

## Chapter III

# Medieval Periods (7<sup>th</sup>- 14<sup>th</sup> Century A.D.)

### 1. Societal and Agricultural Situations

#### 1) Unified Kingdom of Silla (668 - 935 A.D.)

The three Kingdoms, Goguryeo, Baekje, and Silla were politically and militarily in hostile relationships. The other two Kingdoms occasionally invaded Silla from north and west. However, Silla managed to become an ally with Tang dynasty of China and defeated Baekje Kingdom in 660 A.D. Also Silla conquered Goguryeo in the north in 668 A.D. And Silla expelled the military forces of Tang in 676.

The unified Silla restructured the country and formed a total of nine provinces with counties and sub-counties under each province. And through a migration policy the King Munmu relocated leaders of large clans to other rural or central areas and only small clans were allowed in rural areas. Each Chon (village) was composed of about 10 blood-tied families and a few such villages had a leader who was controlled by a sub-county chief appointed by the central government.

In the Unified Kingdom of Silla, there were two types of agricultural fields; paddy field and upland. Rice was cultivated in paddy field and barley, beans, millet, etc. were cultivated in upland. Other activities including sericulture, weaving and animal grazing as well as wild Ginseng gathering and Chinese tea planting were widely practiced.

#### 2) Goryeo Kingdom (918 - 1392 A.D.)

The soils of the Korean peninsula were rich for agriculture even with its mountainous landscape. The good soils made the country self-sufficient food supply during normal years from ancient times. But the country needed to feed the people with

own agricultural products even in famine years, so the government policy promoted agriculture and the local government officials' responsibilities were primarily both promoting agricultural activities and collecting taxes.

As a famine relief system a government loan organization called Heukchang (a warehouse to store grain) was established during the First King Taejo. The organization stored grain during normal years and lent during emergency times such as flood or drought to the affected people with a condition of paying back after harvesting in the fall. Later the organization was expanded and renamed to Euichang and installed in every local district. This type of institute would have been necessary and very effective for helping people who suffer from frequent flood and drought damages.

During Goryeo Kingdom grain production rapidly increased with enhanced promotion of agriculture. Such grain production improvement was influenced by such agriculture promotional systems and policies as well as development of farming techniques and methods. Oxen helped cultivate crops and farming tools such as plow, plowshare, spade, etc. were used. Also government loaned oxen and farming tools to poor farmers.

## **2. Land Policy**

### **1) Unified Kingdom of Silla**

After the unification the type of land tenure system changed through the strengthened power of the central government and influence of the Chinese system. History showed that the Kingdom imitated the Gyunjeon system (land division) of the Sui and Tang dynasties of China. The land ownership was classified as follow: land owned by government which was granted to government officials, land owned by the royal family, land granted to local chief officials and land given to farmers. The farmers were required to pay a certain portion of the products as tax and the remainder belonged to them.

Through numerous land reform under the strong central government, the noble classes enjoyed rich and luxury life style with large land ownership while the farmers lived like slaves. Such rich noble classes moved out of the capital area and became local landlords. Power of the landlords grew so strong that during the late period of the Kingdom, they self-governed their area. Such powerful landlords eventually caused failure of the central government system and later the fall of the Kingdom.

## **2) Goryeo Kingdom**

The most critical and important issue for the new Goryeo Kingdom was to restructure the failed land tenure system of the previous Kingdom. Restructuring of land ownership would not only strengthen the Kingdom's finances, but also provide financial base of the government officials, which was directly related to stabilizing the new Kingdom. The land tenure system of Goryeo Kingdom was based on the Banjeon system of Tang dynasty of China. This system did not allow private ownership of land. According to this system, lands were granted to government officials (Gwajeon), people with distinguished services (Gong-eumjeon), and local and central government offices and temples (Geupjeon).

Even the Kingdom started with public ownership of land and central government system, the land system slowly collapsed in the middle period of the Kingdom due to corrupted politics and loosened discipline of government officials. As a result private landownership started to emerge during this period. And during the late period of Kingdom the landownership became extremely disarrayed. The government pursued many times to outlaw the private landownership but failed. The Kingdom governed the Korean peninsula for 474 years from 918 to 1392 A.D. eventually fell as a result of the failure of landownership system.

