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Research on Historical Literature Records of Ecological Management of the Yellow River in Shanxi Section

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Abstract

The Yellow River flows through approximately 965 kilometers within Shanxi, forming unique geographic units such as the Jin-Shaanxi Grand Canyon. Historically, frequent floods have made ecological management a key task for successive dynasties. This paper focuses on classical literature concerning the ecological management of the Yellow River within Shanxi Province, systematically reviewing records on river dredging, dike construction, and soil and water conservation found in texts such as the "Book of Documents: Tribute of Yu," "Commentary on the Water Classic," "History of Ming: Records of Rivers and Canals," and "Comprehensive Records of Shanxi," while analyzing the ecological wisdom embedded in ancient river governance within its historical context. The study finds that the management of the Yellow River in Shanxi evolved from techniques of "channel dredging and water diversion" to "controlling water and attacking sand," reflecting an ecological philosophy of "harmony between man and nature" and governance wisdom of "guiding according to circumstances." These literature records provide historical references for contemporary ecological protection of the Yellow River Basin. Through textual analysis of dozens of core classical works, this paper adds details on governance practices during the Jin and Yuan periods and examples of modern transformations, constructing a more systematic historical narrative. It emphasizes the ecological rationality of traditional techniques and the modern adaptation of governance systems, aiming to provide a sustainable modern framework and approach for the ecological management of the Yellow River.

Keywords

Shanxi River Basin, Yellow River, Ecological Governance, Documentary Collation

1. Introduction

As the core area of the middle reaches of the Yellow River, Shanxi's ecological governance can be traced back to the Ming and Qing dynasties. Yan Shengfang of the Ming Dynasty in "The Reconstruction of the Zhenhe Tower" [1]. He clearly pointed out that excessive deforestation in upstream areas will destroy surface vegetation, which will cause serious soil erosion. The lost sediment flows downstream to silt up the river, eventually leading to frequent floods and bringing deep disasters to the people along the coast. This cognition was very forward-looking at that time, and it resonated with the core idea of the holistic view of the watershed system in modern ecological governance, which fully reflected the ancients' deep thinking on the relationship between man and nature. However, due to the background of the times, Yan Shengfang's governance methods are still based on "feng shui suppression", which fails to jump out of the framework of traditional folklore and cannot form a systematic solution covering the whole basin and running through the long term, and it is ultimately difficult to fundamentally reverse the trend of ecological deterioration.

In the 1910s and 1920s, Shanxi's ecological governance began to move towards institutionalized exploration. At that time, the local ruler Yan Xishan implemented the reform of "Six Policies and Three Affairs", incorporating afforestation into the official administrative system, and tried to promote ecological restoration through government power. In order to ensure the implementation of the policy, the Shanxi Provincial Police Department has clarified the implementation path in the "Shanxi Police Report" [2], and has also formulated the "Shanxi Provincial Afforestation Regulations" and other regulations to build a governance model of "government-led and public participation". This model combines ecological governance with administrative system for the first time, breaking the previous scattered and spontaneous governance state, and providing an important institutional prototype for modern soil and water conservation work. However, unfortunately, due to the pragmatism of governance at that time, large-scale deforestation occurred in the later period to meet economic development and resource demand, which greatly reduced the achievements of afforestation in the early stage and left profound lessons for future generations of ecological governance.

From a longer historical perspective, the ecological governance of the Yellow River Basin in Shanxi did not begin in the Ming and Qing dynasties. In the pre-Qin period, the ancients began to explore ways to coexist with the Yellow River, dredging the water flow through simple water conservancy facilities; during the Northern and Southern Dynasties, with the development of agriculture, people gradually realized the protective role of vegetation on water and soil, and began to plant trees sporadically around the riverbank; during the Tang and Song dynasties, the official attention to the governance of the Yellow River was further increased, and relevant records were scattered in various historical materials, forming a richer governance experience.

Therefore, combing through these literature records and governance practices

spanning thousands of years can not only clearly see the technical system formed by the ancients in the governance of the Yellow River, from simple water conservancy projects to organized afforestation actions, but also dig out the philosophical thinking behind it, from "reverence for nature" to "active intervention". These historical wisdoms provide an important reference for the ecological governance of the contemporary Yellow River: it is necessary to inherit the systematic thinking of the ancients of the "overall view of the river basin". It is also necessary to avoid the short-sighted behavior of pragmatism; it is necessary to give full play to the leading role of the government and mobilize the enthusiasm of all sectors of society to participate [3]. Only by combining historical experience with modern science and technology and institutional innovation can we build a modern logic of sustainable development for the ecological governance of the Yellow River and promote the Yellow River Basin to a good ecological and virtuous cycle of economic development and improvement in people's livelihoods.

2. Pre-Qin to Northern and Southern Dynasties: Ancient Book Traceability of Ecological Cognition of the Yellow River in the Shanxi Basin

The pre-Qin to the Northern and Southern Dynasties was a key stage in the gradual germination and deepening of the ecological cognition of the Yellow River in the Shanxi Basin, and the preserved classics and documents became the core carrier of tracing this process. At that time, people's understanding of the Yellow River gradually moved from simple geographical observation to the preliminary exploration of ecosystems and water control systems, laying an ideological foundation for later generations of Yellow River governance and ecological research.

2.1. Jizhou Water Control System and Geographical Cognition in "Shangshu Yugong"

First, confirm that you have the correct template for your paper size. This template has been tailored for output on the custom paper size (21 cm × 28.5 cm). As the earliest existing systematic geographical document in China, the record of the Yellow River Basin can be called the culmination of geographical cognition and water control ideas in the pre-Qin period. The whole of Shanxi is clearly included in the territory of Jizhou, and with accurate geographical narrative, a path system in the middle reaches of the Yellow River is constructed, which is "Longmen - as for Jishi - south to Huayin - east to Shizhu - east to Mengjin" [4]. This path description is not a simple geographical record, but contains the ancients' deep understanding of the hydrological characteristics and geographical pattern of the western section of the Yellow River.

Among them, Longmen, as a key geographical node, is located at the junction of present-day Hejin City, Shanxi Province and Hancheng City, Shaanxi Province, and is an important throat of the Yellow River when it flows through the Shanxi Gorge. The deep canyon and turbulent water here are not only natural obstacles

to the shipping of the Yellow River, but also the core difficulty of the flood control project. The ecological inference of this article: The expression of "guiding the river" in "Yugong" reflects the core water control idea of dredging rivers and stagnation in the pre-Qin period, which is different from the strategy of blocking in some later periods, the ancients let the water flow of the Yellow River rush down in accordance with the natural terrain by dredging the river channel and cleaning up the siltation. At the same time, the essence of this "river guidance" practice is to carry out ecological governance actions in response to the ecological problems of dense canyons and obstructed water flow in the western section of the Yellow River, which reflects the initial coordination awareness of the ancients on the relationship between man and nature.

When the Han Dynasty scholar Kong Anguo made a note on the "Book of Shang", he further explained the value of Longmen's water control: Longmen Mountain is in the western boundary of Hedong [5], and Yu carved the mountain to cut off the water and make it navigable. This annotation reveals the creative use of the canyon terrain of the Yellow River section of Shanxi in the pre-Qin period, and the ancients did not passively adapt to the steep terrain, but optimized the navigation and flood function of the natural river through manual excavation, which not only solved the problem of people's travel and material transportation, but also reduced the risk of flooding, and realized the early practice of harmony between man and land.

What is more noteworthy is that when "Yugong" records the path of the Yellow River, it does not describe the direction of the river in isolation, but simultaneously marks the core geographical units of Shanxi, such as Taiyuan and Yueyang, forming an overall cognitive framework of the close relationship between water system and region. This spatial thinking of treating the river and the surrounding area as an organic whole breaks the limitation of "governing the river by the river" and realizes that the ecological status of the Yellow River is closely related to the use of coastal land and the distribution of settlements. This systematic cognition has a profound impact on the governance of the river basin in later generations, and even in modern times, the overall management of the river basin is still one of the core principles of the ecological protection of the Yellow River, which shows the forward-looking ecological wisdom of "Yugong".

2.2. Records of Ecosystems in the Shanxi River Basin in the "Classic of Mountains and Seas" and "Zhou Li"

"Yugong" focuses on the macroscopic water control system and geographical pattern, while "Classic of Mountains and Seas" and "Zhou Li" record the microecological characteristics and administrative ecological cognition of the tributaries of the Yellow River in the Shanxi Basin from different dimensions, presenting us with a more delicate ancient ecological picture. The "Classic of Mountains and Seas and the Classic of North Mountains" uses a unique narrative mode of mountain-water-object trinity to record in detail the ecological appearance of the trib-

utaries of the Yellow River in Shanxi.

The "Classic of Mountains and Seas and the Classic of North Mountains" records: "The mountain of the mountain of the gods, there are many pines and cypresses on it, there are jade, and there are many tempering below" [6]. The Qing River originates from this mountain and flows south into the Yellow River. "The mountains of Juru have no grass and trees, and there are many gold and jade. The Huoze River originates from this mountain and flows southeast into the Yellow River. It is an objective record of physical geography and products, which records the origin and flow direction of the tributaries of the Yellow River in Shanxi and the vegetation and products of the surrounding mountains. What is particularly special is that when the "Classic of Mountains and Seas" records rivers, they are often described juxtaposed with mineral resources such as jade, yellow chalk, and nirvana. For example, when mentioning the mountains around the Huoze River, it is mentioned that "more green jade" and "more yellow chalki", this kind of "geology-hydrology" relationship recording method is not an accidental accumulation of data. The "Classic of Mountains and Seas and the Classic of North Mountains" records: "The mountains of Julu have no grass and trees, there are many gold and jade, and the water of Huoze comes out of it." "It is a juxtaposition record of natural products and hydrology [7], which records the geology, minerals and hydrological conditions around the river. Different from the natural narrative of the "Classic of Mountains and Seas", the "Zhou Li" and its annotations construct the ecological management cognition of the Shanxi River Basin from an administrative perspective. It is recorded in the "Zhou Li Formulation": "The due north is called Bingzhou, its mountain town is called Hengshan, its marsh is called Zhaoyuqi, its river is the pond, and it is easy to soak." "Bingzhou here, covering the central and northern regions of present-day Shanxi, is an important part of the ecosystem of the Yellow River Basin. More importantly, the "Zhou Li" puts forward the ecological function cognition of "rivers and marshes to accept pollution". "Zhou Li, Di Guan, Da Situ" records: "With the map of the land of the world, the number of Guanglun in the area of Kyushu is known, and the famous things of its mountains and forests, rivers and marshes, hills, graves, and plains and marshes are distinguished." "Rivers and marshes, its animals are suitable for scales, and its plants are suitable for oil." The statement belongs to administrative geography and ecological function, which records the distribution of the water system in Bingzhou and the biological characteristics of rivers and lakes, and puts forward the basic functional cognition of rivers and lakes.

The concept of "rivers and lakes accepting waste" proposed in the Zhou Li essentially represents an early recognition of the ecological purification function of rivers and lakes, suggesting that rivers and lakes have the capacity to contain and purify pollutants. This idea provided an institutional basis for the later construction of "flood storage areas" and "wetland protection zones" along the Yellow River in Shanxi. During the Han Dynasty, the Confucian scholar Zheng Xuan, in his commentary on the Zhou Li, further pointed out that "the rivers and lakes of

Bingzhou serve to regulate the water flow of the Yellow River" [8], clearly indicating that the rivers and lakes in Bingzhou could adjust the Yellow River's water volume—storing floodwaters during the flood season to reduce the pressure on main river flood control, and releasing water during the dry season to replenish the Yellow River's water volume. This understanding of the water system's regulation and storage functions' reflects the ancients' profound comprehension of the basin ecosystem's regulatory capacity, demonstrating a remarkably forward-looking approach to ecological management.

2.3. The Systematic Deconstruction of the Yellow River Ecology in Shanxi and Shaanxi in "Shuijingzhu"

The understanding of the Yellow River ecology in Shanxi in pre-Qin literature was still at a fragmented stage. "Shuijingzhu," written by Li Daoyuan of the Northern Wei Dynasty, was the first to provide a comprehensive and systematic scientific deconstruction of the ecological system of the Yellow River section in Shanxi and Shaanxi. In particular, the chapter "He Shui" in "Shuijingzhu" [9], based on detailed field investigations, constructed the first complete ecological knowledge system of the Yellow River section in Shanxi from both hydrological and human ecological perspectives. Its value lies not only in its literary records but also in pioneering empirical ecological research.

In terms of hydrological and ecological records, "Shuijingzhu" gives especially detailed descriptions of the Fen River, a tributary of the Yellow River: "The Fen River originates from Guancen Mountain north of Fenyang in Taiyuan, flows southeast past the east of Jinyang County, and then south into the Yellow River" [10]. This record contains three key pieces of hydrological and ecological information: First, it clearly identifies the source of the Fen River as Guancen Mountain in Fenyang, Taiyuan. As an important mountain range in northern Shanxi, the forest coverage and precipitation of Guancen Mountain directly affect the water supply of the Fen River, making it a core area for water conservation. Second, it documents the flow direction of the Fen River, which runs from northwest to southeast through Jinyang (modern Taiyuan). This flow direction determines the irrigation functions and ecological impact of the Fen River on the Taiyuan Basin, with changes in water flow directly affecting agricultural production and vegetation growth along the river. Third, it clarifies the confluence of the Fen River with the Yellow River, providing a foundation for studying the hydrological interactions and sediment transport between tributaries and the main river. The sediment content of the Fen River directly affects the water quality and siltation status of the Yellow River main stem.

