectors of society should work together to contribute to water resources management, so that water resources can be scientifically and reasonably used and protected, and achieve a harmonious and win-win situation between environmental protection and economic development.

CHAPTER 2

CURRENT ANALYSIS OF THE LONGKOU CITY WATER RESOURCES MANAGEMENT

2.1 Current situation of the Longkou City water resources

The study on the problems and countermeasures of Longkou urban water resources management helps to strengthen the public property management of water resources and promote the water resources environmental protection and sustainable development. With the acceleration of the urbanization process, Longkou City, as an important part of the urban system, faces many water resources management problems and challenges. It is imperative to study the problems and countermeasures of water resources management in Longkou city.

2.1 To provide a basis for the government's overall development decisions. It is helpful to scientifically study and plan the types and stock of urban water resources in Longkou, correctly measure and plan the types and volume of water resources, and provide the basis for the local government. For the stock analysis of Longkou urban water resources, various factors need to be considered comprehensively. On the one hand, it is necessary to conduct an in-depth analysis of the local climate, terrain, geology and other natural conditions to understand the natural conditions and changing trends of the local water resources. On the other hand, it is also necessary to consider the local population distribution, economic development status, water resources development and utilization situation and other factors, to understand the utilization status and existing problems of local water resources.

On this basis, various methods can be used to evaluate the stock of water resources, including water resources evaluation, water resources planning, water resources monitoring, etc. Through these methods, the stock situation of Longkou urban water resources can be more accurately understood and provide scientific basis for local water resources management and planning.

2.2 To provide a basis for the government water resources management laws and policies. It is helpful for the local government to formulate and improve water resources management laws, policies and measures, improve the links and processes of water resources management, standardize water resources management, and seek sustainable and stable development of society.

2.3 Provide data support for water resources governance. It is helpful to prevent and respond to all kinds of water disasters, treat and eliminate water pollution, ensure the safety of people's water use, and reduce or reduce the adverse impact of water resources problems on local people's production and life. Longkou city should establish a sound early warning and monitoring system, including hydrological monitoring stations and meteorological monitoring stations, to monitor the key indicators such as rainfall, water level and flow in real time. Through the early warning and monitoring system, the hidden dangers and risks of water disasters can be found in time to provide scientific basis for emergency response. For the possible water disasters, Longkou City should formulate detailed emergency plans, including emergency organization, emergency resources and emergency process. The plan should be formulated according to the local actual situation, focusing on practicability and operability; Longkou City should strengthen the emergency response capacity, including establishing emergency teams, storing emergency supplies and carrying out emergency drills. In case of disaster, we can quickly organize rescue and relief efforts to minimize disaster losses. After water disaster, Longkou City should organize post-disaster recovery work as soon as possible, including repairing water conservancy facilities, cleaning up garbage and resuming production. At the same time, the post-disaster reconstruction work should strengthen the publicity and education of water disaster prevention and response to improve the public awareness and response to water disasters. Through publicity and education, the public can be guided to actively participate in the prevention and response of water disasters, and form a good atmosphere for the participation of the whole society.

2.4 Ensure the domestic water demand of local residents and improve the efficiency of water resources utilization. Longkou city has many residents and agricultural land. The management of water resources is directly related to the local residents' demand for

domestic water and irrigation of agricultural production. Through the research and management of water resources in Longkou City, the demand for domestic water of local residents and irrigation of agricultural production can be better guaranteed, and the quality of life and agricultural production efficiency of local residents can be improved. Longkou city is often faced with the problem of water shortage and low efficiency of water resources utilization. Through the research and management of water resources in Longkou City, the utilization status of water resources and the existing problems of water resources can be better understood, and targeted solutions can be proposed to improve the utilization efficiency of water resources, and realize the optimal allocation and efficient utilization of water resources.

2.5 To promote the sustainable development of the local economy and society. It is helpful to establish a professional water resources management team, improve the level of water resources management, accumulate rich experience in water resources management, ensure the sound development of water resources management and use, and help the local economic development. Water is the basic resource for economic and social development. As an important unit of local economic development, Longkou city's water resources management directly affects the sustainable development of local economy and society. Through the research and management of water resources in Longkou City, the water demand for the development of local economy and society can be better met, and the sustainable development of local economy and society can be promoted.

2.2 The difficulties and challenges of water resources management in Longkou City

Water is necessary for human survival and development, and it is an irreplaceable resource. However, with the rapid advancement of urbanization and the increase of industrial and agricultural production, the contradiction between supply and demand of water resources is increasingly intensified, especially in Longkou city, water resources management is facing many difficulties and challenges, and we need to take timely measures to solve them.

1. Limited natural conditions

One of the primary problems of water resources management in Longkou City is the limitation of natural conditions. Due to the different climate and geographical conditions and the influence of human activities, the water resources in Longkou city are increasingly showing seasonal or regional changes, which show the total amount of water resources, the scope and degree of drought water disaster risk change, and the increasing impact on people's life and production needs. In addition, the impact of climate change such as insufficient rainfall and river depletion on water resources in Longkou city makes water resources management more complicated and difficult.

With the social progress and economic development, the characteristics of water resources in Longkou city have changed greatly, and the stock of surface water resources in the city generally shows a decreasing trend, and the problems of resource, engineering and water shortage have become more and more serious. Longkou rapid economic development in recent years, total GDP has entered the top ten China longkou, industrial and agricultural output always present rapid growth, the demand for water resources is more and more large, parts have frequent surface water stock warning, excessive groundwater exploitation, local governments have long-term contradiction between supply and demand of local water resources nearby river water diversion project construction, water storage project expansion, control of groundwater exploitation. For example, the government presided over the construction of the Yellow River (Yellow River water) open channel, the project through more than 10 towns in Longkou, mainly using water diversion to enrich the water storage of large reservoirs, and on this basis, expand large reservoirs, increase the water storage, fundamentally alleviate the regional water tension.

2. Illegal occupation and pollution of water resources

With the advancement of industrialization and urbanization in Longkou City, as well as the increase of new industries and the influence of scientific and technological progress, the problem of illegal exploitation and excessive utilization of water resources is becoming more and more common. One of the most serious problems is the illegal occupation of water sources, resulting in the shortage or interruption of water supply; another important problem is water pollution, industrial wastewater, domestic sewage,

pesticides and fertilizers and other harmful substances in the water body increase, threatening the quality of surrounding water sources. At the beginning of this century, with the improvement of industrialization, the surface water quality in Longkou city, especially the river quality, the pollution degree is increasing, and the decrease of groundwater level shows a trend of gradually decreasing. With the continuous rectification in recent years, the overall water environment is getting better. In recent years, in terms of water environment in Longkou City, there are two state-controlled sections in Longkou City, among which the Huangshui River reaches the class standard and the Yongwen River reaches the surface water standard, which are all better than the national standard. The water quality of urban drinking water sources steadily reaches the standard of surface water, and the water quality of the nine monitoring points in coastal areas all meets the requirements of corresponding functional zoning.

At the end of last century and the beginning of this century, with the rapid development of society and economy, the water resources in eastern northern China, especially water sources and rivers, became serious pollution, and the groundwater level in most Longkou cities dropped sharply. In recent years, Longkou Municipal Government attaches great importance to environmental protection work and actively takes effective measures to strengthen the management of water resources. The work of energy conservation and emission reduction has been fruitful, and the overall water resources situation has continued to develop well. By 2023, the proportion of excellent water bodies in surface water assessment section was 83.0%, 5.2 percentage points better than the same period last year; the water bodies in Class V and below were "zero" for two consecutive years, and the proportion of excellent water bodies in the Yellow River basin, Nansi Lake basin and the main stream of Xiaoqing River reached 100% for the first time. The proportion of excellent water quality in the province is 93.3%, but the hidden water pollution still needs to be inspected.

3. Safe water supply problem

Longkou city water supply safety is a long-standing problem. Most longkou cities have a long history, the water supply facilities are insufficient or aging, the leakage rate of the water supply network is high, the water source, water quality and water quantity

cannot be effectively guaranteed, and the safety supervision is not in place, resulting in urban residents can not produce and live at a reliable water supply level and then cause public health problems.

Longkou city faces some difficulties in ensuring safe water supply. Although longkou through the implementation to increase water reservoir capacity engineering, in order to improve water consumption of water unicom engineering, in order to improve the water supply rate of water supply engineering, to increase resource utilization to reduce pollution of recycled water utilization engineering and water desalination project, formed a more perfect "four water" joint deployment of water network, but still face some challenges in the process of actual water supply.

First of all, the distribution of water resources in Longkou city is uneven, and the storage of reservoirs is not fully supplemented, which leads to limited water supply capacity. In order to solve this problem, Longkou city needs to actively strive for the diversion of water, scientifically formulate water diversion plan, to maximize the diversion capacity, ensure the demand of urban and rural residents and the sustainable and stable development of economy and society.

Secondly, with the rapid development of urbanization and the continuous expansion of the population scale, the demand for water resources in Longkou City is also increasing. This requires Longkou city to ensure the safety of water supply, but also pay attention to the conservation and efficient use of water resources, promote the construction of water-saving society, intensive and economical use of water resources.

In addition, water quality safety is also an important issue facing the safe water supply in Longkou City. Although Longkou city has made some achievements in the water quality of urban drinking water sources, it still needs to strengthen the protection and treatment of the water sources to ensure that the water quality reaches the standard stably. At the same time, it is also necessary to strengthen the supervision and maintenance of water supply facilities to ensure the safe and reliable operation of water supply facilities.

4. The utilization of water resources is inefficient and chaotic, and the management level needs to be improved

The utilization rate of water resources in Longkou city is inefficient and the waste phenomenon is common, mainly manifested as farmland channels, water leakage and water pollution, directly increasing the pressure of water resources; in the development process, lack of unified water resources planning, decentralized governance and lack of management cooperation with surrounding counties and cities, easy to form "zero-sum effect" and waste resources; Besides, Longkou water resources managers have low comprehensive quality, relatively weak technical strength, insufficient management experience, and analysis of water resources, which further aggravates the operation and management problems.