## **3. Land Reclamation**

### **1) Unified Kingdom of Silla**

The Kingdom promoted and emphasized agriculture even before the unification, as agriculture was the most fundamental industry from the ancient times. The Kings also encouraged agriculture through building embankments, promoted sericulture and land reclamation to add more farmlands. The Kingdom had a policy to encourage agriculture. In this policy the King appointed Gwanchalsa (provincial governor) to provinces to supervise agricultural status, censured government officials in case of loss of farmlands and allowed government grain and exempted taxes to the farmers who suffered from natural disasters. Such policy resulted in increased farmlands and agricultural production. Also development of handicraft industry and private land ownership created wealthy families.

### **2) Goryeo Kingdom**

Goryeo Kingdom pursued land reclamation from the beginning of the Kingdom. During the 4th King Gwangjong (949 - 975 A.D.) abandoned lands were reclaimed and land reform policy was applied to such reclaimed lands. In December of the

24th year of King Gwangjong (973 A.D.) a new tax policy was set up to reclaim abandoned lands. According to the policy, tax exemption to reclaimed lands was applied for one year to private lands and 3 years to public lands. The reason for such favorable policy was to encourage settlement by migrating farmers through means of land reclamation. Later the government policy to encourage reclaiming abandoned lands was further enhanced in 1111 A.D. According to the policy if the lands under fallow for more than 3 years were reclaimed all the products are allowed to the reclaimant for 2 years and shared 1:1 ratio with the landowner thereafter. For 2 years old fallow land, 3:1 distribution (reclaimant vs. landowner) and 2:1 ratio for more than 1 year-old fallow land.

In 1116, the King visited Seokyeong (present Pyeongyang) and censured the chief official when he spotted unreclaimed fallow lands on the way. This proved that the Kingdom pursued to increase farmlands through reclamation of fallow lands to meet the land demand for the newly emigrated foreign people across the northern border.

## **4. Irrigation Facilities**

### **1) Unified Kingdom of Silla**

In 790 A.D., Byeokgol-je (built by Baekje Kingdom in 330 A.D.) was restored.

People from seven local provinces including Jeonju were mobilized for this project. This shows that the Kingdom was flourished after the unification and pursued to enhance irrigation systems in the old Baekje area. Based on the records that the King Heondeok and the King Heongang ordered to repair all the reservoirs, it would be easy to understand that the Unified Kingdom of Silla was active in agriculture through irrigation systems.

In the irrigation history of Silla Kingdom attention should be given to the 8th - 9th century. Restoration and enlargement of irrigation systems during this period were well recorded in the Cheong-je-bi (a monument in Yeongcheon, 798 A.D.). The monument presents Sangbaegulri (similar to a modern-time water intake gate) which is a kind of wooden pipe to convey water. Before this invention the top of embankment was cut off to deliver stored water. Therefore, the invention of Sangbaegulri was an exceptional improvement to control water intake from the reservoir. Embankments equipped with such gates did not require repairing damages by cutting off the top of embankment to release water to canals (Figure 3-1).

### **2) Goryeo Kingdom**

The country had numerous floods and droughts and needed construction and restoration of embankments and diversion dams. Therefore, there were numerous

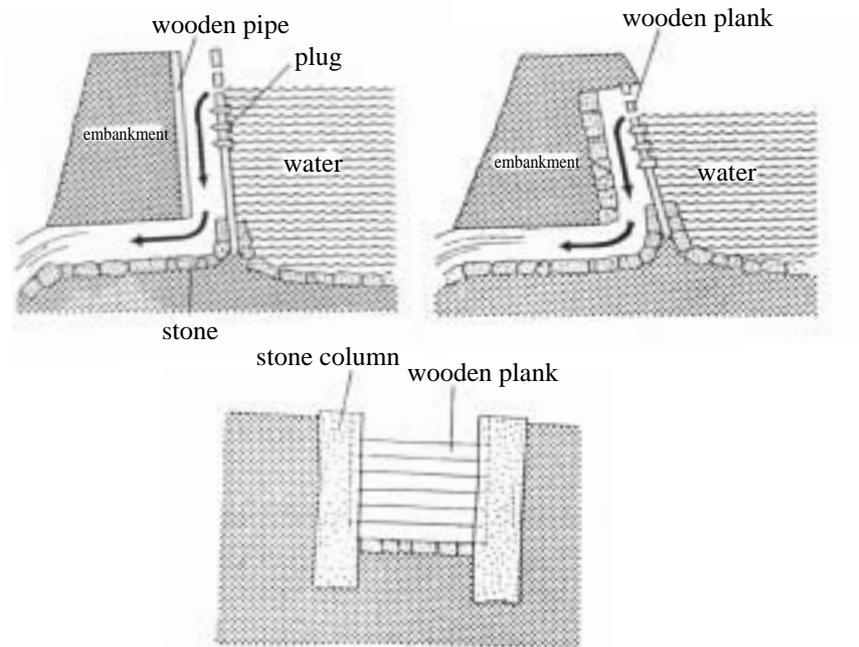


Figure 3-1 Three examples of intake gate during Goryeo Kingdom  
(drawn based on historical records)

