Construction of Farmland Water Conservancy in Guanzhong Region during the Sui and Tang Dynasties in China

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Abstract The achievements of Guanzhong farmland water conservancy construction before the Sui and Tang dynasties were outstanding. But after the warlord wars at the end of the Eastern Han Dynasty and the division of the Wei, Jin and North and South Dynasties, a large number of water conservancy projects were destroyed and abandoned, which provided space for the construction of Guanzhong farmland water conservancy in the Sui and Tang dynasties. During the Sui and Tang dynasties, not only the original three major irrigation aqueduct systems were restored, developed and expanded, but also the technological breakthroughs of the Yellow River Diversion Irrigation Project were realised, which enabled the further development of the agricultural economy in the economic zone centred on Guanzhong in Shaanxi at that time.

Keywords Sui and Tang dynasties, Guanzhong, Agricultural irrigation

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China's historical period of Qin, Han, Sui, Tang and other major unified regime are built in the Guanzhong region, not only because of the Guanzhong region's military status, and Guanzhong rich and fertile, was the core economic zone. For Guanzhong, known as the "Land of Heaven", Sima Qian said that "Guanzhong land, one-third of the world, and the number of people is only thirteen, but the amount of its richness, ten in its six". In a country like China, where farming is absolutely dominant, economic development mainly refers to the development of the agricultural economy. For agriculture, the role of farmland water conservancy needless to say. During the Sui and Tang dynasties, China's socioeconomic development reached a whole new height. On the one hand, there is certainly the effect of the development of remote areas; on the other hand, Guanzhong as the economic core area also played a leading role. Based on the results of previous research, this paper further explores the interaction between the development of farmland water conservancy in Guanzhong during the Sui and Tang dynasties and the development of agricultural economy and society.

1 Geography of the Guanzhong region

Sima Qian mentioned Guanzhong several times in the *Shiji*. The explanation of Guanzhong in the *Tongdian* is quoted from the *Guanzhong Ji*. It's said that "from Hanguan in the east, the border of Lingbao County, Hongnong County, and from Longguan in the west to the border of Qianyuan County, between the two passes, it is called Guanzhong, with an east–west area of more than a thousand miles"[1]. Although the records of the scope of the Guanzhong area have varied since ancient times, Guanzhong nowadays generally refers to the area that extends from Hangu Pass in the east to Dashanguan Pass in the west, as far south as Wuguan Pass, and as far north as Xiaoguan Pass.

Guanzhong is surrounded by the tall Qinling Mountains to the south, the Loess Plateau with its deep ravines to the north, the mighty Yellow River flowing from the east, and the Longdong Plateau to the west. During the geological and tectonic period, Guanzhong was a relatively low and flat area because it was located between two faults and formed a tectonic plain of graben type due to geological subsidence. The Wei River, which originates from the Bird Rat Mountain in Weiyuan, Gansu Province, runs from west to east, gathering tributaries such as the Zhuanhe River, Heihe River, Ba River and Jinghe River along the way, and stretches for more than 500 km from east to west in Shaanxi Province. As it flows through the Loess Plateau, it carries a large amount of sand and sediment, which is deposited in Guanzhong, where it shapes a large piece of relatively flat and fertile plain, which we call the Weihe Plain or Guanzhong Plain. The plain is the main terrain in Guanzhong, because of the flat terrain, fertile soil, rich produce, natural and economic conditions, and thus get the reputation of eight hundred miles of Qinchuan. However, the topography of the Guanzhong region is not without its ups and downs, the Weihe River on both sides of the river due to the river scouring and crustal intermittent changes, but also the formation of a large number of terraces. On both sides of the plains, there are also many loess plateaus with steep borders and flat surfaces, which are also terraced. The eastern part of Guanzhong is the area where Huang, Wei and Luo converge, and here there is a sand garden with continuous sand dunes, 40 km long from east to west and 9 km wide from north to south[2].