The per capita water resources of Longkou city is only 1 / 6 of the national per capita water resources, which belongs to the serious resource water shortage area. This makes the management of water resources particularly important to ensure the efficient and rational use of limited water resources; the coastal area of Longkou city is designated as a groundwater overmining area, which means that effective measures need to reduce the amount of groundwater extraction and protect the groundwater resources. However, due to historical reasons and economic development needs, the exploitation of groundwater has always been large, which makes the recovery and management of groundwater resources difficult; despite regulations and policies of Shandong Water Resources Regulations and other regulations on water resources management, the actual implementation, leading to poor water resources management; insufficient public attention to water resources protection may lead to waste and pollution of water resources. This requires enhanced education on water protection and public awareness of water protection; With the advancement of technology, water management technologies and means are constantly updated. However, Longkou City may be backward in water resources management technology and means, so it is necessary to introduce and apply advanced water resources management technology and means to improve the efficiency and level of water resources management.

CHAPTER 3

JUSTIFICATION OF DIRECTIONS FOR IMPROVING THE MANAGEMENT OF WATER RESOURCES IN THE CITY OF LUNKOU

3.1 Improvement of water resources management planning

The Longkou Municipal Government shall establish a water resources management plan, adopt a unified management mode according to the local water resources situation and the needs of urban development, make reasonable planning and construction, and strictly regulate the development of water resources. Strengthen the collection, measurement and monitoring of water, implement a strict standard control system for each water resource collection point, indicate the open source and flow direction of water, and prevent the illegal occupation of water. At the same time, strengthen publicity and promotion, improve public awareness of environmental protection, reduce the abuse and waste of water resources.

3.1.1 Implement scientific water resources measurement and clarify the direction of regional water resources utilization. First, Combined with the urban geographical conditions of Longkou, Invite a professional team to regularly regular comprehensive measurements of water resources, Using advanced water quality monitoring equipment, Water resources measurement should be scientific and accurate, Combined with the actual and effective use of advanced water resources measurement technology, Such as: satellite remote sensing technology, sounge instrument, professional laboratory analysis and monitoring, continuous meteorological observation, ultrasonic technology, electromagnetic technology, etc., Ensure the accuracy and reliability of the data; Establish and improve the water resources monitoring network, Strengthening the construction of the water resources monitoring system, Including surface water, groundwater, rain water, seawater and other monitoring stations, To clarify the regional surface water, groundwater level, stock assessment and forecast and the overall resource

distribution, Classify and sample the water quality, Guide the subsequent use decisions with accurate data; Regular release of water resources monitoring reports, For government decision-making, business operations and public understanding.

Suppose there is a small watershed with an area of 100 square kilometers. Through hydrological monitoring and analysis, the following data were obtained and obtained:

1. The annual average annual precipitation is 800 mm.
2. The surface runoff coefficient is 0.4 (the proportion of precipitation converted into surface runoff).
3. Groundwater recharge accounts for 20% of the precipitation. First, calculate the amount of surface water resources:

surface water resources amount =catchment area $\times$ annual precipitation $\times$ Surface runoff coefficient= $100 \times 10^6 \text{ m}^2 \times \text{meter} \times 0.4 = 3.2 \times 10^7 \text{ m}^3$

Secondly, calculate the amount of underground water resources:

Underground water resources quantity = river basin area $\times$ annual precipitation $\times$ Groundwater recharge ratio= $100 \times 10^6 \text{ m}^2 \times 0.8 \text{ meter} \times 0.2 = 1.6 \times 10^7 \text{ m}^3$

The total reserves of water resources in the basin=Surface water resources amount + underground water resources amount= $3.2 \times 10^7 \text{ m}^3 + 1.6 \times 10^7 \text{ m}^3 = 4.8 \times 10^7 \text{ m}^3$

It should be noted that this is just a simplified example of calculation. The actual calculation of water reserves will be more complex, and more factors need to be considered, such as soil water content, evapotranspiration, aquifer characteristics, etc.

Second, combined with the water quality measurement results, geographical distribution, industrial water, agricultural water, domestic water for reasonable regional water resources utilization planning allocation, to the nearest principle of preliminary

distribution, combined with the long distance network facilities principle of making full use of resource allocation, with reasonable stock principle of water resources allocation as a whole. Formulate water resources utilization plan, evaluate the availability and sustainable utilization of water resources according to the results of water resources measurement; formulate detailed water resources utilization plan, clarify the utilization direction, utilization and timing of different water sources; and incorporate water resources utilization plan into the overall urban development plan to ensure the coordination between water resources utilization and urban development.

Thirdly, strengthen the management and supervision of water resources, and promote water-saving technologies and measures. Establish the responsibility system for water resources management, clarify the responsibilities and rights of governments and departments at all levels, strengthen the supervision of water resources, ensure that the utilization of water resources conforms to the planning and policy requirements; severely crack down on illegal activities such as illegal water intake and misappropriation of water resources, and maintain the order of water resources management. Encourage and support enterprises and individuals to adopt water-saving technologies and appliances to reduce the waste of water resources; promote water-saving irrigation, water-saving production, rainwater collection and utilization in agriculture, industry, urban life and raise public awareness and water saving ability through publicity and education. We will strengthen the protection of water resources and ecological restoration, and strengthen scientific and technological innovation and personnel training. Strengthen the protection of water source to ensure the safety of water quality; implement the treatment and ecological restoration of groundwater overmining area, improve groundwater environment; strengthen water environment treatment, reduce water pollution and ecological destruction; support scientific and technological innovation and development in the field of water resources management, promote the application of new technology and new processes; strengthen the training of water resources management talents, and improve the professional quality and management ability of water resources management team.

3.1.2 Formulate perfect management measures for the change data of water resource stock. Water resources are an important basis for regional ecological and economic development, and accurate data management is the premise of scientific decision-making and effective management. Longkou city should establish a long-term monitoring team of water resources demand and stock change, do a good job in water resources data statistics for a long time, and guide water resources management decisions with scientific data.

Adhere to long-term overall measurement of local water resources use and frequency, accurately predict the change of water resources demand; insist on regular measurement of water resources stock data, combined with seasonal, weather, climate and other factors to make water resource stock change forecast, develop water resources demand emergency plan; responsible for water source safety monitoring, regular detection of water quality in each region, to ensure real-time control of water quality change data. Strengthen data integration and analysis, and integrate the water resources data scattered in different departments and institutions to form a complete set of data system. At the same time, professional analysis tools and methods are used to conduct in-depth analysis of the changes of water resources stock and reveal the reasons and trends behind them. Promote digital and information technology, and use advanced technologies such as big data, cloud computing, the Internet of Things and so on to improve the efficiency and accuracy of water resources data management. For example, a water resources information platform should be established to realize the real-time update and sharing of data. Strengthen data application and services, apply the change data of water resources stock to decision-making, planning, management and other links, to provide accurate and timely data support for the government, enterprises and the public. At the same time, through data release and disclosure, improve the public awareness and protection of water resources. Improve the regulations, policies and standard system, formulate and improve the regulations and policies related to water resources data management, and clarify the responsibilities, rights and obligations of data management. At the same time, a unified data management standard system should be established to standardize the collection, processing, storage and use of data.

Suppose a city has three main water use sectors: residential water, industrial water, and agricultural water. Domestic water consumption: The city has 50 0,000 residents, using an average of 150 liters per person per day. A year is calculated as 365 days.

Annual living water consumption of residents= $500000 \times 0.15 \times 365 = 27375000 \text{ m}^3$

Industrial water consumption: The city has 100 factories, each using an average of $5,000 \text{ m}^3$ water per day, 300 days a year,

Annual industrial water consumption= $100 \times 5000 \times 300 = 150000000 \text{ m}^3$

Agricultural water consumption: The city has 10 0,000 mu of farmland, and the average annual irrigation water consumption per mu is 800 m^3

Annual agricultural water consumption= $100000 \times 800 = 80000000 \text{ m}^3$

The city's total annual water consumption= Household living annual water consumption + industrial annual water consumption + agricultural annual water consumption= $27375000 + 150000000 + 80000000 = 257375000 \text{ m}^3$

This is just a very simple example of the water resource data calculation, and the actual water resource management will involve more complex factors and more detailed data. For example, the difference of water consumption in different seasons, the reuse rate of water resources, the loss of water resources, etc.

3.1.3 Intensify efforts to protect and improve water resources. As a densely populated and economically developed area, the protection and management of water resources are directly related to the quality of life of local residents and the sustainability of economic development. By protecting and controlling water resources, the ecological environment of Longkou city can be improved, promote biodiversity, and provide a more livable environment for local residents. The protection and treatment of water resources is directly related to the health of the people. Strengthening the protection and treatment of water resources can improve the quality of drinking water, reduce the risk of water pollution and protect the health of the people. Strengthen the protection and supervision of water sources, and effectively increase the punishment of illegal exploitation and pollution of water resources. At the same time, we should implement water-saving

technology, build a water-saving society, and improve the scientific level of water saving through scientific and technological means, so as to solve the problem of imbalance between supply and demand. In short, it is of great significance to protect and manage water resources in Longkou City, which is not only related to the quality of life of local residents and the sustainability of economic and social development, but also related to the balance of the whole regional ecosystem and the healthy development of society.

3.2 Strengthening control over the handling of surface sources of drinking water supply

We will increase green publicity of drinking water sources and surrounding environmental protection measures, formulate and improve protection plans for drinking water sources, clarify tasks, objectives, responsibilities and measures, eliminate animal husbandry, various construction projects and industries, and ensure the safety of drinking water. Strengthen the protection of water sources, Ensuring the water quality safety of drinking water sources is the top priority, Water source protection areas shall be designated, And to strengthen regulation, To hhibit activities that may pollute water bodies in water source protection areas, Such as the construction of industrial projects, the discharge of pollutants; Strict water quality monitoring, Establish a sound water quality monitoring system, Regular water quality monitoring of drinking water sources, Ensure that the water quality meets the national standards, At the same time, strengthen the supervision of water supply units, Ensure the safety of its water supply quality; The water supply unit shall strengthen the management and maintenance of the water supply facilities, Ensure the normal operation of the water supply facilities and the water quality safety, Regular inspection and maintenance of the water supply facilities, Find out and solve the problems in time; Strengthening the law-enforcement efforts, Strengthen the law enforcement of illegal acts, Strictly punish the units and individuals who violate the regulations on the administration of drinking water, At the same time, to strengthen publicity and education, To raise public awareness and participation in drinking water protection; Establish an emergency response mechanism, Establish an emergency

response mechanism for drinking water safety, Develop an emergency response plan, To ensure a timely and effective response to emergencies occurring, Ensure the safety of drinking water.