reservoirs constructed long ago. Some of such old reservoirs include Byeokgol-je in Gimje, Gonggeom-ji in Sangju, Daeje-ji in Uiseong, Uirim-ji in Jecheon, Susan-je in Milyang, etc. Some of the above reservoirs were restored during Goryeo Kingdom. For example, Byeokgol-je was restored during King Hyeonjong, and Gonggeom-ji was rebuilt on the original dam site during King Myeongjong. This might show that some of them had been at least abandoned once before.

The reservoirs were built either for irrigation or flood prevention or for both of them. Most reservoirs were constructed across a stream by installing embankments but sometimes dug-out ponds were built in swamps. During late Goryeo Kingdom farmlands were increased through actively building more irrigation facilities. Irrigation facilities in Goryeo Kingdom were rapidly implemented after the 12th century. Such irrigation projects include restoration of old embankments and construction of canals, flood protection levees, tide protection levees, etc.

Traditionally central government used to mobilize people from surrounding provinces to build large structures. But such practices were changed during this period and relatively small embankments were constructed under local government's supervision. Such structures as canals, flood protection levees and tide protection levees represent typical late Goryeo Kingdom's irrigation facilities. And the devel-

opment of coastal low lands for agriculture started during this period.

Even with such well-developed reservoirs, canals and diversion weirs, they did not understand the advantage of Sucha (water pumping wheels). First attempt to use such equipment was in 1362 A.D. when a government official duplicated the Sucha from south China and reported King to use it for irrigation of rice paddy. However, it seemed that the government did not accept the suggestion. It should be noticed that one of the reasons that he proposed distribution of Sucha was for rice transplanting. It is assumed that the suggestion was related to the introduction of double cropping with a newly developed rice variety.

## **5. Mongol's Invasion and Tidal-Flat Reclamation**

Goryeo Kingdom suffered long time from Mongol's invasion. The first invasion (1231 A.D.) forced the Kingdom's capital move from Gaeseong to Ganghwado Island and during the 28 years of war (1231 - 1259 A.D.) producing food was the most serious problem. From the 3rd invasion (1235 A.D.) until 1256 A.D. earthen embankments were built at many places around the coast of the island. These were used not only as outer forts to protect the island from Mongol's invasion by landing but to control tidal water to use the inner low lands for cultivation. This became an exemplary case of tideland development in Korea.

Goryeosa (a history book of Goryeo) mentioned that such coastal embankments were called Bangchuk, and the developed land was used as Dunjeon cultivated by soldiers for military uses. Many coastal embankments were installed at Jepo, Wapo, Ipo, Chopo and other places of Ganghwado Island. Even now coastal embankments are called fortress embankment, meaning that embankments were considered as a fortress to defend the island. Ganghwado Island has geographically adequate conditions to develop tideland. One of the conditions is the high tidal movement of about 8 meters at the maximum, which provides wide open tidal flat during low tide. This condition makes it easy to develop farmlands by constructing relatively simple embankments along the coastline. Tideland development was a way to overcome such national disasters and proved that the western coast had a god-given condition for such development.

## **6. Example Site (Gonggeom-ji)**

Gonggeom-ji is an irrigation reservoir located at Gonggeom-myeon, Sangju-gun, Gyeongbuk province. The exact time of the construction of this reservoir is not known. But it is estimated that it was constructed during Samhan period and Goryeosa mentioned that it was reconstructed at the original location in 1195 A.D. This means that the structure was once abandoned and reconstructed during Goryeo

Kingdom. The dimensions of Gonggeom-ji are;  
 Total length of embankment : 430 m  
 Circumference of the reservoir : 8,680 m  
 The average depth of reservoir : 5.6 m  
 No. of spillway : 1ea  
 Irrigation area : 265 ha

The reservoir was kept until it was badly damaged during the Imjin Waeran war. The Hamseong Land Improvement Association repaired the embankment and used until 1959. It was the No. 1 reservoir in the Yeongnam region until 19th century and was called in 15 different names.