Guanzhong region is located in the warm temperate zone, with the characteristics of continental climate, cold and dry in winter, hot and rainy in summer, often drought phenomenon, the average annual temperature of 12–14 ºC, annual precipitation of 500–700 mm. Rainfall is mainly concentrated in the July–September, the spatial and temporal distribution is uneven, the west is slightly more than the east, and the summer is more than the winter and spring. Then, it is not able to meet the growth needs of crops, especially the needs of spring sowing. Therefore, the development of Guanzhong agriculture must develop water conservancy[3]. In Guanzhong, the annual frost-free period of 160–250 d, sunshine hours, coupled with favourable land conditions. For the development of agriculture, since the Warring States, Qin and

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Han, people in the Guanzhong region built a large number of agricultural water conservancy projects.

2 Overview of Guanzhong farmland water conservancy construction before the Sui and Tang dynasties

2.1 Rise of water conservancy in Guanzhong

In the early days of human civilisation, due to the low level of social productivity, it was very difficult for people to resist flooding. In the event of flash floods, the safety of people's lives and properties would be under great threat. In China, the most famous legend about water conservancy is "Dayu's Remedy of Water". In the *Analects of Confucius*, it is said that Yu endeavoured to do his best in ditches and moats. The first known conclusive record of the practice of irrigation on Chinese farmland is in the *Book of Songs*. It recorded that the pond flows northward, soaking the paddy fields. According to expert speculation, the first water conservancy project described in this account was located in the centre of the Loess region of central Shaanxi[4]. As one of the centres of the origin of Chinese civilization, the Shaanxi region has an early history of water conservancy, as can be seen from this.

Although water conservancy in Guanzhong started earlier, the focus of early farmland water conservancy construction was on flood control and drainage. After the Warring States period, with the widespread use and dissemination of iron tools, as well as the accumulation of knowledge about water conservancy and the improvement of water conservancy construction technology, the construction of large-scale farmland water conservancy projects in Guanzhong did not begin until it was marked by the construction of the Zhengguo Aqueduct. With the formation of the Qin–Han unitary state, the establishment of a centralised political system and the development of the economy, the demand for the construction of farmland water conservancy in Guanzhong arose, and the construction of large-scale farmland water conservancy projects was made possible.

2.2 Formation of basic patterns of farmland water conservancy in Guanzhong

During the Warring States, Qin and Han Dynasties, Guanzhong's farmland water conservancy construction was very fruitful. This period not only opened up the situation in Guanzhong, but also established the basic pattern of Guanzhong's farmland water conservancy. The construction of Zhengguo Aqueduct was started in the first year of Qin Shi Huang (246 BC), which was one of the largest irrigation projects in ancient China. After the completion of the Zhengguo Aqueduct, more than 40,000 hm^2 of saline land could be irrigated, and the harvest was abundant, so Guanzhong became a fertile field without disasters, and Qin was able to become a rich and powerful state and unify the vassal states[5].

During the Yuanshou period of Emperor Wu of the Han Dynasty, a project to divert water from Luoyang, the Longshou Aqueduct, was constructed, and the "well aqueduct method" of "passing water through a well" was adopted at that time. Although the aqueduct was completed later, the irrigation effect did not reach the expected goal. In fact, the symbolic significance of the Longshou Aqueduct in the history of water conservancy was far greater than its actual benefits at that time. The Liufu Aqueduct was constructed in the first year of Yuan Ding of Emperor Wu of the Han Dynasty (116 B.C.) under the auspices of Ni Kuan, and it is recorded in the *Han Shu*, which can be seen as irrigating fields in the north of the upstream side of Zhengguo Aqueduct. The White Aqueduct was built in the second year of Emperor Wu of the Han Dynasty's Taishi reign (95 BC). The White Aqueduct channeled the Jing water, starting at Gukou and ending at Liyang, where the water was injected into the Wei River, irrigating more than 4,500 hm^2 of fields. After the completion of the White Aqueduct, the Zhengguo Aqueduct and the White Aqueduct brought water and fertiliser, as well as abundant harvests. Guanzhong became the land of heaven[6]. The Chengguo Aqueduct was opened around the time of Emperor Wu of the Han Dynasty, mainly irrigating the fields around present-day Meixian, Fufeng, Wugong, and Xingping, and once became the most important irrigation aqueduct in Guanzhong. In addition to this, a number of smaller irrigation aqueducts were built at that time, such as the Lingzhi Aqueduct located in the east of Zhouzhi County; the Wei Aqueduct located roughly in Fufeng and Wugong; and a Jing-channel diversion project called Fanhui Channel located in the east of Xianyang City, constructed during the Eastern Han Dynasty.