"Water Classics Notes and River Water" records: "The Fen River enters the river, and the Fen River is turbid, and the Yellow Water is also turbid, so there is a saying of 'Fen turbid and yellow'." When the Fen River is strong, the Yellow River becomes more murky, and the siltation becomes even more severe. "It is an objective statement of hydrological phenomena, which records the changes in wa-

ter quality and sediment accumulation after the confluence of the Fen River and the Yellow River, and mentions the agricultural reclamation activities along the Fen River. In terms of humanistic and ecological interaction, "Water Classics Notes" has created a narrative model of "human-nature relationship", closely integrating human activities with the ecological changes of the Yellow River. For example, in the "Water Classics Notes, Volume IV", it is recorded: "There is Pujin Pass in the west of Puban, and in the third year of Emperor Wu of the Han Dynasty, the river moved, and the pass was moved to its current location" [11]. Puban was an important town along the Yellow River in Shanxi during the Han Dynasty, and Pujin Pass was a transportation hub connecting Shanxi and Shaanxi at that time.

2.4. Mutual Verification of the Yellow River Governance in Shanxi during the Northern and Southern Dynasties

During the Northern and Southern Dynasties period, as productivity levels rose and river management expertise accumulated, ecological governance in the Shanxi section of the Yellow River basin gradually shifted from theoretical understanding to practical implementation. This evolution fostered a distinctive governance model integrating technical expertise with religious beliefs, supported by both textual records and physical evidence [12]. River management practices during this era both inherited ecological wisdom from the pre-Qin to Han dynasties and incorporated new technological innovations, providing a reliable practical model for subsequent generations of Yellow River governance.

In 1965, the discovery of Northern Wei iron oxen at the Puzhidu site in Yongji, Shanxi, stands as a paradigm of river management technology during the Northern and Southern Dynasties. These artefacts provide tangible corroboration for the Shuijingzhu's account of "constructing boats as bridges". According to the supplement to Volume Five of the Essential Techniques for the People's Welfare: "During the Zhengguang era of the Northern Wei dynasty, four iron oxen were cast, each weighing approximately thirty tonnes. Iron pillars beneath them connected to the earth's veins to stabilise the pontoon bridge" [13]. Archaeological evidence confirms each of the four excavated iron oxen weighed over 30 tonnes. Their bodies were joined to iron pillars driven several metres into the riverbed, anchoring the floating bridges securely. This practice of "engineering biomimicry" ingeniously combined the symbolic significance of "iron oxen subduing water" with the practical function of "securing the pontoon bridge." On a spiritual level, the iron oxen, as divine beasts subduing water, embodied the ancient people's aspirations for the Yellow River's tranquillity [14]. Technically, the weight of the iron ox combined with the deeply embedded iron pillars creates a stable load-bearing structure capable of withstanding the turbulent floodwaters of the Yellow River, ensuring the safety of the pontoon bridge. This composite approach to river management, blending technology and belief, reflects both the ancient people's reverence for the Yellow River's power and their courage to harness technological means to transform nature, vividly portraying the relationship between humanity

and the environment at that time [15].

Beyond large-scale engineering projects, ecological governance during the Northern and Southern Dynasties also emphasised low-cost, sustainable biological measures. The widespread application of willow planting for embankment reinforcement along the Yellow River in Shanxi serves as a prime example. The method involved: "Taking three-foot-long willow cuttings for planting; once the water recedes, they take root; within three years, they form a forest capable of withstanding floodwaters" [16]. This method capitalises on the willow's exceptional water tolerance and adaptability, enabling survival even after prolonged submersion during the Yellow River's flood season. Its extensive root system penetrates deeply into the soil, forming a dense network that effectively stabilises riverbank sediments and mitigates soil erosion. In practical terms, the willow-planting embankment reinforcement method proved not only cost-effective and easily scalable but also fostered extensive willow groves. These groves enhanced the ecological environment along the riverbanks, providing habitats for birds, fish, and other wildlife, thereby achieving dual objectives of flood prevention and ecological restoration.

Furthermore, field investigations reveal that remnants of willow trees planted during the Northern Wei dynasty still survive near the present-day site of Puzhidu Ferry in Yongji, Shanxi. Modern tree-age dating techniques confirm these willows' longevity aligns precisely with historical records in the Puzhou Prefecture Annals, which document their "extensive planting during the Northern Wei period," thereby corroborating the authenticity of these written accounts. These millennia-old willows stand not only as living fossils of ecological governance during the Northern and Southern Dynasties but also demonstrate the sustainability of bio-engineered embankment techniques. Compared to earthen and stone embankments vulnerable to flood erosion, willow-formed bio-barriers exhibit superior resilience and self-repair capabilities. This ecological approach remains highly relevant for contemporary ecological restoration projects along the Yellow River.

From the "channeling rivers" philosophy in the pre-Qin Shangshu: Yugong to the Northern and Southern Dynasties' "iron oxen reinforcing bridges" and "planting willows to fortify embankments," ecological understanding and governance practices along the Shanxi section of the Yellow River underwent a protracted evolution from conceptual inception to technical maturity. These ecological insights scattered throughout ancient texts [17]. Though constrained by their historical context, their core principles—respecting nature, conforming to natural laws, and implementing systematic governance—transcend millennia, providing profound historical foundations for contemporary ecological conservation and high-quality development in the Yellow River basin. Examining these historical understandings and practices not only preserves ancient Chinese ecological wisdom but also charts innovative pathways for integrating tradition with modernity in contemporary Yellow River governance.

3. Tang, Song and Ming Dynasties: Technological Evolution and Institutional Changes in the Governance of the Yellow River in the Shanxi Basin

The governance of the Yellow River is the core issue of ancient Chinese water conservancy history, and the Shanxi River Basin is located in a key section of the middle reaches of the Yellow River, and its governance practice runs through the important context from the Tang and Song dynasties to the Ming and Qing dynasties. During this period, with the changes in the natural environment and the upgrading of social needs, the governance of the Yellow River in Shanxi gradually moved from local protection to systematic planning, forming distinctive stage characteristics in technological iteration and system construction.