Compared to 26 hectares, the average irrigation area of reservoirs reported by Sokchanjiriji (a history book) of Gyeongsang province (15th century A.D.), Gonggeom-ji would have been the largest reservoir with 265 hectares irrigation area. In 1897 - 1906 A.D. the reservoir was reduced when the embankment was demolished to make paddy field. The Gonggeom-ji became useless in December 1959, when Odae reservoir was constructed on the southwest of it.

After the reconstruction of Gonggeom-ji in 1195 A.D. it irrigated Sangju-Hamchang area for about 700 years. Due to the development of the adjacent area, Gonggeom-ji lost most of its old appearance and in 1968 Hamchang Farmland Improvement Association set up a monument to commemorate the original location of Gonggeom-ji. And a pond with 1.3-hectare area was constructed in remembrance of Gonggeom-ji in 1993.



Figure 3-2 Reconstructed Gonggeom-ji

## Chapter IV

# Modern Times (15<sup>th</sup> - Mid 20<sup>th</sup> Century)

### 1. Societal and Agricultural Situations

The Joseon Kingdom started in 1392 at the fall of Goryeo Kingdom. The new Kingdom pursued to establish public land ownership policy and to restructure the tax systems. The Kingdom declared the Confucianism as the national primary ideology and strong agricultural policy. During the early Kingdom it was absolutely necessary for the government to control land system, as the sources of tax were solely dependent on land, and government officials' stipends were paid out of land. Therefore, it was very natural that the founder of the Kingdom, King Taejo took the strong agricultural policy as the primary national policy.

The strong agricultural policy was directly reflected in the Kingdom's personnel management policy. Considering that complete agronomic preparation in early springtime was the essential requirement to assure good production, the scheduled appointment of the local chief officials was made until at least 50 days before the vernal equinox. Also, chief officials of a local government had to complete such agricultural duties because completion of such position was a requirement to be promoted to a higher position in central government. The background of this policy was that nobody could participate in central government positions without understanding agriculture and having field experiences.

In 1744, a law said that if a person appointed to the chief of a local government did not proceed to the position or pursued to avoid the appointment, he would be forced to exile to the same area for 3 years. The law was amended in 1865 to include those who abandoned the position before completion of their duties. From these laws it can be assumed that the responsibilities of local chief officials were very heavy and difficult.

Local chief officials were extremely powerful who held the three important powers of government, but they were required to perform assigned responsibilities such as promoting agriculture, increasing population, promoting education, maintaining military, fair imposition of labor services, fair judgement and maintaining moral society.

The national economy was extremely deteriorated during the 7-year war of the Imjin-waeran. For example, the total farmland area in 1592 when the war broke was 1,698,000 gyeol (a unit to measure land area) but it was 541,000 gyeol in 1611 after the war ended. There were more invasions by Ching dynasty, Jeongmyo-horan in 1627 and later Byeongja-horan war in 1636 - 1637 A.D. These war-torn conditions of the Kingdom badly deteriorated the Kingdom's economy and government's finance, the worst since the foundation of the Kingdom.

Following this period the Kingdom tried to reconstruct the Kingdom's economy through promoting agriculture and chief officials of local governments had to work hard. The high rate of evading or leaving their positions by chief officials of local government well reflected difficulties of performing these positions. In the mean time incentive policy was established and expanded to prevent these problems. A new law was announced in 1744 to award well performed chief officials with special promotion by one rank.

## **2. Land Tenure and Management**

### **1) Land Tenure**

From the beginning the Joseon Kingdom declared that all land of the Kingdom belonged to Gongjeon (public land). Gongjeon was defined as the land where taxes and services were paid to the Kingdom and Sajeon (private land) was the land granted to officials or nobles who were recipients of taxes and services from the land. Therefore, the difference of Gongjeon and Sajeon was determined not by who owned the land but whether the recipient of taxes and services from the land were public or private sector.

Lands were given to royal families, meritorious nobles, and government officials according to their ranks and social levels. A total of 18 ranks were classified (the ranks were called Gwa) and the size of land granted was 150 gyeol for the highest rank and smaller for the lower ranks. These lands were called Gwajeon and ruled by the law of Gwajeon. