

The Logic of National Governance in the Integration of Pre-Existing and Newly Built Canal Systems during the Xixia: A Study Centered on Water Conservancy on the Ningxia Plain

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Abstract: Situated in the arid and rain-scarce northwestern territories, Xixia was compelled by its distinctive climatic structure to accord paramount importance to water resources. The development of water conservancy and the protection of canal systems thus became both pivotal undertakings and fundamental safeguards in Xixia's state-building. Canal irrigation works epitomize the technical sophistication of Xixia's hydraulic exploitation and its broader capacity for state governance. Taking Xixia's canal networks as its central object of inquiry, this article undertakes a systematic investigation by integrating Xixia's own documentary legacy with relevant historical sources. Xixia attained effective control over its hydraulic infrastructure through well-articulated water statutes, a specialized administrative hierarchy, and an operational model rooted in collaborative maintenance between officialdom and the populace. Water conservancy construction was not merely a critical measure by which Xixia adapted to the northwestern ecological environment; more profoundly, it constituted an essential pathway through which the regime consolidated its foundations and advanced the project of state-building.

Keywords: Xixia, Hanyan Canal, Tanglai Canal, Haowang Canal.

1. Introduction

Xixia established its state in the arid and semi-arid northwestern region, where water resources and hydraulic infrastructure directly impinged upon the national economy and the people's livelihood, assuming an irreplaceable strategic significance in the economic, military, and political functioning of the regime. As one of the most representative water conservancy projects of Xixia, the Haowang Canal not only epitomizes the level of hydraulic engineering attained by the state but also furnishes a vital entry point for observing Xixia's governance and social operations. Over an extended period, scholarship both at home and abroad has yielded fairly abundant research findings on the institutional framework, economic functions, military value, and political implications of Xixia's water conservancy, thereby laying a solid foundation for further inquiry.

In the domain of water conservancy institutions, the translation, annotation, and collation of the *Tiansheng gaijiu xinding lüling*[1] have provided crucial documentary support. The exegesis of the *Tiansheng lüling* by scholars such as Shi Jinbo, Nie Hongyin, and Bai Bin furnishes a direct textual basis for the study of Xixia's water conservancy statutes. Yevgeny Kychanov and others have examined provisions related to water conservancy irrigation[2], while Du Jianlu has synthesized the system of Xixia water laws[3]; together, their work reveals the fundamental characteristics of Xixia's water management: a high degree of legalization and overarching state direction. Through a comparative study of water conservancy systems under the Song, Liao, Jin, and Xixia, Luo Xiangyi further illuminates the contemporary context and regional particularities of Xixia's water conservancy institutions[4].

Research on the economic dimension is especially

systematic. Works such as Li Fanwen's *General History of Western Xia*[5], Du Jianlu's *A Study on the Economic History of Western Xia*[6], and *Development and Management of Farmland Water Conservancy in Western Xia*[7] all point out that water conservancy development constituted the very foundation of Xixia's statehood and its economic lifeline. Under state leadership and institutional safeguards, Xixia, relying on irrigation districts fed by the Yellow River and inland river basins, established a stable agricultural production system in an arid environment; the management model of "official oversight and popular maintenance" (*guandu minxiu*) further served as a critical guarantee for the sustained operation of its water conservancy undertakings.

Concurrently, the interconnection of water conservancy with military affairs and politics has also attracted scholarly attention. Sun Fangyuan, taking rivers and water sources in the Song-Xixia wars as an example, reveals the significant influence of water resources on military offense and defense as well as geostrategy[8]. Zhang Jingping, from the perspectives of regional development and state-building, explicates the political logic embedded in the water conservancy development of the Hexi Corridor[9]. Nie Hongyin stresses that water conservancy and transportation both served as the economic lifelines of Xixia, and he examines the configuration of canals on the Yinchuan Plain and their institutional repercussions[10].

In summary, scholarly circles have approached Xixia's water conservancy from multiple dimensions-institutional, economic, military, and political-yet the treatment has largely remained at a macroscopic level, with relatively few micro-level, concrete studies. This article takes Xixia's canal networks as its point of entry, integrates documentary records with existing research findings, and traces the construction, management, and operational mechanisms of Xixia's hydraulic works, thereby elucidating the pivotal role of water

conservancy in the development of the Xixia state. In so doing, it aims to enrich our understanding of Xixia's state

governance and regional social history.

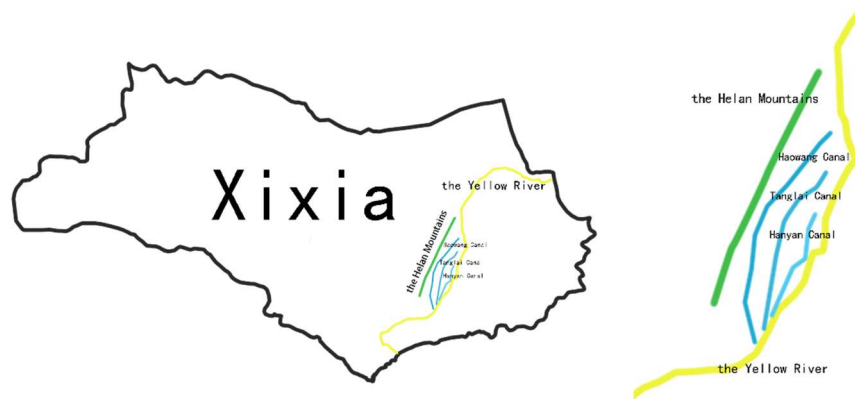


Figure 1. Schematic Map of Xixia Territory and Its River & Canal Distribution. Map drawn by the author.

2. The Geographical Context of Water Conservancy Construction in Xixia

The geographical conditions of Xixia dictated its climatic patterns, and these in turn compelled the state to place exceptional value on water resources. The Song Shi biography of the Xia state records the extent of Xixia's territory: "Yuanhao came to possess all of Xia, Yin, Sui, You, Jing, Ling, Yan, Hui, Sheng, Gan, Liang, Gua, Sha, and Su, while Hong, Ding, Wei, and Long were garrison towns elevated to the status of prefectures; he continued to reside in Xingzhou, relying on the river and the Helan Mountains for defense"[11]. This passage delineates the domains held by Xixia during the reign of Emperor Jingzong, most of which were prefectures marked by low precipitation and broadly fell within arid and semi-arid zones.

China's ancient climate was by no means static; each period witnessed certain shifts. The Xixia era fell within the phenological age, permitting the reconstruction of local climatic conditions through the growth processes and cycles of natural landscapes. By scrutinizing Xixia documents—principally the phenological phenomena recorded in the Yueyue Poems and Shengli Yihai: Names of the Moon—scholars have concluded that the period was characterized by a dry and cold climate, a circumstance that carried manifest consequences for agricultural production[12].

The geographical focus of this article is primarily the Ningxia Plain. Unlike the environs of the Qilian Mountains, which largely depended on meltwater from glaciers and snow—"when snows on the southern slopes melt, the rivers rise in force"[13]—the Ningxia Plain relied chiefly on artificial canals and constituted the area with the densest concentration of irrigation networks. The Ningxia Plain lies in the lower stretch of the upper Yellow River, nestled between the Helan Mountains and the Ordos Plateau. Formed by the combined action of fluvial alluviation and diluvial deposition, it is an oasis plain that extends southward from Qingtongxia to Shizuishan in the north, borders the Yellow River to the east, and reaches the foothills of the Helan Mountains to the west. Stretching over two hundred li from south to north and varying from a few dozen to several tens of li in width, this was the largest, earliest developed, and agriculturally most robust plain within Xixia's territory.

In terms of physical geography, the Ningxia Plain is situated deep in the northwestern interior, far from the sea,

where moisture transport is relatively weak. The barrier effect of the Helan Mountains on the southeastern monsoon further bestows the region with sparse precipitation, abundant sunshine, intense evaporation, sharply differentiated seasons, and a pronounced contrast between dry and wet conditions. Consequently, natural rainfall was far from sufficient to sustain stable grain production. Yet, ancient records have long attested to the practice of farmland irrigation on the Ningxia Plain, offering a basis for investigating the region's mode of agricultural development. Passages such as "In Xing and Ling there are ancient canals called Tanglai and Hanyuan, both diverting water from the Yellow River, so that thanks to irrigation, there is year after year no worry of drought or flood"[14] and "East of the mountains, west of the river, there are several thousand qing of flat fields that can be irrigated"[15] unequivocally attest to the widespread need for irrigation on the Ningxia Plain.