3.2.1 We will crack down on the illegal exploitation of water resources. To strengthen law enforcement, Longkou Municipal Comprehensive Administrative Law Enforcement Bureau should cooperate with other relevant functional departments, such as Qijia Town government, fire prevention team, land institute, etc., to carry out special rectification of illegal water mining behavior. Strictly investigate the illegal water mining sites, Demolish illegal water intake and water supply facilities and equipment, Close the intake wellhead, Urge farmers to dismantle illegal buildings around the water source area; Ban illegal sand mining sites according to law, Demolition of illegal buildings and illegal sand mining equipment, Cut off the power supply lines for illegal operation, Cleaning up illegal sand mining vessels and generators and other operating tools; Formulate remediation standards, Ensure the effectiveness and thoroughness of the action, Remove all sand mining equipment within the visible scope of the river channel in the reservoir area, Remove all illegal buildings in the river course in the reservoir area, The illegal sand mining site in the reservoir area should be restored and leveled; Establish a long-term strike governance mechanism, Take measures such as construction containment at the intersection of illegal sand mining into the reservoir, Prevent illegal sand mining personnel and equipment from entering the reservoir.

3.2.2 We will strengthen the management of underground water sources. Determine the groundwater overmining and forbidden areas, formulate the comprehensive treatment plan for the groundwater overmining area, define the management measures of the forbidden and restricted areas, close the well and enterprises; reduce the groundwater water intake through water source replacement and closed water well, strengthen the groundwater monitoring and supervision, establish groundwater dynamic monitoring system, monitoring the changes of underground water level and water quality in real time, and solve the problems found and solved in time. At

the same time to strengthen the supervision of groundwater exploitation units, establish and improve the underground water management institutions, clear measures for the management of groundwater exploitation, reasonable setting and register underground water sites, improve the efficiency of groundwater, avoid excessive mining, ensure that the mining unit comply with the relevant laws and regulations, in accordance with the provisions of mining and mining way; Actively carry out groundwater protection publicity activities, hold lectures, exhibitions, publicity weeks and other activities to popularize public knowledge of groundwater, publicize the importance of groundwater protection, raise public awareness of water saving and awareness of groundwater protection, strengthen the crackdown on illegal groundwater exploitation, strengthen law enforcement, punish illegal groundwater exploitation, punish offenders and exert public pressure; take measures to build reservoirs, artificial supply Wells, and improving water quality of rivers and lakes to increase groundwater recharge.

3.3 Coordination of maintenance and construction of water management facilities

The overall planning of the maintenance and construction of water conservancy facilities is of great significance for ensuring the normal operation of water conservancy facilities, promoting the rational utilization of water resources, improving the ability of disaster prevention and mitigation, and promoting economic and social development. The municipal government and relevant departments should attach great importance to the maintenance and construction of water conservancy facilities, increase the investment, improve the maintenance mechanism, and ensure the normal operation and benefits of water conservancy facilities. Urban water conservancy facilities mainly serve the management and utilization of regional water resources, including: water storage facilities, such as reservoirs, ponds, water storage channel, water diversion channel, water diversion facilities, water transmission network, drainage facilities, drainage ditches, drainage channels, water diversion facilities, such as hydropower stations, water turbines, flood control facilities, spillway, etc., shipping facilities, such as channel regulation

facilities and ship locks. Accurate management ledger should be established for relevant water conservancy facilities and equipment.

3.3.1 Maintenance of water conservancy facilities. The normal operation of water conservancy facilities can better serve the regional development, Its routine maintenance work, Mainly include: regular inspection and cleaning, Eliminate potential hazards, Ensure smooth water flow; Regular maintenance of water conservancy equipment, Ensure that the equipment works properly, Clean up and replace the damaged parts in time, Improve the operation efficiency and reliability of the equipment; Anti-freezing measures should be taken according to the seasonal changes, Avoid damage to the facilities; Strengthen the prevention of floods, earthquakes, wind disasters and other disasters in water conservancy facilities, Strengthen inspection and maintenance, Regularly check the working state of the disaster early warning equipment; Develop a regular maintenance plan, Clear responsibilities and division of labor, Prevent faults caused by the lack of maintenance; Establish an emergency maintenance and troubleshooting mechanism, Ensure that the professional maintenance team can adopt advanced testing technology and remote inspection system, Predict and solve problems in advance; Formulate a scientific, reasonable and perfect management system and strictly implement it, Clarifying the use rights and use principles of facilities and equipment, Regular inspection, evaluation, assessment, Strengthen the training of professional personnel, Improve the comprehensive quality and skill level of equipment users.

Establish and improve the maintenance management mechanism, formulate detailed maintenance management system of water conservancy facilities, define the maintenance responsibility subject, maintenance cycle, maintenance standards, etc.; establish a professional maintenance management team responsible for daily inspection, maintenance and emergency treatment of water conservancy facilities; establish maintenance files of water conservancy facilities, record the maintenance history, existing problems and maintenance records of facilities, to provide reference for subsequent maintenance work.

Increase the investment, increase the financial input for the maintenance of water conservancy facilities, ensure sufficient funds for the maintenance and renewal of facilities; encourage social capital to participate in the maintenance of water conservancy facilities and form the mode of cooperation between government and social capital; explore the establishment of the fund of water conservancy facilities maintenance, and provide stable sources of funds for the maintenance of facilities through diversified financing methods.

Strengthen the technical support, introduce and apply advanced water conservancy facilities maintenance technology, such as intelligent monitoring and UAV inspection, to improve the maintenance efficiency and effect; strengthen the training and education of water conservancy facilities maintenance personnel, improve their professional skills and quality; establish cooperative relations with universities and scientific research institutions to jointly carry out the research and innovation of water conservancy facilities maintenance technology.

Carry out preventive maintenance, timely find the problems and hidden dangers of water conservancy facilities through regular inspection and inspection, and take corresponding preventive measures; establish early warning system for water conservancy facilities maintenance, monitor the operation status of facilities in real time, timely find abnormal situation and take treatment measures; conduct regular maintenance and maintenance of water conservancy facilities to extend their service life and performance.

3.3.2 Construction of water conservancy facilities projects. The purpose of water conservancy facilities project construction is to better manage and utilize water resources. The project construction should follow the principle of resource conservation, ensure the convenience of surrounding residents and have no safety risks, and the principle of economic rationality. The specific management measures should consider the following contents:

planning programming. Formulate detailed plans according to the water resources, current situation and development needs of water conservancy facilities in Longkou City.

This plan will define the project objectives, tasks, implementation steps and the schedule. In the planning and design stage, the feasibility, technical requirements and environmental impact of the project should be fully considered. The planning and design scheme shall comply with relevant regulations and standards and conduct comprehensive and necessary evaluation and review. Strengthen project management, establish and improve the management mechanism of water conservancy facilities project construction, including project approval, examination and approval, bidding, construction, supervision, acceptance and other links. Ensure the smooth implementation and high-quality completion of the project fund management. Water conservancy facilities projects usually need a large amount of capital investment, so it is necessary to formulate effective fund management plans, including budgeting, fund raising and use supervision, to ensure the reasonable distribution and effective use of funds. Actively raise funds for the construction of water conservancy facilities projects, including government investment, bank loans, social investment, etc. At the same time, we will explore the use of PPP and other models to attract more social capital to participate in the construction of water conservancy facilities projects. Adhere to technological innovation. Introduce advanced technology and equipment to improve the scientific and technological content of water conservancy facilities project construction. For example, water-saving irrigation technology and intelligent monitoring technology should be adopted to improve the efficiency and efficiency of water conservancy facilities. Intelligent application: With the development of artificial intelligence and big data technology, intelligent technology has been more and more applied in the construction of water conservancy facilities projects, for instance, Monitoring the operation of water conservancy facilities in real time through intelligent sensing equipment, Using data analysis to provide accurate prediction and decision support, The application of these intelligent technologies can significantly improve the operation efficiency and safety of water conservancy facilities; Application of new materials: the new materials should be widely used in the construction of water conservancy facilities projects, for instance, Polymer materials can be used in waterproof, anti-corrosion, corrosion prevention and other aspects of water conservancy facilities, Nanomaterials can improve the performance and life span of water conservancy

equipment, Composite posites can reduce the weight of the hydraulic structures, Improve the compressive capacity and durability of the structure; Remote monitoring and control: The application of remote monitoring technology enables water conservancy facilities to conduct remote real-time monitoring and control, Through the remote monitoring system, Engineers can keep abreast of the operation status of the water conservancy facilities, And make timely adjustments. The application of this technology can improve the safety and reliability of water conservancy facilities; Water-saving irrigation technology: and in agricultural water conservancy facilities, Promote water-saving irrigation technologies such as drip irrigation, sprinkler irrigation, micro-irrigation, Can effectively reduce the farmland water consumption, Improve the efficiency of water resources utilization; Recycled water utilization technology: in both urban and rural areas, Promotion of the circulating water utilization system, The sewage treatment is used for farmland irrigation, landscaping, etc., To maximize the utilization of water resources; Sewage treatment technology innovation: to increase the research and development of sewage treatment technology, Improve the efficiency and quality of sewage treatment, Reduce the pollution to the water environment; Water ecological restoration technology: carrying out the water ecological restoration project, To restore the damaged water ecosystem, Improve the stability and health of the water ecological environment.

Supply chain management. Water conservancy facilities projects involve the procurement of a large number of materials and equipment, so it is necessary to establish a sound supply chain management system, including supplier selection, procurement contract management and material transportation, etc., to ensure the timely and reliable supply of materials required by the project. Full chain supply chain management: Establish an integrated supply chain management system, covering the whole process from raw material procurement, production, logistics and final delivery to customers, through real-time data analysis and monitoring to ensure the response speed and flexibility of the supply chain. Supplier management: conduct comprehensive evaluation and selection of suppliers to ensure high quality products and service capabilities, establish long-term and stable cooperative relationship with suppliers to jointly deal with market changes and risks, and at the same time, conduct regular performance evaluation

of suppliers to ensure that they always meet the project requirements; Inventory management: establish a scientific inventory management system, according to the project demand and market changes, reasonably adjust the inventory level and inventory structure. Monitoring and analyzing inventory data in real-time, Avoid overstock overstocking and waste, Ensure the smooth operation of the supply chain; Logistics management: optimize the logistics network and transportation mode, Lower transportation costs and time, Utilizing advanced logistics technology and equipment, Improve logistics efficiency and accuracy, At the same time, strengthen the risk control in the logistics process, Ensure the safety and integrity of the goods; Information sharing and collaboration: establishing a supply chain information platform, To realize information sharing and collaboration among all links of the supply chain, Through the platformized management, Increasing transparency and synergy in supply chains, Promote close cooperation and coordination between various links; Risk management: to identify and analyze the potential risks in the supply chain, Develop the corresponding risk management strategies and measures, Through a regular risk assessment and monitoring, Timely detection and response to risk events, Ensure the stability and reliability of the supply chain.

Construction management: in the construction stage, we need to supervise and manage the construction process, including the construction plan and schedule control, quality management, safety management, etc. Ensure that the construction complies with the design requirements, and solve the problems and risks in the construction in time. Project organization structure: clarify the organizational structure of the project, establish engineering technology Department, operation management Department, field headquarters, Quality management Department, Safety supervision Department, Finance and Labor Department, Mechanical and electrical materials Department, General office and other departments, and clarify the responsibilities and cooperation of all departments to ensure the smooth progress of the project; establish quality assurance system: strengthen quality awareness, strengthen quality management from design, construction, acceptance and other links to ensure the project quality. At the same time, to strengthen the supervision of the construction site to ensure that the construction meets the design

requirements and quality standards; supervise production safety, strengthen safety management system, strengthen the safety supervision of the construction site, conduct regular safety inspection, timely find and eliminate safety hazards; control schedule: make scientific construction plan, reasonably arrange the construction schedule, to ensure the completion of the project on time. At the same time, strengthen the monitoring of construction progress, find problems and take measures; control cost: strengthen cost management, control project cost and improve the economic benefit of the project. Starting with equipment procurement, material use and labor cost, formulate reasonable cost control measures; strengthen information management: using modern information technology to establish project management information system and realize the real-time update and sharing of project information. Improve the efficiency of project management and reduce the management cost; strengthen risk management: identify and analyze the possible risks in the project construction process, and formulate corresponding risk management strategies and measures to ensure the stable progress of the project.

Environmental protection: The construction of water conservancy facilities projects may have a certain impact on the environment, so it is necessary to formulate environmental protection measures and management plans, including environmental impact assessment, environmental monitoring and governance, to protect the sustainability of the surrounding environment. In the construction of water conservancy facilities projects, we should pay attention to ecological and environmental protection, reduce the damage and negative impact on the natural environment, and realize the coordinated development of economy, society and environment. For example, in river management, ecological slope protection, ecological restoration and other measures are adopted to protect the ecological environment of rivers.

Environmental protection planning: In the project planning and design stage, environmental protection should be taken as an important consideration, and detailed environmental protection planning should be formulated to clarify environmental protection goals and measures;

Pollution control at the source: to strengthen the supervision of production enterprises and industrial parks, Ensure that the wastewater discharge in the production process meets the relevant standards, At the same time to promote the use of environmentally friendly materials and

processes, Reduce the generation of pollutants; Construction of sewage treatment facilities: each industry should build the corresponding sewage treatment station, Production wastewater is treated before discharge, At the same time, to strengthen the maintenance and overhaul of sewage treatment facilities, Ensure its proper operation, Cracking down on the discharge of untreated wastewater, Formulate and strictly implement relevant laws and regulations on water resources protection, Ensure the sustainable use of water resources; Ecological bank protection construction: in the river course management and shoreline regulation, Should pay attention to the construction of ecological revetment, Improve the self-purification ability and ecological function of rivers; Strengthening environmental monitoring and law enforcement: establish and improve the water source protection and water source environmental monitoring system, Timely detection, early warning and treatment of water pollution incidents. At the same time, we will strengthen environmental law enforcement and punish and punish enterprises in accordance with the law.

Quality management: The quality of water conservancy facilities project is an important factor to ensure the function and life of the project, so it is necessary to establish a quality management system, including quality control and quality inspection, to ensure that the project construction and equipment installation meet the quality requirements. Establish and improve the quality management system: formulate clear quality management policies and objectives, Clarifying the tasks and responsibilities of the responsibility subjects and links at all levels, Ensure that the whole process of project quality is controllable; Strengthening project planning and design management: in the project planning and design stage, The actual situation of the project shall be fully considered, Comprehensive analysis based on geological, hydrological, meteorological and other factors, Ensure that the engineering design is scientifically feasible, At the same time, to improve the qualification and technical strength of the design units, Ensure the accuracy and reliability of the design; Strict construction supervision: to establish a strict construction management standards, Strengthen the supervision and management of the construction team, Ensure that the construction unit has the corresponding qualifications and technical capabilities, During the construction process, To strictly implement the

engineering construction specifications and standards, Ensure that the construction quality meets the corresponding requirements; Strengthen quality inspection and evaluation: strengthen the monitoring, testing and evaluation of water conservancy project quality, establish timely feedback mechanism, form a professional quality management system, and rectify the quality problems found in time to ensure that the project quality meets the requirements; improve the acceptance system: supervise and accept the whole process of water conservancy project construction to ensure that the project construction meets the corresponding standards and requirements. Strengthen the quality control and monitoring of engineering construction, timely find and solve the problems in engineering construction; improve the professional level of quality management: strengthen the training and education of quality management personnel, improve their professional quality and skill level, and introduce advanced quality management technology and methods to improve the scientificity and effectiveness of quality management.

Supervision and evaluation: An effective supervision and evaluation mechanism in the construction process of water conservancy facilities projects should be established to monitor and evaluate the progress and effect of the project. Managers should regularly evaluate the project, and make adjustments and improvements according to the evaluation results. Project approval and environmental impact assessment: Before project commencement, Project approval and environmental impact assessment in strict accordance with relevant laws and regulations, Including restrictions or adjustments to items that may cause damage to water and soil resources, Ensure the coordination between the project construction and water and soil resources protection; Environmental monitoring and evaluation: the establishment of water and soil environment monitoring system, Monitoring environmental indicators such as soil quality, water quality and atmospheric environment, Timely detection and early warning of environmental problems, Analyze and evaluate the monitored data, Formulate corresponding environmental protection measures, Protect the stability and improvement of the soil and soil environment, To assess the environmental impact of the construction project, Ensure that the project construction is coordinated with water and soil resources protection, To

achieve the unity of economic benefits, social and ecological benefits; Strengthen the supervision in the construction process of: strengthen the dynamic follow-up of the project management, to ensure that the project in accordance with the design requirements and relevant standards, strengthen the quality inspection of water conservancy departments at all levels, record data for record, improve quality supervision, dynamic monitoring of the project, timely understand engineering dynamic, to ensure the quality of water conservancy project has been in the supervision and control state, implement the responsibility system, bidding system and construction supervision system, make the project to orderly. In the tendering and bidding process, strictly check, make the audit and decision, ensure high level and high quality construction contractors; investigate and punish violations of laws and regulations: strengthen the supervision and inspection of soil and water conservation, discover and investigate violations of soil and water conservation, including violation of planning, illegal land occupation, unauthorized development and utilization, water pollution, encourage the public to participate in the supervision of water resources projects, enhance the transparency and credibility of the projects, and improve the public awareness and conservation of water resources.

3.4 Training of water resources management personnel

Strengthening the training of water resources management personnel, building a professional team, improving the technical ability and management level of management personnel, making them have a sense of cooperation between the same industry, and coordinating the work between various departments can effectively avoid the chaotic phenomenon of water resources management. The management of water resources in Longkou city is mainly caused by the disorderly development and utilization, illegal occupation and pollution. From planning management, water resources protection and utilization of multiple perspectives, strengthen water resources management personnel training, seek comprehensive solution of water problems, realize efficient management and utilization of water resources, establish and improve the efficient, professional, system of water resources management team is particularly important, the move to

promote longkou city propaganda image, expand urban development opportunities, guarantee the influence of sustainable development.

3.4.1 Develop the training plan. Developing a training plan for water management managers is a systematic and professional process, which needs to take into account many aspects of training objectives, content, methods, time, place and participants. Clear training objectives: First of all, the training objectives need to be clearly defined, including improving the professional knowledge and skills of water resources management personnel, and enhancing their management ability and innovation awareness. The objectives should be definite, measurable and feasible; analyze the training needs: evaluate the existing capabilities and needs of water resources managers, determine their knowledge and skills and the problems and challenges they may encounter in their work, which can be conducted through questionnaires, interviews, group discussion; make training plans: make detailed training plan, including training content, training method, training place, which can include water resources management theory, policies and regulations, case analysis, practical operation and so on. The training methods can include theoretical teaching, practical operation, on-site investigation, group discussion, etc; Selection of training teachers: According to the needs of the training plan, select teachers with relevant professional knowledge and rich practical experience can be experts, scholars, industry practitioners, etc. Implement the training plan: organize and implement training according to the training plan. During the training process, attention should be paid to the interaction and feedback of the participants, and timely adjust the training content and methods to ensure the training effect: After the training, the training effect of the participants can be evaluated through questionnaire survey, test, interview and other methods, and the evaluation results can be used to improve and optimize the future training plan.

Strengthen theoretical study. Strengthen the theory of water resources management personnel study is the key to improve their professional level and comprehensive quality, strengthen the theoretical study of water resources management personnel need to consider the training content, teaching methods, practical operation,

learning community and evaluation and feedback mechanism, etc., through constantly improve and optimize the training system, improve participants' theoretical quality and comprehensive quality, provide powerful guarantee for water resources management smoothly. Selected training content: According to the actual needs and working characteristics of water resources management personnel, select the training content. The training content should include the basic concepts of water resources management, policies and regulations, management theories, technologies and methods, so as to ensure that the participants can comprehensively and systematically master the relevant theoretical knowledge; Innovative teaching methods: according to the actual situation and learning needs, adopt various teaching methods, such as lectures, case analysis, group discussion, role play, etc., to stimulate the interest and enthusiasm of participants, and improve modern teaching techniques, such as multimedia teaching and online teaching; emphasizing the combination of theory and practice: while theoretical study, pay attention to practical operation and field investigation. Through the practical link, Let the participants personally experience and apply the theoretical knowledge learned, Deepen the understanding and memory of theoretical knowledge, In addition, the participants can be organized to conduct the actual case analysis, Improve their ability to solve practical problems; Building a learning community: to encourage communication and cooperation among the participants, Building a learning community, By learning and sharing experiences together, Promote the growth and progress of each other, Organize regular learning and exchange activities, Such as seminars, symposiums, etc., Provide a platform for participants to learn and communicate; Improve the evaluation and feedback mechanism: to evaluate and feedback the theoretical learning effect of the participants, The evaluation can be done through tests, questionnaires, Understand the mastery degree and existing problems of the participants. According to the evaluation results, adjust the training content and method in time to ensure the training effect. At the same time, timely feedback the evaluation results and suggestions to the participants to help them realize their own shortcomings and need to improve.

3.4.2 Promote new technologies. With the continuous development of science and

technology, new water management technologies continue to emerge. The promotion of new technologies is crucial for the training of water managers, which helps to improve their technical level and enable them to better cope with the new challenges in the field of water management.

Introduction of frontier technology courses: In the training course of water resources management personnel, the latest water resources management technologies and methods should be introduced, including the application of Internet of Things technology, big data analysis, artificial intelligence and other cutting-edge technologies in water resources management;

Organize technical seminars: Organize regular technical seminars, invite experts, scholars and enterprise representatives to share the latest water resources management technologies and experience, which will help water resource managers to understand the latest developments of the industry and broaden their horizons;

Conduct practical training: during the training process, Should pay attention to the practical link, Organize visits and experimental operations, Let the water resources management personnel personally experience the advantages and application effect of the new technology;

Establish a technology exchange platform: establish a technology exchange platform for water resources management, Encourage water resources managers to share experiences and exchange experiences on the platform, Help to form a learning community, Promoting the popularization and application of new technologies;

Provide technical support: For water resource managers who experience problems in the application of new technologies, The necessary technical support and guidance shall be provided, Set up a special technical support team or provide online consulting services;

Formulate incentive policies: In order to encourage water resources managers to actively learn and apply new technologies, Relevant incentive policies can be formulated, We will set up policies on incentives for the application of new technologies and preferential promotion of professional titles.

3.4.3 Establish an assessment mechanism. Establish scientific evaluation mechanism, assessment and evaluation of water resources management personnel training results, motivate them to improve their business level, water resources management personnel training assessment mechanism is to ensure the training effect and

improve work ability, assessment mechanism should be comprehensive, scientific, practical, should pay attention to the effect of training, and to ensure the fairness and effectiveness of assessment. Set clear training objectives: set clear training objectives, including what skills, knowledge or attitude that water resources managers will master through training; strengthen training process management: during the training process, manage and supervise the participants, ensure that they participate in the training according to the plan, and actively participate in the interaction and discussion; Evaluation of the training effect: after the training, The training effect should be evaluated, Through questionnaire survey, examination, practical operation and other ways to understand the water resources management personnel of the training content; Establish the assessment mechanism: combine the training effect with the assessment mechanism, Ensure that water resource managers can be truly applied to practice after training, Take the training results as an important basis for promotion, rewards and punishments; Feedback and improvement: Based on the results of the training assessment, Collect feedback from participants, To improve the training content and methods, To improve the training effect; Regular update of the assessment mechanisms: With the development and technological progress in the field of water resources management, The assessment mechanism should be updated regularly, Ensure that the assessment content is consistent with the actual work needs.

3.4.4 Strengthen the practical operation. Water resources management needs to have certain practical operation ability, so it is very necessary to strengthen practical operation training. Strengthening the practical operation training of water resources management personnel is the key to ensure that they can effectively apply the knowledge and skills learned in practical work. Promote the construction of practice base: establish a special practice base or laboratory to simulate the real water resource management scenario, water supply resource management personnel conduct practical operation, the base can include water treatment equipment, water resource monitoring equipment, so that the managers can operate themselves; case study: introduce the actual water resource management case, let the managers analyze and find the solution, through the case study,

the managers can understand the problems and challenges in the actual work, and learn how to deal with and solve these problems; Strengthen on-site teaching: organize management personnel to the actual water resources management site for teaching, Let them observe and participate in the actual operations, Such on-site teaching can help managers understand the process and requirements of practical work, Improve their practical and operational ability; Simulation exercise: By simulating an emergency or emergency, Let the managers conduct the simulation drills, Can test the emergency management ability and practical handling ability of management personnel, At the same time, it can also let them learn and improve in practice; Implement the tutorial system: provide experienced mentors, Let them get guidance and help from their mentors in their practical work, The supervisor may, according to the actual situation and needs of the managers, Provide personalized guidance and advice, Help them to improve their practical operation ability; Regular assessment and feedback: conduct regular assessment of the practical operation ability of managers, And provide feedback and advice, Help managers understand their own strengths and weaknesses, Timely adjustment and improve their own practical operation.

Establish a feedback mechanism. The establishment of a training feedback mechanism for water resource management personnel is an important measure to improve the training effect and ensure the training quality. To establish an effective feedback mechanism, timely collect the opinions and suggestions of water resource management personnel, constantly improve the training content and method, and improve the training effect. Develop the feedback questionnaire: design the feedback questionnaire including the training content, teaching methods, training effect and other aspects, The content of the questionnaire should be concise and clear, The problem is targeted, In order to collect effective feedback information; Collect feedback regularly: after the training, Collect collect feedback from participants, Can be conducted by email, paper questionnaires or online surveys, Ensure that participants have enough time to assess the training and what they learn; Analyze the feedback data: organize and analyze the collected feedback data, Identify the strengths and weaknesses in the training, Focusing on the participants' evaluation of the training content, teaching methods, and practical applications, In order

to improve the follow-up training plan; Adjust the training plan: according to the feedback data and analysis results, timely adjust the training plan, optimize the training content, improve the teaching method, increase the practical operation link, to improve the training quality and meet the needs of participants; continuous tracking and evaluation: after the training, continuously track the participants' application and work performance, evaluate the training effect, can be conducted through regular return visit, questionnaire survey or actual work performance evaluation.

Establish effective water resources management positions and mechanisms

Water resources management directly affect regional industrial and agricultural production and residents' daily life, longkou government should be combined with the actual situation to establish planning, coordination, management, monitoring, technology, training, publicity covers many aspects of water resources management functions, reasonable setting, to ensure clear responsibility classification, comprehensive functions, form management work together. At the same time, the management responsibilities can be fully implemented, the unified development and comprehensive utilization of water resources, through the reform of water price and water resource fees, the rapid growth of water demand can be effectively controlled, so that the water resources can be rationally allocated, effectively protect water resources and realize the sustainable development of the water conservancy industry.

Establish and improve the water resources management organization according to the law: according to the national and local laws and regulations on water resources management, Ensure that the establishment and responsibilities of water resources management positions meet the legal requirements, All management activities should be carried out within the legal framework, Establish a special water resources management agency, To be responsible for the unified planning, management, supervision and protection of the water resources of the whole city; The institution shall be independent and authoritative, Ability to coordinate and guide the work of relevant departments; clear management responsibilities and division: within water resources management organization, The responsibilities and division of labor of each position should be clearly defined, Ensure that all the work is orderly, At the same time, an effective communication

mechanism should be established, Promote collaboration among various departments, Forming a joint force to promote the water resources management work situation; Formulate scientific and reasonable water resources management plans and plans: combining the water resources situation and social and economic development needs of Longkou City, Formulate scientific and reasonable water resources management plans and plans, Planning shall include the development, utilization, protection, conservation and management of water resources, Clear goals, tasks, measures and time nodes; Implementation of the water resources management system: to establish a sound water resources management system, Including the water intake permit system, the paid use of water resources system, the water resources demonstration system, the total water use control system, etc., Through the implementation of the system, Standardize the development and utilization of water resources, Protect the ecological environment of water resources, Improve the efficiency of water resources utilization; Strengthening water resources monitoring and evaluation: establishing a sound water resources monitoring and evaluation system, Real-time monitoring and evaluation of the city's water resources, Through the monitoring and evaluation, In time to detect problems, Develop countermeasures, Ensuring the safe and sustainable use of water resources; Strengthening water resources publicity, education and training, Encouraging public participation in water management: By widely publicizing the importance and urgency of water management, Increasing public awareness and participation in water conservation, Strengthen the training and education of water resources management personnel, Improve their professionalism and management skills, To encourage public participation in water resources management, Increasing transparency and public participation in water resources management, To form a good atmosphere for the whole society to participate in water resources management.

Strengthen publicity and education on water resources management and use

In order to raise the awareness of residents and the whole society to Longkou city water resources protection, it is necessary to carry out great publicity and education. The government should publicize the importance of water resources and the necessity of protection and utilization to the public through various ways, such as publicity, education

and social education, and at the same time implement the environmental protection responsibility system to guide the residents to actively participate in the protection and governance of water resources. The current water resources management in Longkou city has great problems and challenges, so effective countermeasures must be taken to effectively improve the urban water resources management and environmental quality, and further promote the process of urban sustainable development.

1 The importance of water resources. It introduces the basic knowledge and current situation of water resources, emphasizes the important position of water resources in the survival of Longkou urban residents and regional economic development, and improves the public's awareness and awareness of the multiple values and irreplaceability of water resources.

The focus on: the source of life, water is the basic needs of all creatures on earth, is the source of human beings and animals and plants, without water, organisms can not metabolism, life will not be maintained; the cornerstone of economic development: water resources is the basic resource of economic and social development. Agriculture, industry, energy, transportation and other fields are inseparable from water, The sustainable use of water resources is crucial to promoting economic development; Ecological environment protection: Water plays a key role in maintaining ecological balance and environmental protection, Water bodies are important habitats for various organisms in the ecosystem, At the same time, it is also involved in the atmospheric circulation, soil formation and other natural processes; Cultural and historical heritage: Water resources are closely linked to human civilization and history, Rivers, rivers and lakes are not only natural landscapes, It is also the birthplace of civilization and the carrier of cultural inheritance; Strategic resource position: With global climate change and population growth, Water resources are becoming increasingly scarce, Water resources is seen as an important strategic resource, Its management and protection are of great significance to regional security and social stability; Multifunctional use: Water is not only a necessity for life and production, Can also be used in power generation, shipping, fisheries, tourism and other fields, It has multiple economic and social functions.

2 Laws and regulations on water resources management. Promoting national

laws and regulations on water resources management, can effectively enhance the public and staff of legal concept, clear legal boundary of water resources management and protection, maintain the order and stability of water resources management, ensure the safety and sustainable utilization of water resources, improve the public awareness of water resources management supervision, encourage the public to actively participate in the supervision of water resources management and protection, help to strengthen social supervision, promote the work of the open, transparent and standardization of water resources management. Carrying out the water conservancy work according to law can guarantee the healthy development of the water conservancy industry and maintain the good order and interests of the water conservancy industry. By holding lectures, exhibitions, distributing publicity materials and other forms, we can improve the public's awareness and compliance of water resources management laws and regulations, combining with specific cases, let the public understand the serious consequences of illegal acts, so as to enhance the legal awareness and the concept of the rule of law.

Key publicity content around: "Water Law of the People's Republic of China": clear water resources belong to the state, And also stipulate the basic principles, systems and measures of water resources management, In the publicity, the obligations and rights of units and individuals to exploit, utilize, conserve and protect water resources according to law may be emphasized; Law of the People's Republic of China on the Prevention and Control of Water Pollution: Protect and improve the water environment, Ensure the safety of drinking water, The publicity can mention the importance of preventing the water pollution and protecting the water environment, And the responsibility of enterprises and individuals in the prevention and control of water pollution; Water intake Permit and Paid Use of Water Resources System: introducing the water intake permit system and paid use system of water resources implemented by the state, Emphasizing the regulations that units and individuals need to observe when drawing water and using water resources; Water resources protection red line system: the water resources protection red line system can be introduced in the publicity, That is, to set the upper limit for the development and utilization of water resources, Ensure the sustainable use of water resources; Laws and regulations on water conservation: publicize the importance of water conservation,

popularize laws and regulations on water conservation, such as Water Conservation Regulations, and encourage units and individuals to take measures for water conservation; Responsibilities and supervision mechanisms of water resources management: Publicity can introduce the responsibilities and supervision mechanisms of water resources management department, emphasizing the importance and determination of the government to water resources management.

3 Protection of water resources. Introduce water resources protection measures, including water quality monitoring and improvement, soil and water conservation, water ecosystem protection, and advocate the public to actively participate in water resources protection work. The relevant contents of water resources protection cover the limitation and value of water resources, the concept and method of water conservation, the laws and regulations of water resources protection, the scientific and technological means of water resources protection, and the importance of environmental education. These contents aim to guide the public to cherish water resources, rationally use and protect water resources, and promote the sustainable utilization of water resources and the healthy development of the ecological environment.

The focus focuses on the limitation and value of water resources: the limitation and non-renewable of water resources, And the importance of water resources to human society and the ecological environment, By promoting these elements, Guide the public to cherish water resources, Rational utilization and protection of water resources; The concept and method of water conservation: to publicize the concept of water conservation, Introduce the methods and techniques for water conservation, Such as reasonable use of washing machines, dishwashers and other home appliances, Adjust the water consumption such as bathing and flushing reasonably, And the timely repair of water leakage equipment; Scientific and technological means of water resources protection: introducing the scientific and technological means of water resources protection, Such as rainwater collection, sewage treatment, water conservation and other technologies and equipment, Let the public understand the important role of scientific and technological progress in water conservation; Importance of environmental education: emphasizing the importance of environmental education in water resources protection, Promote relevant

environmental education activities in schools, communities and the media, Raise public awareness of environmental protection, Let more people participate in the water conservation action.

4 Conservation utilization of water resources. The shortage of water resources in the world is increasingly serious. With the growth of population growth, urbanization and excessive development, many water resources in northern China, just like Longkou City, have been unable to meet the demand, and the conservation of water resources has become a necessary means to cope with this challenge. Excessive exploitation and waste of water resources will not only lead to water shortage, but also cause damage to the environment and ecosystem. Saving and utilization of water resources can reduce the pressure on the natural environment, protect the health of rivers, lakes, wetlands and other ecosystems, and reduce the consumption of water resources, thus reducing the cost of water use.

The key content focuses on the preciousness of water resources: emphasizing the preciousness and irreplaceable of water resources, Remind the public of the importance of every drop of water, Thus pay more attention to water conservation in daily life; Water-saving technologies and water-saving appliances: popularize water-saving technologies and water-saving appliances, Such as water-saving toilets, water-saving faucets, etc., Let the public know how and how these techniques and instruments work, So as to achieve water saving more conveniently in daily life; Use water properly and avoid waste: to teach the public how to use water properly, Avoid the waste, For example, the reasonable arrangement of washing, bathing and other living water, Ensure that, while meeting life's needs, Minimize water consumption, Timely repair of water leakage equipment, Prevent water resources in the imperceptible loss; Rainwater collection and utilization: to publicize the importance of rainwater collection and utilization, Encourage the public to use rainwater collection systems, Collect rainwater for non-drinking water purposes such as watering flowers and flushing, Thus reducing the dependence on tap water; Recycling of water resources: advocating the recycling of water resources, For example, collecting used water such as washing vegetables and laundry, After a simple treatment, it is used for flushing, mopping, etc., So as to maximize the use of water resources.

5 Water resources management and regional economic sustainable development. There is a close relationship between water resources management and sustainable regional economic development.

The key publicity content revolves around: First, water resources are the foundation of economic development, Water is an indispensable resource for production activities, Including agricultural irrigation, industrial production, energy production, transportation and other aspects, Sustainable management of water resources can ensure the steady progress of these production activities, Provide a solid foundation for the sustained growth of regional economy; Secondly, water resources management affects the economic structure and industrial layout, Reasonable water resources management can promote the optimization of regional economic structure and the rationality of industrial layout, For example, through the scientific water resource allocation, Can guide the transfer of high water consumption industries to water-rich areas, Promote the efficient utilization of water resources and the sustainable development of industries; The sustainable management of water resources again helps to protect the ecological environment, Maintaining the ecological balance, To provide a good ecological environment support for the sustainable development of the economy; Finally, water resources management drives economic innovation and transformation, With the increasing water shortage and the increasing water crisis, Promoting the economy to water saving, environmental protection, sustainable development has become an inevitable trend, By strengthening water resources management and promoting related technological innovation, Can guide the regional economy to a greener, low-carbon and circular direction, To achieve high-quality economic development.

Water resources imbalance to improve the channels

There are obvious regional differences in the distribution of water resources in Longkou City. Some areas may have abundant water resources, while others may face water shortage. This unbalanced distribution leads to tight water supply in some areas, while others may waste and overdevelopment. Although the water resources are relatively large, per capita, which means that everyone has limited water resources, which puts higher requirements for the management and protection of water resources.

The following measures can be taken to scientifically improve the imbalance of water resources in Longkou City: The government should formulate scientific and reasonable water resources planning and management plans, and clarify the objectives of the development, utilization and protection of water resources. To ensure the balance of water resources; promote water conservation technology and water conservation culture, encourage people to develop the good habit of water conservation, increase the development and promotion of water saving technology, improve the efficiency of water resources; and adopt a series of measures to strengthen the protection and restoration of water resources, including water source protection and water ecological restoration. Through these measures, we can improve the ecological environment of water resources and improve the sustainable utilization capacity of water resources; Implement the market reform of water resources, establish water resources price formation mechanism, guide people to cherish and rationally use water resources more, encourage enterprises and social capital to participate in water resources development and protection projects, and form a diversified water resources input mechanism; establish a sound water resources monitoring and early warning system to find and solve water resources problems in time. Through real-time monitoring of water quantity and quality changes, provide scientific basis for government decision-making and ensure the stable and sustainable supply of water resources.

Promote scientific water storage measures to deal with water resources shortage

1 The necessity of popularizing scientific water storage measures. Total water resources shortage in Longkou city, The gap between the stock of water resources and the regional economic development needs, The promotion of water storage measures can effectively protect and store natural water resources such as rainwater and floods, Increase the availability of water resources, Alleviating the problem of water shortage; At the same time, it can effectively adjust the river water level, To mitigate the occurrence and impact of flood disasters, Especially during the rainstorm season, Reasonable water storage measures can reduce the peak flow of river flood flow, Reducing the threat of floods to coastal residents and farmland; Scientific and effective water storage measures can

provide a stable irrigation water source, Promote the sustainable development of agricultural production, Through ecological hydration, Can improve the river ecological environment, Maintaining the ecological balance, To promote biodiversity; Promotion of water storage measures can reduce groundwater extraction, Reduce energy consumption and environmental pollution, By making rational use of natural water resources such as rainwater and floods, Can reduce the reliance on traditional water sources, To achieve the goal of energy conservation and emission reduction; The promotion of water storage measures can promote the sustainable development of the economy and society, By increasing the supply of water resources, Can promote the development of agriculture, industry, services and other industries, Improve the people's living standards.

2 Specific and effective water storage measures.

2.1 River course management and restoration. For longkou huangshui river, swimming river, south Luan river, dragon river, north river, eight shahe six main river, to the whole river system management and repair, clean up the rubbish and the sediment, ensure the river, river in the construction of some small water conservancy facilities, such as small dam, block brake, used to regulate the river level, increase the storage capacity of the river. River dredging and dredging: conduct regular dredging of the river channel, remove the sediment and obstacles in the river channel, keep the river channel unobstructed, and improve the flood discharge capacity of the river channel; Riverbank reinforcement: to reinforce the river bank, Using stone cage, concrete and other materials to protect the river bank, To prevent river bank erosion and collapse, Ensure the safety of river course; ecological restoration: by planting vegetation and constructing ecological bank protection, To restore the ecological environment of the river course, Improve the self-purification capacity of the river channel, Improve the water quality of river channel; sewage treatment: construction of sewage treatment plant and sewage pipe network, Centralized treatment of the sewage around the river course, Reduce the direct discharge of sewage into the river channel, Protect the water quality of river courses; strengthen the management of water resources in river courses, Rational allocation of water resources, Ensure ecological water for river courses and irrigation water for agricultural purposes, Avoid the drying up of rivers and water shortages; River inspection: strengthen river

inspection, Timely detection and treatment of river channel problems, Prevent the repollution and destruction of river courses, Ensure the safety and ecological environment of river courses.