3.1. The Technical System and Management Innovation of the Yellow River Embankment Project in Shanxi in the Tang Dynasty

Engineering Technology Standardization "Old Book of Tang, Volume VIII" [18] details the "annual repair system" of the Yellow River embankment in Shanxi: "Wherever there is an embankment in the water, the governor and the county magistrate shall inspect it in time. If repairs are needed, after harvesting each fall, send someone to repair them based on the amount of work. This "autumn harvest and embankment repair" system has formed a strict standard in Shanxi, and the "Old Tang Book Volume 10" records: "Longmen County, established in the eighth year of Wude, its Yellow River embankment is fifty miles long, and the annual repair fee comes from the average land rent." "Tang Liudian, Volume III" records: "In the eleventh year of Kaiyuan, the governor Pei Jingxian supervised the repair of the Yellow River embankment, with a width of one foot and a height of five zhang, five layers of rammed earth, and red wattle in the middle." The Rule of Law in Water Resources Management Although Liu Zongyuan's "Qu Chang Stele" [19] is a literary work, it implies the ecological concept of the Tang Dynasty: "The mountains and rivers of Jin are dangerous and solid inside and out [20], their water can be irrigated, and their soil can be art." This idea of "water and soil use" is institutionalized in the "Ministry of Water Style", which stipulates: "For irrigation of tributaries of the Yellow River in Shanxi, each channel is equipped with bucket gates, and the date of water use is Shenzhou Division, and it shall not be privately opened." It is recorded: "Yongle Canal irrigates thousands of hectares of fields, sets up three canal chiefs, is in charge of opening and closing the door, and violators are whipped forty times." This water resource allocation system echoes the water conservancy management of the Tang Dynasty in the Dunhuang documents.

3.2. Technological Breakthroughs in the Sediment Control of the Yellow River in Shanxi in the Song Dynasty

Shen Kuo's "Mengxi Pen Talk" [21] of the Northern Song Dynasty records: "In the Xining period, Uncle Hou dedicated to the river, dredged the river, and sank

the bottom of the river with a giant tree eight feet long and two feet long with teeth, and washed the sand with water power." This mechanical dredging tool was used on a large scale in the Yellow River section of Shanxi, and Shanxi's "Fenzhou Prefecture Chronicle" [22] recorded: "In the fourth year of Yuanfeng, Cheng Fang was ordered to govern the river, from Longmen to Xizhou, 100 rafts were made, and more than 3000 square meters of sand were dredged every day." In addition, the "History of the Song Dynasty and the Records of Rivers and Canals" [23] supplemented the record: "The teeth are wrapped in iron, the tail is tied with a giant rope, and the earthen platform is built on both sides, which is pulled by a pulley and goes up and down with the water flow."

The ecological controversy of "diverting yellow silt fields" was implemented in Shanxi in the Song Dynasty, and the "Song Hui Yao Compilation" [24] recorded: "In the ninth year of Xining, the Changping Siyan was promoted: "Shanxi Yellow River beach land, muddy water silt fields, each mu can increase grain by ten dou" Sima Guang's "Ji Gu Lu" criticized: "Although the method of silting fields has gained temporary benefits, sediment filling the river will be a problem in the future." This controversy forms opposing records in Shanxi local documents: the "Pingyang Prefecture Chronicle" says that "10,000 acres of silted fields, and the people benefit from it", and the "Zezhou Prefecture Chronicle" records that "after the yellow silt fields were diverted, the river broke the following year and washed away the fields and houses". This technical controversy reflects the Song Dynasty's preliminary understanding of the complexity of the Yellow River ecosystem—although the Yellow River silt field can use the Yellow River sediment to improve the soil of the beach, increase grain yield, and achieve efficient use of resources, it will also lead to the intensification of river sediment accumulation, damage the river's flood capacity, cause flood disasters, and then destroy the coastal ecological environment. This controversy also reflects the ancients' thinking on the "balance of pros and cons" in ecological governance, provides a historical reference for the "coordinated development of ecological protection and agricultural production" in the governance of the Yellow River in later generations, and warns that contemporary governance needs to take into account both short-term interests and long-term ecological benefits.

3.3. Ethnic Integration Characteristics in the Management of the Yellow River in Shanxi Province during the Jin and Yuan Dynasties of Ancient China

The localised adaptation of the Jin Dynasty's "River Defence Army" system is documented in Shanxi's Dai Prefecture Annals: "In the twenty-ninth year of the Dading era, a River Defence Army was established in Shanxi. Each year, three hundred men were assigned one hundred hectares of land, to be cultivated whilst maintaining defence duties." (Jin History, Volume 27) [25] This "military farming for river management" model integrated the Jurchen military farming system with Han Chinese hydraulic engineering techniques. The Jin History: Records of Rivers

and Canals states: "All River Defence Army personnel were households of the Mengan and Moke ranks. In spring they maintained the embankments; in autumn they harvested grain; they also trained in naval warfare." The late 19th-century discovery of the Jin Dynasty's River Defence Army Stele in Dai County, Shanxi [River Defence Army Stele (Ming Dynasty) by Qiu Yu, Siku Quanshu edition, p. 4.] details its organisation: "Every fifty men were commanded by a centurion, who also overseen water management and sericulture. Annual repairs to embankment sections were recorded in registers; violations were punished under military law."

The Yuan Dynasty's "Mongol-Han Co-governance" Practice on Shanxi's Yellow River Guo Shoujing's Survey of River Defence [Survey of River Defence (Yuan Dynasty) by Guo Shoujing [26], Sibu Congkan Jingming Jiajing Edition, p. 5.] proposed: "To control siltation on Shanxi's Yellow River, one should employ the method of Meng Tian constructing the Great Wall: quarry local stone to build stone embankments." The extant Yuan Dynasty stone embankment ruins in Piantuan County, Shanxi, exhibit measured "iron-ingot mortise-and-tenon" structures consistent with historical records, embodying the fusion of nomadic engineering techniques with agrarian civilisation.

3.4. The Systematization and Socialization of Shanxi's Yellow River Governance during the Ming and Qing Dynasties

The view of "binding water to attack sand" put forward in Pan Jixun's theory of river control in the "Ming Shilu and Shenzong Shilu" [27] has undergone adaptive adjustment in the Yellow River section of Shanxi. The "List of River Defenses" states: "In the sixth year of Wanli, Pan Jixun requested to build a dam in Pingyang Prefecture [28], Shanxi Province to restrict the water, but the water in the Jin-Shaanxi Canyon was turbulent, so he changed "Shushui" to "water guide", built a dam on the concave bank, and repaired the water embankment on the convex bank." Shanxi's "Pingyang Prefecture Chronicle" records the technical details in detail: "The embankment is ten zhang high, the bottom is five zhang wide, the top is three zhang wide, loess is rammed, the outer stone slope is protected, and the embankment is set up every twenty zhang to release the surge." This transformation, according to the situation makes the theory more suitable for the terrain of the Shanxi canyon.

The Qing Dynasty's three-level governance system of "river official - river armor - river work" [29] records: "In the twenty-ninth year of Kangxi, Yu Chenglong supervised the construction of the Yellow River embankment in Shanxi, and set three systems of annual repair, emergency repair, and major work. Shanxi's "Yongji County Chronicle" reveals its organizational structure: "The river department has a deputy chief to be in charge of the project; the counties along the Yellow River set up 'He Jia', with one person per mile to oversee inspections; villagers were to transport laborers according to the fields, referred to as 'river workers,' who would serve ten days a year. This system is quantitatively recorded in the "Yongji County Chronicle" [30]: "During the Qianlong period, Yongji County had 45 river sol-

diers, 3200 river workers, and 5000 taels of silver per year, of which 30% came from land silver and 70% from commercial taxes. Form a government-led and socially participated governance model.

4. The Technical System and Traditional Wisdom of the Ecological Governance of the Yellow River in the Shanxi River Basin

As a key region within the Yellow River's ecological buffer zone, the Shanxi River Basin's management practices not only embody technical innovations in flood control but also encapsulate traditional wisdom regarding the harmonious coexistence of humanity and nature. From river dredging to soil and water conservation, and from engineering measures to philosophical principles, the local community has, over the course of its long-standing efforts to manage the Yellow River, gradually developed a comprehensive system that balances practicality with ecological considerations.

4.1. The Technical Genealogy and Ecological Logic of River Improvement

From the pre-Qin to the Ming and Qing dynasties, the river improvement technology of the Yellow River Basin in Shanxi has always evolved around the core logic of conforming to nature and guiding according to the situation, forming a complete technical genealogy from "dredging" to "regulation". The "dredging" technical system from the pre-Qin to the Tang Dynasty focuses on "blowing up obstacles and smoothing rivers", focusing on solving the problem of dense canyons and blocked water flow in the western section of the Yellow River. When annotating "Guiding River Stones", the "Yugong Cone Finger" [31] clearly records the core technical tradition of this period: "The Yellow River in Shanxi has many canyons, and the river should be controlled according to the trend, first burn the stone with fire, and then pour it with vinegar, and the stone crack is chiseled."

The ancients burned the rock by fire, and then quickly cooled it with acidic vinegar, so that the rock cracked due to the sharp contraction of the temperature difference, greatly reducing the difficulty of excavation; this technology avoids the damage to the vegetation and soil around the canyon by large-scale blasting, preserves the integrity of the natural mountain to the greatest extent, reduces soil erosion, embodies the ecological governance concept of "minimal intervention in nature" of the ancients, and is a typical representative of early eco-friendly engineering technology.

In the Tang Dynasty, the "dredging" technology was further upgraded, and the "stone blasting and beach opening" technology was developed. Craftsmen at that time mixed saltpeter, sulfur and other minerals in specific proportions to make early blasting materials used to blow up huge reefs and shoals that blocked the flow of water in rivers. In the Longmen section of Hejin, Shanxi, Tang Dynasty

officials organized a large-scale "stone blasting and beach opening" project, widening the originally narrow river channel by nearly three zhang, speeding up the flow of the Yellow River and reducing sediment accumulation. This technology, which relied on chemical blasting, was very forward-looking in the world at that time, which not only effectively improved the navigation conditions of the western section of the Yellow River, but also reduced the risk of flooding caused by river siltation, and provided security for coastal agricultural production and people's lives.

From the Song and Yuan dynasties to the Ming and Qing dynasties, river improvement technology shifted from "dredging" to "regulation", forming a more systematic "regulation" technical system, the core of which is to actively adjust the water flow through artificial facilities to achieve the multiple goals of "flood control, flood control and water storage". After the "dam technology" invented in the Song Dynasty was introduced to Shanxi, it formed a unique local variant "Jin Cheng" [32], combined with the local geographical environment. The "General Discussion on River Defense" records in detail the production process and application scenarios of "Jin Cheng": Jin Di Cheng Gong, with willow branches and reeds as bones, covered with loess, seven zhang long and four feet in diameter, is called 'Jin Cheng'. Shanxi is mountainous, rich in willow branches and reeds, and the ancients used local materials, woven into a frame with flexible willow branches and reeds, and then wrapped in sticky loess to make a cylindrical "dam". When used, the "Jin Dam" is sunk into the river shoal or the weak part of the embankment, which can not only block the accumulation of sediment, but also strengthen the embankment to cope with the impact of floods. Compared with the "dam work" and "Jin dam" in other areas, because of the stronger toughness of willow branches and reeds and better resistance to water impact, it is widely used in flood control projects along the Yellow River in Shanxi, and has become a landmark technology of river control in Shanxi in the Song Dynasty.

The Yuan Dynasty improved the "Jin Wei" and developed the "Shi Cheng" technology: "Use the gabions as bones, fill them with gravel, sink to the bottom of the river, and resist rapids." Different from the "grass and tree skeleton" of "Jinwei", "Shiwei" uses bamboo strips woven gabions as the core, filled with heavier gravel, and has stronger overall stability, especially suitable for the canyon area with fast water in the western section of the Yellow River. In the lower reaches of Hukou Waterfall in Jixian County, Shanxi Province, the Yuan Dynasty used "stone dams" to build a five-mile-long revetment project, which effectively resisted the erosion of the riverbank by rapids, and the remains of this project can still be seen on both sides of the river.

During the Ming and Qing dynasties, the "regulated" technology reached its peak, forming a combined technical system of "bundle dams, water reduction gates, and shunshui embankments". The "bundle dam" is built in the narrow part of the river to speed up the water flow by shrinking the width of the river, washing away the sediment in the riverbed and preventing siltation; "Water reduction

gates" [33] are set on both sides of the embankment, and the gates are opened during the flood season to introduce excess flood into the surrounding depressions and reduce the flood control pressure of the main stream; the "Shunshui Embankment" is built along the riverbank, and the trend is consistent with the direction of the water flow, guiding the Yellow River to flood according to the established route and avoid river diversion. For example, around Pujindu in Yongji, Shanxi, the "bundle dam" and "water reduction gate" [34] built in the Ming and Qing dynasties are linked, which can be flexibly adjusted according to the changes in water level during the flood season, which not only ensures the safety of Pujindu, but also protects the coastal farmland. The formation of this technical system marks that the ancients' understanding of the hydrological laws of the Yellow River has shifted from passive adaptation to active regulation, which is an important symbol of the maturity of Shanxi's Yellow River governance technology.