Hydrological conditions were the decisive factor shaping the pattern of development on the Ningxia Plain. The Yellow River traverses the region from southwest to northeast, its gentle flow and moderate sediment load providing both a stable water source for irrigation and favorable topographical conditions for the excavation of ancient canal systems. In comparison with other arid regions of the northwest, the Ningxia Plain's stretch of the Yellow River enjoys relatively stable discharge and an appropriate gradient, facilitating diversion without barrages and gravity-fed irrigation—a natural precondition that allowed the area to long serve as a crucial agricultural zone in the northwest.

The Ningxia Plain thus combines an inherently arid climate of low rainfall with the hydrological advantage of the Yellow River passing through its territory; together, these two factors constitute the fundamental geographical constraints on regional development. The arid climate precluded reliance on natural precipitation for agriculture, while the fluvial regime of the Yellow River supplied an irreplaceable water resource for irrigation farming. This geographical configuration served as the natural foundation upon which Xixia, once established, attached great importance to inherited hydraulic works such as Hanyan Canal and Tanglai Canal, and it was also the historical precondition that enabled the emergence of large-scale irrigation projects like Haowang Canal.

3. The Inheritance and Limitations of the Pre-Existing Canals

3.1. The Historical Trajectory of the Pre-Existing Canals

The history of irrigation on the Ningxia Plain is an enduring one. Owing to its distinctive geographical conditions, irrigation became an indispensable prerequisite for the development of the Ningxia Plain, which consequently emerged as one of the oldest large-scale irrigation districts in ancient China. Among the canals that have survived through repeated renovation and reconstruction, some remain in use even today. “Currently, the irrigation district contains 14 ancient canals, extending 1,292 kilometers in total length and commanding an irrigated area of 3,620 square kilometers”[16]-a fact that, in some measure, reflects the absolute indispensability of water conservancy and irrigation to the Ningxia Plain.

The history of the Yellow River diversion irrigation system in Ningxia can be traced back to roughly the Han dynasty. The Ningxia region has long been known as “the screen of Guanzhong and the throat of Helong”[17], holding a position of considerable strategic importance; its development carried significant political weight and was closely bound up with the central government’s frontier-defense policies. The record that “Lingzhou was established in the fourth year of Emperor Hui”[18] clearly attests to the Han dynasty’s control over the Ningxia area. To develop and control this region, its particular conditions dictated that the foremost task was the large-scale excavation of canals diverting water from the Yellow River. Indeed, a great number of the ancient canals were excavated during the Han dynasty. The two longest-serving arterial canals on the Ningxia Plain-Hanyan Canal and Tanglai Canal-originated in the Han period and remain in use to this day. The construction of these canals marked a major advance in water conservancy on the Ningxia Plain under the Han dynasty. This not only provided ample provisions for garrison troops and civilian settlers, but also greatly stimulated the local economy, laying a crucial agricultural foundation for later dynasties to manage the northwest. It can be said that the Han period was the foundational era for the development of water conservancy works on the Ningxia Plain.

Between the Han and the rise of Xixia, the canal system of the Ningxia Plain underwent a slow, gradual evolution. During the Wei, Jin, and Southern and Northern Dynasties, political instability interfered to some degree with the normal operation of the canals. The Northern Wei minister Diao Yong once submitted a memorial stating, “the official canals lack water, so extensive cultivation cannot be carried out”[19]; he subsequently had the Aishan Canal constructed on the basis of the existing channels, thereby achieving “the irrigation of over forty thousand qing of public and private fields”[20]. Thus, although the canal system experienced cycles of construction and abandonment during this period, the irrigation tradition was perpetuated. With the reunification of the empire under the Tang dynasty, the state, in order to strengthen frontier defenses and secure supplies for the Shuofang military command, carried out large-scale dredging and expansion of the existing canal network, the most representative undertaking being the Tanglai Canal. The Ming Wanli-era Shuofang Xinzhì records: “Tanglai Canal is likewise an old Han canal that was re-dredged in the Tang period,” explicitly pointing out that Tanglai Canal, built upon

the foundation of a Han-dynasty old canal, derived its name from the large-scale dredging and expansion carried out during the Tang. During the period from the Five Dynasties to the early Song, although the degree of control exercised by the Central Plains regimes over the Ningxia Plain fluctuated, the mature canal system built up during the Han and Tang continued to function, and a fairly comprehensive irrigation management system took shape. Hence, on the eve of Xixia’s rise, the Ningxia Plain already possessed a mature irrigation system-centuries in the making, crisscrossed by canals, and functionally complete-which furnished a critically important material foundation for Xixia to establish its state there and develop an agricultural economy.

3.2. The Structural Predicaments of the Pre-Existing Canals

The backbone canal network developed since the Han and Tang and preserved on the Ningxia Plain represented an indispensable historical treasure for Xixia. These canals, well-suited to the distinctive topographical features of the region, were inherited and continuously exploited under Xixia rule to “enrich and strengthen” the state[21]. The Xixia legal code, the Tiansheng lǐlǐng, contains specific chapters such as “Affairs of Opening Canals in Spring(Kaichunqushimen)” and “Canal Waters(Qushuimen),” strictly regulating all matters pertaining to canals and ditches, further attesting to the significance Xixia attached to them. The pre-existing canal system was not merely perpetuated under Xixia, but its maintenance was elevated to the level of national law, as it constituted the very lifeblood of the agricultural economy. Yet the continued operation of these old canals did not mean that their efficacy matched Xixia’s developmental ambitions after its founding. Over the centuries, the inherent structural limitations of this system became ever more pronounced, posing formidable challenges to its performance.

First, the fixed extent of the irrigated area constituted a bottleneck for spatial expansion. The alignments of the main canals and the layout of the major branches of the Han-Tang old canal system had become largely rigid through long-term operation; their effective irrigation zone was concentrated primarily in the eastern part of the Ningxia Plain, on the relatively low-lying core oasis belt along the Yellow River. In the face of the inevitable population concentration, increased garrison troops, and heightened demand for grain supply that accompanied the establishment of the capital at Xingqing Prefecture(Xingqingfu), agricultural development urgently needed to extend into wider territories. Yet the irrigation network of the old canal system exhibited pronounced path dependency; its trunk canals and diversion structures could not be effectively extended to the higher terrain of the western areas or to more remote regions. Moreover, the water supply capacity of the old canals may well have had an upper limit, making it difficult to meet surging demand. The diversion volume and conveyance capacity of these old canals had been subject to inherent limits from their initial design; continued reliance on this entrenched system could hardly sustain the large-scale expansion of arable land and a quantum leap in total grain output. This gave rise to a fundamental contradiction: the developmental needs of the state urgently demanded an expansion of productive space, yet dependence on the inherited Han-Tang canal system entailed insurmountable constraints on both irrigated acreage and water supply.

Second, the natural aging of the works imposed immense

maintenance pressures and fiscal burdens. Any hydraulic engineering work, subjected to centuries of weathering and water erosion, inevitably faces such problems as channel siltation, embankment collapse, and the shifting of intake points. The annual “routine maintenance” required to keep them unobstructed was by no means a matter of small-scale repairs; it was a systematic undertaking that consumed enormous manpower and material resources. The water management provisions of the Tiansheng gaijiu xinding lüling also reflect, to a certain degree, the vulnerability and high maintenance costs brought about by the aging of the old canal system. In the early Yuan dynasty, barely twenty years after the fall of Xixia, these old canals were already “ruined, damaged, silted up, and shallow since the wars”[22] -a direct indication that the deterioration of the works had not formed overnight; the burden of maintenance and reconstruction during the Xixia period can well be imagined. The Xixia state continuously invested enormous administrative and fiscal resources to address the everyday wear and tear of this infrastructure, imposing a persistent burden on the national economy.

The old canal system thus found itself in a predicament during the Xixia period. On the one hand, it remained of pivotal significance, sustaining basic agricultural production and regime survival; on the other hand, its inherent constraints-limited irrigation coverage, an increasingly onerous maintenance burden, and a water supply capacity that may have already peaked-entailed definitive limitations. Xixia’s strategy of state-building, the security of the capital’s grain supply, population growth, and military grain reserves all converged on the urgent objective of expanding irrigated acreage and increasing total grain output. Relying solely on the maintenance and exploitation of the Han-Tang old canals meant being confined to traditional areas and paying a high annual price to sustain the aging system. The continuity of the old canals was, therefore, an undeniable fact, but so too was the gap between their efficacy and the demands of a new era. The existence of this structural contradiction dictated that if the Xixia regime wished to consolidate its state foundations on an agricultural base and realize its developmental ambitions, it could not content itself with merely preserving past achievements; it had to adopt breakthrough water conservancy measures and open up a new hydraulic landscape.