2.2 Reservoir upgrading and transformation of storage capacity. For large reservoirs such as Wangwu Reservoir, Chijiagou Reservoir and Beixingjia Reservoir and medium water source reservoirs, the storage capacity should be upgraded and transformed to deepen the depth of the reservoir and expand the storage capacity, so as to improve the storage capacity of the reservoir and increase the flood control capacity of the reservoir. Raise the overflow gate: by raising the working gate of the overflow gate, Can increase the storage capacity of the reservoir during flood periods, Thus increasing the storage capacity of the reservoir; Implementation of field lifting and slope protection works: through field lifting works, Can increase the storage area of the reservoir, And increase the storage capacity, Slope protection works can protect the reservoir bank slope, prevent loss of water and soil erosion, Ensure the safe operation of the reservoir; Construction of management roads and crossing buildings in reservoir area: construction of management roads and crossing buildings in reservoir area, Can facilitate the daily management and maintenance of the reservoir, Improve the operation efficiency of the reservoir, Thus indirectly increasing the storage capacity of the reservoir; Reservoir management information project: through the implementation of reservoir management information project, Real-time monitoring and prediction of the operating status of the reservoir, Find and deal with possible problems in time, Ensure the safe operation of the reservoir, It can also improve the efficiency of reservoir management, Raise the storage capacity.

2.3 Utilization of rainwater resources. Construction of a rainwater collection system, Through the implementation of key water conservancy projects such as laolan large reservoir, Wolong medium-sized reservoir capacity expansion, new reservoirs and trunk channel storage projects, Make full use of the rain and flood resources, Increase the water storage capacity of the river reservoirs, Effective development and utilization of rain and flood resources, Strengthen the local water resources support and guarantee capacity; Strengthen the construction of sponge cities, By following the ecological-first principle, Combining the natural pathways and the artificial measures, To maximize the

accumulation, infiltration and purification of rainwater in urban areas, Reasonable construction of the sponge space, By renovating urban roofs, roads, and squares, Increase the rainwater infiltration area of the city, And set up the rainwater collection facilities, Integrating rainwater into urban water systems, Reduce the surface runoff, Effectively improve the city's capacity to absorb and discharge rainwater, Alleviating urban waterlogging problems; Development of rainwater utilization: the use of the collected rainwater for road washing, irrigation and greening, the supply of domestic water, etc., Reduce the urban water pressure, It can both save water resources, It can also reduce the cost of water use in cities; Strengthening rainwater management: Strengthening the construction of urban drainage system, Increase the drainage capacity, Construction of rainwater regulation and storage facilities, Slowing down the peak flood flows, Protect the water security of the city, Effectively response to extreme weather and natural disasters, Ensure the normal operation of the city; Increasing green coverage: adding green space in the city, In particular, wetlands, forests and other vegetation with good rainwater maintenance and storage capacity, To improve the city's natural water retention capacity, Increase the ecological diversity of the cities, Improving the environmental quality of the city; Rational use of the "East Water West" project, Transfer the water storage of Beixingjia Reservoir to Chijiagou Reservoir, To increase the reserves of surface water resources in the western region, Improve the utilization rate of rain and flood resources.

2.4 Soil and water conservation and ecological restoration of river reservoirs and canals. Soil and water conservation and ecological restoration should be carried out in the upper reaches of rivers and around the reservoir area, and afforestation and grass planting should reduce soil erosion, protect water sources and increase the water storage of the river courses. Continue to build green mountains and green water greening projects, Green the vacant land and the space beside the courtyard and the forest, Implement a series of greening projects, Such as the greening project before the factory area, the factory renovation project and the orchard base construction project, We will promote the construction of green ecological corridors along rivers, Reduce soil erosion; Ecological restoration design: to promote the restoration of vegetation and wetlands, Select a suitable

vegetation species, Planting according to the local climate and soil conditions, To improve the ecological value; Landscape construction design: combining with the local terrain and vegetation characteristics, Select suitable sites for landscape construction, The viewing deck is designed to take full account of the surrounding terrain and vegetation conditions, Create a viewing platform with local characteristics.

2.5 Science and technology support. Modern scientific and technological means, such as remote sensing technology, geographic information system, artificial rainfall, etc., are used to conduct real-time monitoring and management of rivers and reservoirs to improve the efficiency and effect of water storage measures. At the same time, the renovation and reconstruction of small irrigation and drainage pumping stations shall be implemented with new projects: through the renovation and new small irrigation and drainage pumping stations, to increase the irrigation area and improve water relief capacity, etc., including large water conservancy facilities and "five small water conservancy" projects, such as the construction of small water cellar, small pool, small pond, small pumping stations and small canal.

CONCLUSION

This paper focuses on the analysis and research of the overall situation of water resources management in Longkou City, makes a detailed analysis of the background of water resources management in Longkou City, comprehensively judges the difficulties and challenges of water resources management in Longkou City, and puts forward some feasible countermeasures to solve the problems according to the actual situation.

1. The water resources management in Longkou city is generally complex. Longkou current overall distribution of water resources distribution, insufficient stock, unreasonable utilization, advanced technology, there is still a certain degree of water pollution, publicity is not comprehensive, management system is not sound, with climate change, population growth, urbanization and other impact on water resources and demand is increasingly severe, to strengthen and promote water resources management is of great significance.

2. Longkou city water resources management is still facing great challenge pressure. It mainly focuses on natural conditions, illegal occupation and water pollution, safe water supply, low water resources utilization, and management level to be improved.

3. Longkou city water resources management core response measures. In view of the current situation of water resources management in northern county-level cities, The corresponding local governments and the functional departments should actively take the countermeasures, We can focus on the following ten aspects: strengthening water resources management planning; Implement the scientific measurement of water resources, Clarify the direction of regional water resources utilization; Formulate perfect management measures of water resources stock change data; Strengthening the protection and management of water resources; To coordinate the maintenance of water conservancy facilities; To build and strengthen the training of water resources management personnel; Establish effective positions and mechanisms for water resources management; Strengthen the publicity and education of water resources management and use; Water resources imbalance improvement channels; Promoting scientific water storage measures, Deal with water shortages.

With the progress of science and technology and the development of social economy, Longkou City, as a member of a county-level city in northern China, Water resources management work will be increasingly thorough, Management methods are becoming increasingly advanced, Longkou city water resources management work is expected to be more refined and intelligent, Using the Internet of Things, big data, artificial intelligence and other technological means, Effectively realize the real-time monitoring, prediction and scheduling of water resources, The efficiency and accuracy of water resources management will be greatly improved; Focus on the implementation of ecological protection measures for water resources, Will promote the construction of regional water ecological civilization, By strengthening the protection of water sources, improving the water environment and restoring the water ecology, The sustainable utilization effect of water resources will become more obvious; Facing the challenge of the uneven distribution of water resources, With cooperation with water management in surrounding areas, The advancement of water resources management policies, Will also realize the sharing and optimal allocation of water resources, Through transboundary water resources allocation and protection, The overall utilization efficiency of water resources will also be improved; Water literacy, social participation and public awareness will become the norm for water management in the future, The management of water resources will also form a good atmosphere for the whole society to pay attention to and protect water resources; The legal and regulatory system of water resources management will be continuously improved and more scientific and reasonable, which will also provide strong legal guarantee and policy support for water resources management. With the increasing improvement of water resources management, the future of Longkou city will be favorable weather, clear surrounding environment and green mountains, people living and working in peace and contentment, and rapid economic development.

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APPENDIXES

APPENDIX A

LONGKOU CITY WATER RESOURCES SURVEY QUESTIONNAIRE

In order to strengthen water resources management, better protect water resources and improve the utilization effect of water resources, we carry out this survey. We hope you can spare some precious time to fill in it patiently. I sincerely thank you for your support and cooperation.

1. Your gender?

- ☐ male
- ☐ female

2. What is your profession?

- ☐ Farmers
- ☐ workers
- ☐ self-employed, entrepreneurs
- ☐ civil servants
- ☐ Students
- ☐ enterprise and public institutions employees
- ☐ others

3. Is it your age group?

- ☐ Under 18 years
- ☐ 18 – 25 years
- ☐ 25 – 40 years
- ☐ 40 – 60 years
- ☐ 60 years or older

4. How many water source reservoirs do you know about in Longkou City?

- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5

5. What do you think are the current river pollution sources in Longkou city?

- ☐ Industrial wastewater
- ☐ aquaculture sewage
- ☐ domestic sewage
- ☐ Silting and pollution
- ☐ household garbage

6. Do you think longkou city has sufficient water resources?

- ☐ Sufficient
- ☐ insufficient
- ☐ shortage

7. Do you think the water resources protection measures in Longkou city are comprehensive?

- ☐ Comprehensive
- ☐ deletion
- ☐ basically no relatively comprehensive

8. Do you know anything about the construction of sponge city?

- ☐ Very familiar with
- ☐ slightly know one or two
- ☐ completely do not know

9. Do you think it is necessary to strengthen the water resources management in Longkou City?

- ☐ Very necessary

- ☐ It is not necessary
- 10. Do you know about the Yellow Canal of Longkou City?
 - ☐ Very familiar with
 - ☐ slightly know one or two
 - ☐ completely do not know
- 11. Do you know the laws and regulations on water resources management?
 - ☐ Very familiar with
 - ☐ slightly know one or two
 - ☐ completely do not know
- 12. Do you think there is the largest water consumption in Longkou city?
 - ☐ Industrial water
 - ☐ agricultural irrigation
 - ☐ domestic water
- 13. Do you are in the habit of saving water?
 - ☐ Good
 - ☐ general
 - ☐ waste
- 14. What do you think of the protection measures for the surrounding water sources in Longkou City?
 - ☐ Very good
 - ☐ no protection measures
 - ☐ good green
 - ☐ reasonable building
- 15. The number of times you and your family take by the water each week.
 - ☐ 0
 - ☐ 1
 - ☐ 2
 - ☐ occasionally
 - ☐ never
 - ☐ other
- 16. Do you think it is necessary to build the main river water storage project in Longkou City?
 - ☐ Very necessary
 - ☐ Unnecessary
 - ☐ dispensable
- 17. What is the source of your daily drinking water?
 - ☐ Purchase mountain spring water
 - ☐ purchase purified bottled water
 - ☐ community unified purified water
 - ☐ others
- 18. Have you ever encountered illegal mining or water occupation in your life?
 - ☐ Common
 - ☐ never encountered
 - ☐ parts exist
- 19. Have you ever participated in any training or publicity related to water resources management in your daily life?
 - ☐ Never
 - ☐ occasionally
 - ☐ often
- 20. Have you ever seen the rain and flood resource utilization facilities in Longkou City?
 - ☐ No more
 - ☐ facilities and less
 - ☐ facilities

APPENDIX B

APPROVAL OF RESEARCH RESULTS

1. Gao Debing Core problems and solutions of water resources management in county-level cities in China. *Enterprise economics: modern problems of theory and practice: Materials of the twelfth international science and practice Conf.*, September 8, 2023. Odesa: ONEU, 2023. 671 pp., pp. 415-416.