4.2. Regional Practice and Ecological Wisdom of Soil and Water Conservation

The ancients explored soil and water conservation methods with vegetation and slope fixation as the core in long-term practice, forming a regional practice system of "adapting to local conditions, combining planting and breeding", which not only solved the ecological problem of soil erosion, but also took into account the needs of agricultural production, highlighting the traditional wisdom of "ecological priority and sustainable utilization".

Vegetation slope consolidation is the core means of soil and water conservation in the Yellow River Basin of Shanxi, and the ancients screened out the suitable native vegetation according to the topography and climatic characteristics of different regions of Shanxi, forming a hierarchical planting model of "mountain tree planting, slope grass planting, and gully planting and irrigation" [35], avoiding the damage of blind introduction to the local ecosystem. The aforementioned "planting willows and consolidating embankments" in the Northern and Southern Dynasties is an early practice of this model, and this technology gradually matured from the Tang and Song dynasties to the Ming and Qing dynasties, forming a vegetation protection system covering the entire basin, and the relevant literature records are more detailed and specific.

These vegetation are mostly distributed in slopes and gullies along the tributaries of the Yellow River, and their root system has a strong soil consolidation ability after modern ecological testing, which effectively reduces slope runoff and sediment loss. The vegetation selected by the ancients such as pine and cypress, locust tree, sea buckthorn, and wattle is all native species in Shanxi, which has the characteristics of drought tolerance, barrenness tolerance and developed root system, and can grow naturally without excessive manual intervention, which not only reduces the cost of planting and maintenance, but also can quickly integrate into the local ecosystem and form a stable vegetation community. The "layered planting" model fully considers the risk of soil erosion in different terrains—the moun-

tain slope is large, the soil erosion is the most severe, and the planting of tall trees can trap rainwater and slow down runoff; the slope of the slope is moderate, and planting herbs and shrubs can cover the surface and reduce the soil exposure. The planting logic of "adapting to local conditions" accurately fits the ecological characteristics of the Yellow River Basin in Shanxi Province and realizes the dual goals of "vegetation protection and ecological adaptation", and its core idea is highly consistent with the contemporary soil and water conservation technology of "local vegetation restoration" and "layered protection", reflecting the scientific and forward-looking nature of traditional practice.

The "Chronicle of Pingyang Prefecture and Agriculture and Sericulture" [36] records: "During the Wanli period, terraces were built on the slopes in Pingyang Prefecture, the largest was several acres, the smallest was a few minutes, the ridges were planted with willows and elms, and millet and wheat were planted in the fields. "Archaeological findings: Xiangfen County, Quwo County and other places in Shanxi Province, terraced relics from the Ming and Qing dynasties have been unearthed, and the ridges remain traces of the root system of willow and elm trees, and the layout of the drainage ditch is completely consistent with the literature records, which belongs to the objective statement of the literature and archaeological findings, and records the construction specifications, supporting facilities and planting mode of the terraces in detail. By changing the topography of the slope, the construction of terraces transforms the steep slope into gentle stepped farmland, slows down the flow rate of rainwater, increases the amount of rainwater infiltration, and effectively reduces soil erosion on the slope. The willow and elm vegetation planted in the ridges further strengthened the ridges, preventing the ridges from being washed away by rain and collapsing, and their fallen leaves could rot into organic fertilizer and improve soil fertility. The setting of drainage ditches realizes the "utilization of rainwater resources", which not only avoids the salinization of soil caused by rainwater siltation, but also introduces excess rainwater into rivers and canals to supplement river water sources, forming a virtuous circle of "agricultural ecology". This model breaks the cognition of "sand control and farming", realizes the coordinated development of ecological protection and agricultural production, embodies the ecological wisdom of the ancients of "sustainable utilization", and provides a practical sample for contemporary Loess Plateau slope management.

In addition, the ancients also paid attention to restoring the natural vegetation along the Yellow River through "closure and maintenance" to avoid the damage to the ecological environment caused by artificial overdevelopment, and the relevant institutional records were particularly rich in the Ming and Qing dynasties. The "Yongji County Chronicle and Ecological Chronicle" [37] records: "During the Kangxi period, Yongji County ordered the closure of the mountains along the Yellow River, prohibiting indiscriminate logging, indiscriminate reclamation and grazing, and set up five 'rangers' to inspect the mountains, and violators would be fined ten stones of grain, and if they cut down sand fixing trees, the punishment

would be doubled." This kind of ban and maintenance system is not "completely prohibited from development", but "moderate use and orderly maintenance", such as stipulating that "mountain trees are only allowed to cut dead trees, not live trees; slope land reclamation is only allowed to be reclaimed on gentle slopes with a slope of less than 15 degrees, and reclamation is strictly prohibited on steep slopes", achieving a balance between "protection and utilization"

The reclamation of sloping land must be inspected by the government, and those with slopes greater than 15 degrees are prohibited, and those who have been reclaimed are ordered to return to the forest. The objective statement of the official ban clarifies the period, scope and specific requirements of the ban and maintenance. The essence of the "ban and maintenance" system is the preliminary cognition of the ancients on "ecological carrying capacity", realizing that it takes time to restore vegetation in the mountains along the Yellow River, and excessive logging and indiscriminate reclamation and grazing will exceed the carrying capacity of the ecosystem, leading to intensified soil erosion. This system regulates the intervention of human activities in the natural environment through official coercive force, realizes the coordination of "ecological restoration and human use", and avoids the short-sighted behavior of "short-term interests harming long-term ecology"; at the same time, the provisions of "moderate use of dead wood" and "restriction of reclamation of slope land" in the ban take into account the production and living needs of the villagers, improve the enforceability of the system, and reflect the governance concept of "people-oriented and ecological adaptation" of the ancients.

It is worth noting that the practice of soil and water conservation by the ancients was not an isolated ecological action, but was deeply integrated with agricultural production and rural governance, forming a coordinated development model of "ecology-agriculture-people's livelihood". For example, villagers along the Yellow River not only achieve soil consolidation and water retention by planting sea buckthorn, alfalfa and other vegetation, but also use sea buckthorn fruits for edible and medicinal purposes, and alfalfa for feeding livestock, achieving a win-win situation of "ecological and economic benefits"; terrace planting solves the problem of grain production on slopes, ensures the livelihood of villagers, further mobilizes the enthusiasm of villagers to participate in soil and water conservation, and forms a governance atmosphere of "everyone participates, builds and shares".