4. The Excavation of New Canals and Their Strategic Significance

The Haowang Canal was a large-scale strategic hydraulic undertaking initiated by the Xixia dynasty at the height of its national strength. Its construction not only satisfied the imperatives of agricultural development but also served the strategic exigencies of the Xixia regime in consolidating the foundations of the state and expanding its living space. The Ming-dynasty local gazetteer, the Jiajing Ningxia Xinzhì, records: “Jinglu Canal is an abandoned canal from the Yuanhao period, formerly called Liwang Canal.”[23] As the earliest document to transmit the name Haowang Canal, it confirms for scholars the time when the canal was first built-namely, during the reign of Emperor Jingzong, Li Yuanhao. Excavated by imperial decree, the Haowang Canal was a large-scale public work spearheaded by the state, embodying the regime’s will. This manifestly demonstrates that its construction drew upon the formidable mobilization capacity of the Xixia regime, which conscripted substantial human and

material resources.

With respect to the spatial location and general alignment of this ancient canal, modern archaeological consensus holds that the headworks of the Haowang Canal were situated near the Yellow River’s exit from Qingtong Gorge. The trunk canal follows an overall south-north orientation, extending along the margins of the alluvial fans at the eastern foot of the Helan Mountains, its tail end possibly reaching the area north of present-day Pingluo County. Regarding its scale, the Jiajing Ningxia Xinzhì states that it “stretches over three hundred li from south to north”[23], that is, roughly 133 kilometers, whereas modern water-engineering archives, combined with site surveys, estimate that the “overall length of the canal exceeds 200 kilometers”[16]. A spatial relationship of considerable significance attends the Haowang Canal: its entire course lay to the west of another time-honored arterial canal of the Yinchuan Plain, the Tanglai Canal, and ran roughly parallel to it. This distinctive spatial positioning also reflects, to a certain degree, a characteristic feature of Xixia’s water-conservancy canals-namely, a general parallelism of the canals arrayed with the Yellow River at the center. Whereas Tanglai Canal was largely a pre-existing, inherited channel from former dynasties, Haowang Canal was a newly excavated canal that opened up hitherto uncultivated land. Its construction thus vividly demonstrates the conscious agency of Xixia in shaping its hydraulic spatial order.

The Haowang Canal was a long-distance project for diverting Yellow River water for irrigation, and under the technological conditions of the era, building large dams to raise water was hardly feasible. The sole means by which the Yellow River water could flow automatically over such a long channel was to exploit the natural gradient of the terrain, achieving “gravity-flow irrigation”[24]. Modern surveys of its extant remains have found that the canal course was “constructed partly by cutting and partly by filling, in accordance with the relief of the land,” and that it maintains a stable gradient[25]. This indicates that the planners and craftsmen of the time had already mastered the overall topographical characteristics of the Yinchuan Plain-its gentle inclination from higher in the southwest to lower in the northeast, as well as the gradual south-to-north declivity of the Helan piedmont-and, on this basis, designed a canal with a gradient gentle enough yet sufficient for gravity-fed water conveyance. This capacity for large-scale topographical survey and precision design constituted the primary technical guarantee that made the project realizable.

The most conspicuous spatial characteristic of the Haowang Canal is that its alignment lies along the relatively elevated margins of the Helan piedmont alluvial fans, rather than on the low-lying heartland of the older irrigation zones, such as those served by Tanglai Canal. This choice of location reflects a distinct strategic rationale. Its primary purpose was to bring under cultivation the higher wastelands and terraces that had previously remained beyond the reach of irrigation due to elevation constraints, thereby directly and rapidly expanding the stock of arable land under state control. Moreover, diverting and conveying water at a higher elevation physically precluded direct competition over water allocation with the mature downstream irrigation districts. This foregrounds the positioning of the Haowang Canal irrigation district as a strategic new state-reclamation area, one that, to a certain extent, secured the food supply and carried considerable political and military strategic significance.

5. The Institutional Integration of the Pre-Existing and Newly Built Canal Systems

The pre-existing and newly built canal systems were integrated under the Xixia state. Through the medium of statutory provisions that concretely stipulated the development, management, and operation of the canals, an institutional integration was forged between them, thereby further advancing the hydraulic development of Xixia.