From the water conservancy projects built in this period of history, we can see that the water conservancy projects in Guanzhong at that time mainly consisted of three major irrigation aqueduct systems, namely, the Jingjing Aqueduct System, which was fed by Jing water, the Weiwei Aqueduct System, which was fed by Wei water, and the Luolu Aqueduct System, which was fed by Luosu water. In fact, this was the basic pattern of water conservancy construction in Guanzhong, and later the development of farmland water conservancy in Guanzhong was mainly based on these three major aqueduct systems, which continued to develop and expand on top of this pattern.

3 Achievements of farmland and water conservancy construction in Guanzhong in Sui and Tang dynasties

3.1 Establishment of small irrigation channels in the Sui Dynasty

Although the construction of farmland water conservancy in Guanzhong was outstanding before the Sui and Tang dynasties, after the warlord wars of the late Eastern Han Dynasty and the division of the Wei, Jin and North and South Dynasties, a large number of farmland water conservancy projects in Guanzhong were destroyed and abandoned. By the Sui and Tang dynasties, the task of restoring and developing farmland water conservancy in Guanzhong was very urgent.

Although the Sui Dynasty was a short period of time, the achievements of agricultural and water conservancy construction in Guanzhong during the Sui Dynasty were still quite outstanding. In the first year of the Kaihuang period, Yuan Hui was appointed as the Minister of the Imperial Household, and also as the head of the Imperial Household. He requested that the Duyang water be used to irrigate the three ancient sacrificial rites. In the fourth year of the Kaihuang reign (584 AD), Yuwen Kai was ordered to open the Guangtong Aqueduct by diverting water from the Wei River at the rate of water engineers. This channel from the northwest of the city of Daxing diversion of the Wei River flows east to the Tongguan near the Yongfeng warehouse back into the Wei River, can be irrigated along the coast of the farmland up to more than 66,667 hm^2, the benefits are very considerable. In addition, according to the *Sui Shu*, at that time, in Wugong County, Jingzhao County, there were Yongfeng Ditch and Puji Ditch; in Jingyang County, there was Maonong Ditch; in Huayin County, there was Bai Ditch; in Xiangui County, Fengyi County, there was Jin's Pei, and so on.

Although the scale of these projects and the irrigated area are not well documented, but from the distribution pattern of these projects,

it can be seen that at that time near the capital of the Sui Dynasty, agricultural irrigation was very developed. At that time, the government of the Sui Dynasty had obtained achievements not only in the improvement of waterways, dredging rivers, but also the silt in the river for the cultivation of the field, thus receiving the effect of "irrigation and silt"[7]. In short, the construction and maintenance of these water conservancy projects, is to promote the development of the agricultural economy of the Sui Dynasty. The development of the agricultural economy of the Sui Dynasty, for the unification of the north and south of the Sui Dynasty and the consolidation of the regime, all play a vital role. It is also because of the attention to the construction of agricultural water conservancy, the Sui Dynasty also obtained the situation that "the government treasury are full".

Granted, the achievements of the Sui Dynasty in agricultural and water conservancy construction were outstanding. However, the founding time of the Sui Dynasty was relatively short, and the energy that could be spent on water conservancy was limited. Therefore, most of the agricultural water conservancy projects built at that time were small irrigation channels, and it was difficult to form a systematic and large-scale irrigation aqueduct system. In the Tang Dynasty, although the ruler changed, the whole social and economic structure did not have much change. Facing the development of agricultural economy and the need for further consolidation of the regime, the Tang government inherited not only the ruling power at the same time, but also the Guanzhong farmland water conservancy construction practice process.

3.2 Formation of large irrigation aque–ducts in the Tang Dynasty

3.2.1 Zhengbai Aqueduct. The irrigation area of the Zhengguo Aqueduct in the Qin Dynasty was from the Jing River in the west to the Luo River in the east, able to reach the edge of the Loess Plateau in the north and the Wei River in the south. During the Han Dynasty, a White Aqueduct, also a Jing River diversion project, was constructed to the south of the Zhengguo Aqueduct, and later they were collectively called the Zhengbai Aqueduct. During the Tang Dynasty, because of silting, the Zhengbai Aqueduct actually became mainly a White Aqueduct. According to the *Yuanhe Junxian Tuzhi*, the Zhengbai Aqueduct was divided into three branch aqueducts, the Taibai Aqueduct, the Zhongbai Aqueduct, and the Nanbai Aqueduct. Therefore, the Zhengbai Aqueduct was also known as the Three White Aqueducts.

At that time, due to the occupation of Jingyang irrigation benefits of the powerful people were using the aqueduct profit, resulting in water shortage in the downstream of the Gaoling County, so the Gaoling County magistrate Liu Shiren according to the "water ministry style" in the list of the legal provisions, sued Jingyang County, and ultimately won the lawsuit. The government then ordered Liu Shiren to change the waterway, naming it Liu Gongqu, and the weir Pengcheng[8]. Under the Pengcheng Weir of the Zhongbai Drainage Aqueduct, there were three branch aqueducts, which were known as the Liu Gong's four aqueducts together with the original Zhongbai Drainage Aqueduct[9]. Through the construction of Liu Gong aqueduct and weir, the irrigation conditions in Gaoling County were restored and developed, and the irrigated area of Zhengbai Aqueduct was greatly increased, exceeding the Han Dynasty by more than four times, reaching 13.33 km^2 up and down.

During the Tang Dynasty, another important measure for the restoration and development of the Zhengbai Aqueduct was the construction of a water diversion weir. The construction of the Jiangjunsha increased the water diversion capacity of the Zhengbai Aqueduct and expanded the irrigated area of the aqueduct. In addition, the Tang government paid great attention to the management and maintenance of the Zhengbai Aqueduct. The Zhengbai Aqueduct was under the jurisdiction of Jingzhao Shaoyin, who set up a special management organisation and formulated a corresponding management system. There are many records of maintenance in the historical books, and in the three hundred years of the Tang Dynasty, there was a major refurbishment in less than thirty years on average[10]. It is because the rulers attach importance to the cause of agricultural water conservancy, the Tang Dynasty Zhengbai aqueduct irrigation benefits have been restored and developed.

3.2.2 Chengguo Aqueduct. It was built during the Han Dynasty and expanded during the Cao Wei Dynasty. However, due to the war damage and the age of repair, the irrigation efficiency of Chengguo Aqueduct was not satisfactory. In order to play the water conservancy benefit of Chengguo Aqueduct in Tang Dynasty, from Zhenguan to Dali period, Chengguo Aqueduct was renovated for many times, focusing on the Six Gate Weir. Located in the west of Wugong County, the Six Gate Weir was originally the mouth of the Chengguo Aqueduct in the Han Dynasty, and was called the Six Gate Weir because of the six gates built. The Six Gate Weir, which was rebuilt in the Tang Dynasty, is a trapezoidal dam made of green striped stone, with six orifices for water discharge and flooding next to it, and access gates on the east and west sides of the aqueduct[9]. In April of the thirteenth year of the Xiantong era (872 AD), the Jingzhao Prefecture undertook another major refurbishment of this project. According to the *Chang'an Zhi*, this renovation combined Weichuan, Mogu, Xianggu, Wuan, it can irrigate Wugong, Xingping, Xianyang, Gaoling and other counties more than 20,000 hm^2 of fields, commonly known as Wei Bai Aqueduct[11]. It can be seen that, the irrigation benefits of Chengguo Aqueduct is remarkable.

3.2.3 Longmen Aqueduct. The construction of Longmen Aqueduct is a landmark project in Guanzhong farmland irrigation construction, it is the first big breakthrough in the yellow irrigation technology, which shows that the Tang Dynasty water conservancy knowledge and engineering technology, than the previous generation has a higher level of development. Wude seven years (624 AD), the rule of the middle Yun Dechen from Longmen to draw the river irrigated fields of 6,000 hm^2[8], this is the first time that the successful diversion of the yellow irrigation project in the documentary record. This was a medium-sized water conservancy project to divert water from the Yellow River to irrigate farmland. The Yellow River is a river with a high sand content, and the technology of diverting it for irrigation is very difficult[12]. And this project to divert the Yellow River was not only successful but also had obvious benefits, so it was of great significance. It is said that there was a large-scale attempt to divert the Yellow River during the reign of Emperor Wu of Han Dynasty, but it ended in failure.

3.2.4 Shengyuan Aqueduct. It is located in the north of the west section of Chengguo Aqueduct, and is an irrigation and shipping channel. It is recorded in the *New Tang Book*, under the article of Guo County, "There is the Shengyuan Aqueduct in the northwest, which draws marsh water to Xianyang, and at the beginning of the Qianqong period, it was used to transport qi, and the Longshui water was brought into the capital city"[8]. Wu Zetian used this aqueduct to float timber during his reign. The *Chang'an Zhi* records that "its original out of the marsh water, from Fengxiang, Guo County, Guo County, northwest of the original, flowing to the Wuting, merging several miles, southwest, to the six door weir, east, into the

state of the ditch merging, south-west, out of the county border, in order to its rise of the original flow, that is the meaning of its name"[11]. Because the terrain in Guo County was relatively low, and the terrain in Zhouyuan to its north was high, irrigation conditions were poor and it was impossible to channel the local Wei water up to Zhouyuan. The Shengyuan Aqueduct, on the other hand, was able to divert marsh water from the northeast of Chencang to follow the Zhouyuan, and was able to accommodate tributaries such as the Qishui, the Flowback, and the Wushui, so it was able to solve the irrigation problem around the Zhouyuan area, and was called the Shengyuan Aqueduct because of the water it diverted up to the Zhouyuan. Finally, the Shengyuan Aqueduct merged with the Chengguo Aqueduct in the east of Liumenyan.

In the Weinan area, due to the steep northern slopes of the Qinling Mountains, there are many small and short rivers, which rise and fall, and are frequently damaged by water. In order to make use of these water resources, many water conservancy projects were also built in this area in the Tang Dynasty. Among them, Jiang Shidu, the assassin of Tongzhou, made the greatest contribution. For example, in the fourth year of the Kaiyuan era (716 AD), he excavated the Luowen Aqueduct in the southeast of Huaxian County, which divided the water from the Xiaoshiyu River into several watercourses to irrigate the fields, thus greatly expanding the area of the irrigation region. He also built dykes to drain the mountain torrents in order to safeguard against water hazards. Jiang Shidu presided over another large water conservancy project (Tonglingbei), which made 2,000 hm^2 of abandoned land to be the good fields[8]. Because the area around Chaoyi was low-lying and had a high water table, the local saline land was widespread, making it difficult to grow crops. Jiang Shidu took Luo water weir Yellow River water irrigation Tonglingbei method, not only can play a good role in washing alkali, but also quote the Yellow River water flowing through the Loess Plateau irrigation. The river water is rich in humus, which makes the abandoned land become good land.

4 Reasons for the development of farmland water conservancy in Guanzhong in the Sui and Tang dynasties

During the Sui and Tang dynasties, the achievements of Guanzhong's farmland water conservancy construction were quite outstanding. In terms of scale, it not only restored the water conservancy and irrigation pattern established during the Qin and Han Dynasties, but also further developed and expanded. In terms of technology, the technology of farmland water conservancy project also developed to a new height, such as the breakthrough of the Yellow River diversion technology, etc. At that time, there were many reasons why Guanzhong's farmland water conservancy project was able to achieve such success.

4.1 Favourable natural geographical conditions

The natural geography of Guanzhong has been discussed earlier, and will not be expanded here. But there is a point that needs to be stressed, because Guanzhong is the rift valley type structure plain, the north and south terrain is high and steep, and is high in the west and low in the east. This kind of terrain is good for the development of the river, so Guanzhong river system is numerous, and is feather-shaped distribution. The formation of this water system provides the foundation and stage for the construction of water conservancy in Guanzhong. In addition, many scholars believe that the Tang Dynasty was a warm and humid period in history. According to the *World Temperature Fluctuation Trend Chart in* 1700 *Years* drawn by Zhu Kezhen, the average annual temperature of the Sui and Tang Dynasty was 1 ℃ higher than that of the 70 s of the current century, and 2 ℃ higher than that of the North and South Dynasties, which had a relatively low temperature. According to Li Jiannong's *Ancient Chinese Economic History*, the number of water conservancy projects built in the northern part of China during the Tang Dynasty was much higher than that of the Song Dynasty. Of course, the reason for this is the effect of China's economic centre of gravity shifting to the east and south, but we cannot deny that the difference in climate between the Tang and Song dynasties had an impact on the construction of these water conservancy projects.

4.2 Relatively stable political and social environment

The destruction of Chen by the Sui army in 589 A.D. put an end to nearly 400 years of division and fragmentation and reunited the country. The unification of the country and the further development of the centralised political system of the Sui and Tang dynasties provided a peaceful and stable social environment for the development of agricultural areas. A peaceful and stable social environment was a necessary condition for the development of the agricultural economy, and at the same time, it was an important condition for the construction of farmland water conservancy. According to the statistics of Gu Yanwu, a scholar of the Qing Dynasty, seven-tenths of the water conservancy projects recorded in the *New Tang Dynasty Book of Geography* were constructed before Tianbao (742−756 AD)[6]. After the Anshi Rebellion, not only did the number of water conservancy projects in Guanzhong decrease sharply, but the government's management of the water conservancy system was also in disarray, and incidents of rich merchants and tycoons hijacking water sources were common.

4.3 Driven by demographic pressure

As a result of the unification of the country and the further strengthening of the economic ties between the north and the south, coupled with the vigorous governance of the political rulers of the time, it saw a politically strong and economically prosperous China in the pre-Sui-Tang period. The prosperous economic situation and peaceful and stable social environment contributed to the growth of the absolute population on the one hand; on the other hand, it also accelerated the frequency of population movement. As far as the former is concerned, according to the data of Liang Fangzhong's *Population*, *Land*, and *Tax Data Through Chinese History*, the number of householders in the three provinces of Guanzhong in the fifth year of Sui Daye (609 A.D.) was nearly 500,000 people, whereas the number of people logged into the household of the county of Jingzhao alone in the first year of Tianbao (742 A.D.) reached more than 1.9 million people[13]. This shows how fast the population of Guanzhong prefectures grew, and the number of people in Guanzhong reached another peak after the Western Han Dynasty. As far as the latter is concerned, the increasing socio-political and economic prosperity of the Sui and Tang dynasties, Guanzhong, as the political, economic and cultural centre of gravity at that time, was of course a great gathering place for population, and Chang'an was the centre of population movement. Not only did a large number of industrialists, businessmen and rural farmers flock to Guanzhong, but after the establishment of the imperial examination system in the Sui Dynasty, a large number of scholars who sought to achieve success also flowed to Guanzhong, and their activities had a great influence on the whole city, which in turn had an instigating effect on the movement of population.