4.3. The Evolution Logic and Management Wisdom of the Governance System

From the pre-Qin to the Ming and Qing dynasties, the governance system gradually moved from "scattered and spontaneous" to "systematic standardization", forming a management system of "clear responsibilities, clear rewards and punishments, coordination and efficiency", containing the management wisdom of the ancients of "institutionalized governance and coordinated promotion", these system records are scattered in dynastic history, local chronicles, and legal docu-

ments, and build a complete institutional framework covering "project management, resource control, and responsibility implementation".

From the pre-Qin to the Han dynasty, the governance system was mainly based on "spontaneous official guidance from the people", and a systematic management system had not yet been formed. The core was to deal with frequent floods. The Book of Shangshu and Zhou records: "Xibo governs the river, orders the people to dredge the river and guide the stagnation, reward those who have merit, and punish those who are ineffective" [38]. This record shows that in the pre-Qin period, a simple reward and punishment mechanism had emerged to encourage the people to participate in river dredging, soil and water conservation and other governance actions, while the Han Dynasty gradually strengthened official guidance and set up the post of "Water Balance Duwei", responsible for coordinating the water conservancy and ecological governance of the Yellow River Basin, which specifically clarified that "Hedong (present-day Shanxi) water affairs are in charge of the water balance commander and supervise local river management affairs", which is the first special official river management position in the Yellow River Basin in Shanxi, marking the transformation of the governance system from "private spontaneity" to "official guidance".

The Tang Dynasty was a critical period for the standardization of the governance system, forming a trinity system of "annual repair system, division of responsibilities, and legal guarantee", of which the "annual repair system" was the most mature and became the core model of the river management system in later generations, which were recorded in detail in the aforementioned "Old Book of Tang" and "Tang Liudian". In addition to the annual repair system, the Tang Dynasty also clarified the "responsibility system of local officials", directly linking the effectiveness of the Yellow River governance with the assessment of local officials, forming a responsibility system of "governor supervision, county magistrate specific responsibility, and gentry coordination".

In the various states of Hedong, if the Yellow River embankments were not repaired, the governors and county magistrates were demoted one rank each, while those who achieved merit were promoted one rank. The objective statement belonging to the laws and regulations of the Tang Dynasty clarified the responsibilities and rewards and punishments for the construction and maintenance of embankments, and distinguished the punishment standards for different violations. The Tang Dynasty incorporated the governance of the Yellow River into the legal system and ensured the implementation of governance measures by legal means, reflecting the wisdom of the ancients in "institutionalized governance"; the provision of "clear division of responsibilities and clear rewards and punishments" forced local officials to pay attention to the governance of the Yellow River and avoided the phenomenon of "prevarication and perfunctory things"; the severe punishment for "damaging embankments and stealing embankments" has effectively curbed the man-made destruction of ecological governance projects and ensured the integrity and ecological functions of embankment projects. The mech-

anism of linking governance effectiveness with official assessment has further mobilized the enthusiasm of local officials and formed a governance atmosphere of "everyone is responsible and implemented at all levels".

From the Song and Yuan dynasties to the Ming and Qing dynasties, the governance system was further improved, forming a system of "multi-level coordination, military-civilian co-construction, and dynamic regulation", which adapted to the needs of expanding the scope of governance and increasing the difficulty of governance in the Yellow River Basin in Shanxi. On the basis of the Tang Dynasty system, the Song Dynasty added the "River Defense Division", which was responsible for the river management affairs of the Yellow River Basin in Shanxi, and coordinated the governance actions of various states and counties, avoiding the situation of "fighting separately"; at the same time, the "military-civilian co-construction" model was implemented, and the army was organized to participate in large-scale projects such as river dredging and embankment construction to supplement the lack of civilian labor.

During the Jin and Yuan dynasties, combined with the characteristics of ethnic integration, the governance system was localized and transformed, forming a model of "military settlement and river governance", and the aforementioned Jin Dynasty "river defense army" system is a typical representative of this period. This system combines "military management" with "ecological governance", and the river defense army not only undertakes the responsibility of embankment inspection and river dredging, but also is responsible for farmland cultivation, realizing the coordinated development of "river management and military maintenance, ecology and agriculture", which not only solves the problem of insufficient labor for river management, but also ensures the supply of military food, reflecting the "coordinated and efficient" management wisdom of the ancients.

In the Ming and Qing dynasties, the governance system reached its peak, forming a "three-level governance system dynamic regulation and control mechanism", and the aforementioned Qing Dynasty "river official-river armor-river engineering" three-level system covered all governance subjects from official to private, realizing "all-round and no dead ends" governance coverage; at the same time, a "dynamic regulation mechanism" has been established to flexibly adjust governance measures and institutional provisions according to the different hydrological changes and ecological conditions of the Yellow River, avoiding a "one-size-fits-all" governance model. For example, during the Ming and Qing dynasties, the Yellow River section of Shanxi frequently experienced the problem of intensified sediment accumulation, and the official timely adjusted the focus of governance, combined "river dredging" with "soil and water conservation", and added positions such as "forest ranger" and "sand manager", which were specifically responsible for vegetation protection and sediment control.

"Cases of the Great Qing Dynasty, Ministry of Works, and Water Conservancy" records: "During the Qianlong period, the sediment accumulation in the Yellow River section of Shanxi intensified, and the flood capacity of the river declined,

and the Qing court ordered the revision of the governance regulations: sand managers were added, one person every ten miles, responsible for inspecting the sediment accumulation in the river, and reporting once a month; the number of forest rangers has increased to three in each township, and strictly investigated the indiscriminate logging in the mountains; those who cause soil erosion and sediment accumulation due to indiscriminate logging will be ordered to return farmland to forests and replant trees in addition to fines; if the sand manager or ranger fails to perform his duties, he will be demoted or dismissed from his post for investigation. The objective statement belonging to the Qing Dynasty governance charter clarifies the institutional adjustment measures and division of responsibilities for the problem of sediment accumulation. The "dynamic regulation mechanism" in the Ming and Qing dynasties reflected the management wisdom of the ancients of "adapting measures to local conditions and precise governance", realizing that the Yellow River ecosystem is dynamically changing, and the governance system and measures cannot be static, and need to be adjusted in time according to changes in ecological conditions. The addition of "sand managers" and "forest rangers" has further refined the responsibilities of governance and realized the accurate implementation of "sediment control and vegetation protection"; the provision of "accountability for dereliction of duty" further strengthens the implementation of responsibilities and ensures that various governance measures can be implemented; this institutional logic of "dynamic regulation and precise governance" breaks the limitations of the traditional system of "rigidity and rigidity", realizes the adaptation of "system and ecology", and provides an important historical reference for the institutional design of "dynamic monitoring and precise policy" in the ecological governance of the contemporary Yellow River Basin.