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УНІВЕРСИТЕТ ВІЩА ШКОЛА БІЗНЕСУ (ПОЛЬЩА)
УНІВЕРСИТЕТ ЕКОНОМІКИ В БРАТИСЛАВІ (СЛОВАЧЧИНА)
УНІВЕРСИТЕТ ПРИКЛАДНИХ НАУК (НІМЕЧЧИНА)
УНІВЕРСИТЕТ ГЕНУІ (ІТАЛІЯ)
КИЇВСЬКИЙ НАЦІОНАЛЬНИЙ ЕКОНОМІЧНИЙ УНІВЕРСИТЕТ
ЛЬВІВСЬКИЙ ТОРГОВЕЛЬНО-ЕКОНОМІЧНИЙ УНІВЕРСИТЕТ
НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ «ОДЕСЬКА ПОЛІТЕХНІКА»

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ЕКОНОМІКА ПІДПРИЄМСТВА:
СУЧАСНІ ПРОБЛЕМИ ТЕОРІЇ ТА ПРАКТИКИ

ЗБІРНИК МАТЕРІАЛІВ
ДВНАДЦЯТОЇ МІЖНАРОДНОЇ НАУКОВО-
ПРАКТИЧНОЇ КОНФЕРЕНЦІЇ
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CORE PROBLEMS AND SOLUTIONS OF WATER RESOURCES
MANAGEMENT IN COUNTY-LEVEL CITIES IN CHINA

Water resources refer to the surface water, surface water and water vapor in the atmosphere. Water is a limited resource on which human survival. With the rapid development of the global economy, the scientific and rational utilization of water resources will affect human progress and future development. The main purpose of this paper is to explore the core problems and countermeasures of water resources management in county-level cities in China.

1. The Basic situation of county-level cities in China and the current situation of water resources

China currently has 1,472 counties, including 394 county-level cities, for a total of 1,866 counties. By 2022, the GDP of 54 counties of 100 billion RMB reached 8.6 trillion RMB, accounting for 7.1% of the country's economic total. The economic development of county-level cities occupies a pivotal position in the national economy. Factors affecting the development of county-level cities include land and resources, capital investment, management system of development zones, social governance environment, infrastructure, technological innovation, etc. Among them, water resources are crucial to regional economic development, and directly affect the sustainable development and future of county-level cities.

2. The impact of water shortage on the development of county-level cities

The geographical and natural distribution and various factors of county-level cities in China, including climate change, industrial development, agricultural water overuse, etc. It is bound to lead to the shortage of water resources in some county-level cities, which will inevitably have a negative impact on the local economy, environment and people's life.

First, water shortages can affect the local economy. Due to the shortage, industrial production, agricultural production and other economic activities will be restricted, resulting in a decline in economic benefits.

Second, the water shortage can also have an impact on the local environment. In order to obtain more water resources, people may overmine groundwater, leading to problems such as falling groundwater level and ground subsidence. At the same time, the pollution of water resources will also lead to the deterioration of the water environment, affecting the quality of life of local residents.

In addition, water shortage can have an impact on local society. Since water resources are people's daily necessities, the shortage may lead to social instability and affect people's quality of life.

3. The core problem of water resources management

There are many core problems in water resources management in county-level cities in China.

Continuation of Appendix B

2. Gao Debing Research on strengthening the management measures of county water resources infrastructure in China. *Strategic priorities for the development of accounting, auditing and taxation in the conditions of globalization*: materials of the II International Scientific and Practical Conference (Sumy, November 16, 2023) / edited by Prof. Nazarenko O.V. Sumy: SNAU, 2023. 395 p. pp. 392-394.

СУМСЬКИЙ НАЦІОНАЛЬНИЙ АГРАРНИЙ УНІВЕРСИТЕТ
ФАКУЛЬТЕТ ЕКОНОМІКИ І МЕНЕДЖМЕНТУ
КАФЕДРА ОБЛІКУ І ОПОДАТКУВАННЯ



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«СТРАТЕГІЧНІ ПРІОРИТЕТИ РОЗВИТКУ БУХГАЛТЕРСЬКОГО ОБЛІКУ, АУДИТУ ТА ОПОДАТКУВАННЯ В УМОВАХ ГЛОБАЛІЗАЦІЇ»

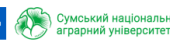
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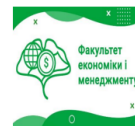
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МАТЕРІАЛИ

II МІЖНАРОДНОЇ НАУКОВО-ПРАКТИЧНОЇ КОНФЕРЕНЦІЇ



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RESEARCH ON STRENGTHENING THE MANAGEMENT MEASURES OF COUNTY WATER RESOURCES INFRASTRUCTURE IN CHINA

Excellent water resources infrastructure has a significant impact on human health and quality of life. In short, water resources infrastructure management has an extremely important impact on human health, economic development, environmental protection and other aspects. We must attach importance to and strengthen the management of water resources infrastructure to ensure the sustainable use of water resources.

1. The significance of water resources infrastructure management
1.1 Ensuring human health: Good water infrastructure management can ensure the safety of water supply, thus providing adequate, clean drinking water, which is essential for human survival and health.

1.2 Maintaining ecological balance: Water resources infrastructure management can effectively manage water supply and drainage, and ensure that the water demand of the natural environment is met, while preventing water pollution, so as to help maintain ecological balance.

1.3 Promoting sustainable development: Water resources are the basic natural resources and the strategic economic resources, and they are the control factors of ecology and environment. Implementing a strict water resources management system and promoting the coordination of economic and social development with the carrying capacity of water resources and water environment is an important means to achieve sustainable economic and social development.

Water resource infrastructure management still faces many challenges, we need

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to work more hard to improve water resources infrastructure management to meet these challenges and achieve a harmonious coexistence between human society and the water environment.

2. Types of county water resources management infrastructure in China

There are many kinds of water resources infrastructure, and each facility has its own specific functions and functions. They cooperate with each other to form the county water resources infrastructure system and provide the necessary water resources guarantee for the economic and social development of the county.

3. Measures for the management of major infrastructure of county water resources level in China

3.1 Measures to strengthen the management of flood control facilities. To ensure the function of flood control facilities, we need to start from many aspects, including planning and design, regular inspection and maintenance, monitoring and early warning, scientific and technological innovation, enhancement of people's awareness of flood control and improvement of emergency plans. These measures can effectively improve the performance and reliability of flood control facilities and reduce the risk of flood caused.

3.2 Measures to strengthen the management of water supply facilities. Take anti-freezing measures in time to ensure its normal operation when the cold wave strikes. Through a variety of ways to publicize the knowledge and methods of cold prevention, improve the public's attention to the water supply facilities for cold prevention.

3.3 Measures to strengthen the management of drainage facilities. Strengthen the inspection and management of drainage facilities; strengthen river inspection and cleaning; Strengthen the water circulation to ensure the secondary river landscape; strengthen the operation and management of pump stations; carry out comprehensive safety inspection on the transformer and distribution facilities and equipment of the pump station; pay close attention to the reports of drainage emergencies and solve the emergency problems at any time.

3.4 Measures to strengthen the management of water ecological protection facilities. Ecological water dispatching: Optimize the water dispatching scheme of water project and fully consider the ecological water demand, ecological storage capacity and fish path shall be set in the project construction; strengthen water quality monitoring, and conduct regular monitoring of key sewage outlets to ensure that sewage discharge meets the standards; for the damaged water ecosystem, ecological restoration measures should be taken; strengthen the public awareness of participation, and improve the public's awareness of water ecological environment protection through publicity, education and science popularization activities.

3.5 Measures to strengthen the management of water and landscape facilities. Regular water quality inspection and cleaning should be carried out to ensure the quality of the water source; cleaned and maintained regularly to ensure the normal operation and aesthetic effect of the facilities; for waterscape water, its circulating flow should be kept to avoid stagnant water area and pollutant deposition; some

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ecological elements can be added to the landscape water, these elements can help purify water bodies and increase the self-purification ability of water bodies; the rationality and practicability of waterscape should be fully considered in landscape design to avoid excessive design or impractical waterscape facilities.

3.6 Measures to strengthen the management of water energy utilization facilities. Reasonable planning of water energy utilization facilities; ensure the stable and reliable water supply, to ensure the normal and efficient operation of water resources utilization facilities; strengthen the management and maintenance, and conduct regular inspection and maintenance to ensure the normal operation and effective utilization of the facilities; advanced technology and management means are adopted to optimize the structure of water resources utilization and improve the economic and ecological benefits of water resources utilization.

3.7 Measures to strengthen the management of shipping facilities. Establish a sound safety management system; improve the technical level of shipping facilities; strengthening the management and maintenance of waterways; strengthening the supervision and inspection of ships; strengthening the training and management of seafarers; establishment of emergency plans and emergency mechanisms.

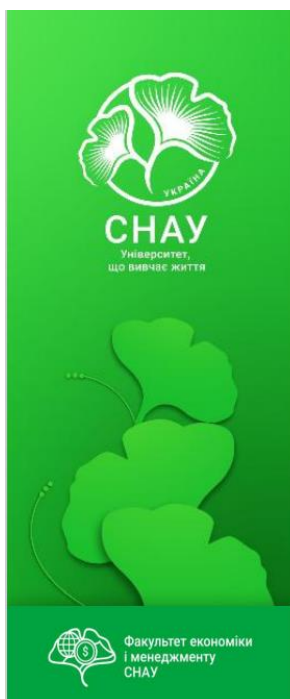
The importance of water resources infrastructure management as a public property management can not be ignored, which needs to get the attention and support of the government and the society, and constantly strengthen the scientific and effective management, so as to better guarantee the people's life and the stable development of the society.

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