For the total population of Chang'an, from the academic research, the estimates vary widely, from 500,000−600,000 to 1.7 million−1.8

million[14]. But for the ancient city population, we estimate even by the most conservative figures, and the population of Chang'an at that time was huge. The main types of population in Chang'an at that time were the palace population, central government officials, garrison troops, religious personnel, foreign expatriates, general citizens, and domestic transients. The large increase in the absolute number of population put a demand on the food supply in Guanzhong at that time. The government, on the one hand, made great efforts to repair the aqueduct and speed up the efficiency of transferring food supplies. On the other hand, it made great efforts to develop the local agricultural economy and improve its own supply capacity. In order to develop agriculture in Guanzhong, the restoration and development of farmland water conservancy was essential. Guanzhong is a region of fertile loess, as long as there are good water sources for irrigation and slippers, its agricultural benefits will be considerable.

4.4 Government attention and management

By the Sui and Tang dynasties, China's early and crude agricultural practices had long since changed. In Guanzhong, it was unlikely that there would be any more land available for development. Instead, the demand for agricultural products prompted people to adopt intensive farming methods. In order to produce more products on limited land, more attention was paid to water conservancy construction. The government attached importance to not only the restoration and construction of farmland water conservancy, but also the management and maintenance of farmland water conservancy projects. In the Tang Dynasty, the Ministry of Works was under the Ministry of Water, and the Ministry of Water set up Langzhong, the foreign minister. The governor in the water department was in charge of rivers, reservoirs and ditches of the whole country[15].

In Guanzhong, for the construction and maintenance of some water conservancy projects, it set up the ditch and weir make. After the completion of the project, it set up a special person on the management of aqueducts, such as in the captial, each ditch and the bucket door to set up the long each one[7]. A law on water conservancy was also enacted in the Tang Dynasty, named the *Shui Bu Shi*. During the reign of Emperor Jingzong of the Tang Dynasty, Gaoling County was short of water due to the illegal milling of water by wealthy families in the upper reaches of the Zhongbai Drainage Aqueduct. So the county magistrate, Liu Shiren, sued Jingyang County based on the provisions of the *Shui Bu Shi*, and won the case, defending the interests of the people in the lower reaches of the county. In the *Tang Laws*, it was stipulated that those who do not repair the dykes and those who repair the dykes out of time shall be punished with seventy strokes of the cane by the chief priest. In the case of theft of dykes, it was stipulated that anyone who steals from the dykes shall be punished with one hundred canes, if he destroys people's homes or loses their belongings, and if the stolen goods are heavy, he shall be punished by sitting on the stolen goods[16]. It is the setting of these management institutions, the development of the system and active management behaviour, so that the water conservancy projects in the Sui and Tang dynasties can be systematically carried out on a large scale.

5 Conclusion

Guanzhong farmland water conservancy construction achievements in the Sui and Tang dynasties were quite remarkable. The construction of these water conservancy projects promoted the development of the economy, enriched the grain silo of the Sui Dynasty, and brewed the weather of the Tang Dynasty. In the history of China's farmland water conservancy, it occupies an important space. However, we should also see that the construction of these large-scale projects certainly promoted the economic development at that time, but also consumed a lot of manpower and material resources, and these costs are of course borne by the general public. In particular, those water conservancy projects with unreasonable design or substandard construction not only consumed huge resources, but also failed to achieve the desired irrigation benefits. For example, in the construction of the Longshou Aqueduct, more than 10,000 labourers were recruited to open the aqueduct, and the construction period lasted as long as 10 years. However, when the well aqueduct was opened to water, the loess in some places collapsed in the face of water, and the benefits of the project were not obvious, leaving more of a symbolic significance to the future generations of the concept of its construction. Even the water hero Jiang Shidu in the Tang Dynasty was not free from the criticism of the times.

Therefore, the construction of water conservancy projects, especially large-scale water conservancy projects, must first undergo a comprehensive and scientific study and assessment, and at the same time pay attention to the people's own capacity and the carrying capacity of the ecological environment. For the construction and maintenance of water conservancy projects, it is necessary to strengthen the construction of rules and regulations, enhance management, coordinate the allocation and use of water resources, and resolutely combat the destruction of water conservancy projects. Only in this way can the development and utilisation of water resources be optimised to serve the people.

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