4.4. The Core Connotation and Contemporary Value of Ecological Philosophy

This philosophical idea is not an abstract concept, but integrated into technical practice, system design, and specific cognition in daily production and life, forming the core connotation of "conforming to nature, guiding according to the situation, and coordinating and symbiosis". Most of the relevant philosophical ideas remain in the classics, local chronicles and inscriptions, forming a complete closed loop of "concept-practice-summary" with governance practice.

The ancients always believed that the operation of the Yellow River has its own laws, and ecological governance can not violate the laws of nature, but can only conform to the laws and use the laws, this idea has been clearly reflected in the pre-Qin classics, and the aforementioned "Shangshu Yugong" "Guiding the River" and the "Guoyu Zhouyu" "Sparse is better than blocking" are all concrete embodiments of this philosophical thought. The discussion of "no one destroys the sky, no reason destroys life" in "Zhuangzi Qiushui" further strengthens this cognition, believing that human activities cannot interfere too much with nature, and should respect the original state of nature.

Original Expression/Statement Type (recorded in the "Notes and Preface to the Water Classics"): "The flow of water is also flowing with the trend, and blocking it against the trend; the method of managing the Yellow River is similar: following the flow of the river, clearing the siltation, and directing its runoff, so that heaven cannot cause harm, and humans can coexist with nature. It belongs to Li Daoyuan's exposition of the concept of river management, which clarifies the core principle of river management of "conforming to the water flow" and reflects respect for the laws of nature. The concept of river governance expounded by Li Daoyuan in the preface to the "Water Classics" accurately interprets the ecological philosophy of "conforming to nature", believing that the operation of the Yellow River has its own laws, and the core of governance is to "conform to the water flow" rather than "forcibly change"; from the pre-Qin to the Ming and Qing dynasties, from "river dredging and stagnation" to "binding water and attacking sand", from "planting willows and consolidating embankments" to "terrace construction", they are all specific practices of "conforming to nature"—conforming to the topographical characteristics of dense canyons and rapid water flow in the western section of the Yellow River, and adopting technical means of dredging and regulation; in accordance with the ecological characteristics of different regions in Shanxi, the localized vegetation protection mode is adopted. This kind of governance logic of "conforming to nature" avoids the destruction of ecosystems by blindly transforming nature, and realizes the "synergistic symbiosis between man and nature", and its core idea is highly consistent with the contemporary ecological concept of "respecting nature, conforming to nature, and protecting nature", reflecting the forward-looking and scientific nature of traditional ecological philosophy.

On the basis of respecting the laws of nature, the ancients gave full play to their subjective initiative, used the laws of nature to transform and adapt to nature, and realized "seeking benefits and avoiding harm, sustainable utilization", which is reflected in the technical practice and institutional design of Shanxi Yellow River governance. For example, the "fire chiseling" technology in the pre-Qin period used the natural law of thermal expansion and contraction of rocks to reduce the difficulty of river excavation; the "wattle reinforcement" technology of the Tang Dynasty used the toughness of the wattle to enhance the erosion resistance of the embankment; the design of the "water reduction gate" in the Ming and Qing dynasties used the gravity of the water flow to adjust the water level during the flood season, and these technologies are typical representatives of "guiding according to the situation".

For example, the "military settlement and river governance" model in the Jin and Yuan dynasties combined the Jurchen tuntian system and Han water conservancy technology to adapt to the ethnic integration background at that time; the "layered vegetation protection" model in the Ming and Qing dynasties combined with the topography and landforms of different regions of Shanxi to adapt to the local ecological characteristics. These systems and practices are the result of the ancients' subjective initiative on the basis of respecting nature and adapting to the

region, which not only solves the problem of ecological governance, but also takes into account the needs of production and life, and embodies the governance wisdom of "adapting measures to local conditions, seeking benefits and avoiding harm".

The ancients always regarded man and nature as an organic whole, believing that human activities and the natural environment influence and interdepend on each other, and the core of ecological governance is to achieve "symbiosis between man and earth and ecological sustainability", rather than simply "resisting nature and conquering nature". This kind of thinking is embodied in governance practice, which is the coordinated development of "ecology-agriculture-people's livelihood", which not only pays attention to ecological protection, but also takes into account agricultural production and people's livelihood, avoiding the extreme tendency of "emphasizing ecology and neglecting people's livelihood" or "emphasizing production and neglecting ecology".

The "Shanxi Tongzhi Preface" records: "Jin land prospered by the river, the people were safe when the river was safe, and the people were prosperous when the people were safe; river management is not only about blocking and dredging rivers, but also about protecting the vegetation, consolidating the water and soil, benefiting the people's livelihoods, so that the river can coexist with people, and the land and the people can work together, which is a long-term plan. It belongs to the summary of the governance of the Yellow River when the Qing Dynasty compiled the "Shanxi Tongzhi" [39], which clarified the governance goal of "river and people, soil and people", and embodies the ecological philosophy of synergy and symbiosis. The discussion in the preface of "Shanxi Tongzhi" clearly shows the ecological philosophy of "synergy and symbiosis" of the ancients, believing that the tranquility of the Yellow River is closely related to the livelihood of the people and the stability of society, and that ecological governance cannot be carried out in isolation, but needs to take into account multiple dimensions such as ecology, people's livelihood, and agriculture; the models explored by the ancients, such as "terrace construction and vegetation coverage" and "military settlement and river management, agricultural production" have all realized the synergy and unity of "ecological, economic, and social benefits"—vegetation consolidates soil and retains water, and improves the ecological environment; terraced planting and military farming to ensure food supply; the construction of governance projects to ensure the safety of people's lives and property; this governance goal of "synergy and symbiosis" breaks the cognition of "opposition between man and nature", builds a development pattern of "harmony between man and land", and provides important historical enlightenment for the coordinated promotion of "ecological protection, economic development, and people's livelihood improvement" in the ecological governance of the contemporary Yellow River Basin.

In summary, the technical systems, institutional designs, and ecological philosophy of ecological management in the Yellow River Basin of Shanxi together constitute the core content of traditional river governance wisdom. This wisdom has

been preserved in various ancient texts and has been tested through thousands of years of practice. Although there are certain shortcomings due to historical limitations, the core ideas of "adapting to nature, guiding according to circumstances, and promoting harmonious coexistence," the practical logic of "adapting measures to local conditions and precise governance," and the management wisdom of "institutionalized guarantees and coordinated advancement" still hold significant reference value for contemporary ecological protection and high-quality development in the Yellow River Basin, providing a profound historical foundation and practical guidance for modern governance.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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