5.1. The Management Regime of the Canal System

The water conservancy management apparatus of Xixia's canals operated under the authority of central decision-making and was executed at the grassroots level. At the center was the Farmland Office(Nongtiansi), which specialized in agricultural production and water conservancy construction; the Transport and Transfer Bureau(Zhuanyunsi) functioned as the actual administrative nexus for hydraulic affairs; while at the grassroots, the Canal Head(Qutou), Canal Master(Quzhu), Canal Water Inspector(Qushuixunjian), and Labor Affairs Overseer(Fushixiaojian)[27] were responsible for concrete operational arrangements. Together, these three tiers constituted an intricate institutional architecture for water conservancy management in Xixia. Canal excavation was a major undertaking of the state, and the annual spring "canal-opening(Kaiqu)" works required the Nongtiansi to "determine the matter in the presence of the chancellor"[26]. Implementation was the responsibility of the Zhuanyunsi, whose functions chiefly encompassed the tallying of corvée laborers, the estimation of materials, and the submission of registers and account books. Materials required for hydraulic works-such as winter straw(dongcao) and fascines(tiaochuan)-were levied on farming households per mu of land according to the Statute on Land Tax, Corvée Labor, and Straw Provision(Zuyongcaofa). Under exceptional circumstances, when official stores of straw proved insufficient, private straw might be requisitioned on a temporary basis, with some compensation granted ex post facto. The Zhuanyunsi also bore the duties of supervising the security of the canals and dispatching inspectors to oversee the planting of trees along the channels. At the grassroots level, dedicated management personnel were deployed: along the trunk canals from Metropolitan Area Command(Dadudufu) to Dingyuan County(Dingyuanxian) were installed "one hundred and fifty Qushuixunjian and Quzhu"[27]. The most basic-level manager was known as the Qutou, a corvée role typically filled by rotation from among the wealthy households along the canals, whose duty was to keep vigil at the canal intake and regulate water release during the irrigation season. This arrangement also reveals, to some degree, Xixia's reliance upon affluent households.

In respect of maintenance, water conservancy upkeep followed the principle of "management according to territorial boundaries(Dangjiéguanli)"[4], meaning that corvée laborers and materiel were preferentially requisitioned from households residing in the vicinity of the water users. The annual spring canal-opening works were a state-mandated project, generally lasting no more than forty days, with the principal tasks being the dredging of channels and the reinforcement of sluices. The conscription of laborers was based on a calculation of labor service according to landholding, with the number of days of service strictly

determined by the number of mu held by the household. Work was organized into squads of twenty men, each placed under a Group Head of twenty laborers(Hezhong) and a Subgroup Head(Zhitou) to facilitate management.

Xixia imposed extremely severe punishments for dereliction of duty in water conservancy management. If a Qutou "abandons his duties, fails to supervise diligently, and the canal intake breaches so that the water is cut off"[28], the penalty was determined by the value of the loss incurred: "for losses from one string of cash(min) to fifty min, penal servitude for three months; for losses from above fifty min to one hundred and fifty min, penal servitude for six months"[29], escalating by degrees, with "all cases involving losses of five thousand min or more punishable by strangulation"[29]. Should a canal breach result in death, "the offense shall be deemed equivalent to the crime of wantonly shooting arrows or hurling objects in a place where one knows there are people, thereby causing death"[29]. Superiors also bore joint and several liability: "if the Fushixiaojian, Xunjian, Quzhu, and the like fail to direct and inspect properly, they shall be held culpable in descending order, with the Quzhu treated as an accessory to the Qutou, the Xunjian as an accessory to the Quzhu, and the Fushixiaojian as an accessory to the Xunjian"[29].

5.2. The Operational Safeguards of the Canal System

In the allocation of water, Xixia enforced a strict sequence of water release by turn. The law unequivocally prohibited powerful individuals from assaulting or bribing the Qutou in order to obtain water ahead of schedule; violators were required to pay compensation and were liable to the same punishment as a derelict Qutou. This reflects the regime's concern with preserving order in water use. The reason the Xixia court attached such importance to the sequence of irrigation from upstream to downstream lay in the fact that, given the raised canal design-where the canal bed was elevated above the surrounding ground-any violation of the sequential water-release order could very easily cause backflow inundation, with consequences of the utmost severity. Because the timing of irrigation frequently impinged upon agricultural cultivation, such incidents, owing to their frequency and grave consequences, were expressly prohibited in Xixia's legal code, the Tiansheng lüling, which laid out detailed punitive provisions.

For those opening up newly reclaimed land who sought to divert water, it was stipulated that they must do so without affecting irrigation of existing cultivated fields, adhering to the principle of "first come, first served(Xianlaihoudao)"[3]. "If one offers bribes or shows favoritism and fails to report to the office in charge, the punishment shall be two degrees less than that for the offense of unauthorized water release. Further, if various persons offer bribes to the Qutou and, before their turn has come, demand water, thereby causing a canal breach, the principal crime is to be borne by the Qutou, while the person who demanded water before his turn shall be judged as an accessory. If the Qutou is either asleep or happens to be away, and then various persons release water causing a breach, the principal crime shall be borne by the person who released the water, and the Qutou shall be judged as an accessory."[30] The Tiansheng lüling thus envisages a wide array of possible circumstances, and in stipulating the conviction of the Qutou with precision, it also bespeaks the strictness with which the equitable order of water management was upheld and the

importance attached to the canals.

Xixia demonstrably possessed an advanced awareness of canal conservation and adopted corresponding measures. The law mandated that tenant households along the canals must plant trees on their respective sections, with inspectors dispatched by the Zhuanyunsi to supervise compliance: “Those who contravene the statute and fail to plant trees shall, if officials, be fined one horse, and if commoners, receive thirteen strokes of the rod”[31]. Moreover, the Tiansheng lüling contained not only provisions on planting trees but also on their protection; corresponding punitive articles addressed the felling of trees or damage caused to them through negligence. The act of tree-planting simultaneously served to consolidate embankments, furnish timber, and yield ecological benefits, and these statutory provisions precisely illustrate the value Xixia placed upon its canals—a fact that, in turn, sheds some light on the comprehensive geographical conceptions held by Xixia’s rulers.

Building upon experience absorbed from the Central Plains, Xixia constructed a water conservancy management system that was at once centralized, law-based, and meticulously calibrated. Through its rigorous organization, equitable corvée regulations, strict sequence of water use, and comprehensive engineering safeguards, it effectively preserved the very lifeline of its agriculture.

5.3. The Significance of the Integration of the Canal Systems

The pre-existing canals and the newly built canals of Xixia ultimately coalesced into an organic whole. The new canals connected with the old, expanding the reach of irrigation and meeting the imperatives of Xixia’s national strategic development. Yet the physical extension and linkage of the canals constituted merely the material substratum of the hydraulic system’s reconfiguration. To achieve the effective integration and enduring management of the old and new canal networks, a binding institutional software—namely, state law and regulations—was indispensable. It was precisely through its legal code that the Xixia regime accomplished this higher-order integration.

The enforcement mechanisms of the law ensured the stable operation of the entire hydraulic system. The law set forth clear maintenance responsibilities and punitive regimes, with the Tiansheng lüling laying down detailed penalties for such acts as illegally breaching dykes and weirs, obstructing canals, and seizing water in violation of regulations. Backed by the coercive power of the state, this guarantee mechanism protected the canal system as a whole, rather than any single, specific canal. Consequently, whether Han-Tang old canals or Xixia new canals, their unimpeded flow and security received equal protection under one and the same legal framework. This ensured that their spatial and functional integration could operate continuously within a stable and predictable institutional environment, rather than depending upon ad hoc administrative orders or informal coordination among the populace.

Thus, the most profound dimension of the restructuring of Xixia’s water conservancy system lay in the integration achieved at the institutional level. By promulgating and enforcing a water conservancy code, the Xixia regime incorporated dispersed hydraulic works built over different periods into a unified, regularized framework of state management. This allowed the old and new canal systems not only to be physically linked into a network but also to be fused

into a single entity in terms of legal relations and administrative order. It signified a leap in Xixia’s control over core water resources from intermittent engineering interventions to routinized institutional governance, profoundly reflecting the enhancement of the state’s capacity. Moreover, the canal system constructed during the Xixia period exerted a long-lasting influence on the historical development of the Ningxia Plain. Even after the fall of Xixia and the devastation of war, it was revived under the Yuan dynasty. The Yuan Shi explicitly records that Guo Shoujing “replaced or re-established the sluices and weirs, restoring all to their former condition”[32], thereby rehabilitating the old canals of Xixia. Ming-dynasty historical sources explicitly note that “the canals of Ningxia are all ancient survivals; only their names differ, for there are no maps or records by which to trace them”[22]. And according to Ming records of canal lengths and the acreage irrigated by diverted water, the Yellow River irrigation area on the Ningxia Plain in Ming times was virtually identical to that under the Xixia canal system. These materials further attest to the synergetic interplay between the new and old canals constructed during the Xixia period, which formed a tight institutional integration so thorough that every single canal became indispensable, leaving a profound imprint on the historical trajectory of the Ningxia Plain.

Xixia’s emphasis on the old and new canal systems was, in essence, rooted in the value it accorded to water resources. In a land of chronic water scarcity, water signified far more than a matter of livelihood—it was itself a form of power. The problems of how to obtain and how to employ water were both immensely challenging, and Xixia, without doubt, furnished its own answers. The scarcity of water rendered the canal-irrigated zones the political and economic heartland of the Xixia state, and water not only influenced the distribution of cities but also served as an element of military preparedness. The tactic of inundation was highly effective. In 1081, “Gao Zunyu had been besieging Lingzhou for scarcely eighteen days when the Liang regent ordered the breaching of the Yellow River’s Qiji Canal to flood his camp; the troops perished from freezing and drowning, and only over thirteen thousand of the remaining soldiers fled to safety.”[34] This episode played a considerable role in the Song-Xixia war. Water resources held extraordinary significance for the Xixia state, and the integrated system of old and new canals enabled the regime to better acquire and utilize them—a system that continued to exert an influence of no small magnitude on the Ningxia Plain throughout subsequent feudal eras and even down to the present day.

6. Conclusion

The developmental trajectory of Xixia’s water conservancy constitutes a comprehensive process in which, building upon inherited engineering legacies, the state proactively confronted their limitations, achieved breakthroughs through the excavation of new canals, and realized a systemic upgrade via the integration of law and technology. This signifies that the regime’s agency in actively transforming, managing, and optimizing the water-resources system—its capacity and role in mastering water—was a crucial hallmark of the maturation of its state governance capabilities and the intensive development of its agricultural civilization.

By tracing the efficiency predicaments of the old canals, the motivations driving the excavation of new canals, and the integrated management of the entire canal network, this article has demonstrated that Xixia’s water conservancy

enterprise was a state project replete with agency and systemic coherence. It was not only the technical guarantee for sustaining and expanding the “frontier Jiangnan” (the fertile oasis of the Ningxia Plain), but also a key to decoding how Xixia—an ancient kingdom once active in China’s northwest—established itself, developed, and prospered.

Centering on the institutional integration of the pre-existing and newly built canal systems on the Ningxia Plain, this study takes the water conservancy provisions of the *Tiansheng gaijiu xinding luling* as its core textual source. It traces the developmental trajectory of the Han-Tang old canals by drawing on the Han Shu and the Wei Shu, and undertakes cross-period corroboration by integrating official histories such as the Song Shi with Ningxia local gazetteers from the Ming dynasty onward. Given the dearth of Xixia’s own original water conservancy records, later-period accounts are employed to retrospectively confirm the continuity and significance of the canal system. On this foundation, the study centrally argues that the integration of the Ningxia Plain’s old and new canal networks—achieved through statutory regulation of management institutions and operational safeguards—constitutes an expression of state governance in which Xixia perpetuated Han-Tang administrative experience while introducing localized adaptations. By correlating trans-dynastic historical sources with the articles of the Xixia legal code, the research clarifies the basic contours of the institutional integration of the old and new canal systems. Nevertheless, constrained by the availability and verification conditions of source materials, the study relies on retrospective reasoning from later records and does not undertake an independent authentication of Xixia’s original documents; its conclusions are therefore valid only for the institutional framework that the extant sources can sustain. Should locally produced water conservancy manuscripts from Xixia be discovered in the future, they would allow a further comparison between the statutory regulations and actual local practice, thereby providing more multi-dimensional empirical grounds for understanding the operational logic of local governance in Xixia. In-depth research into the history of Xixia’s canal systems will undoubtedly enrich our understanding of the economic development models and the statecraft wisdom of multi-ethnic polities in Chinese history.

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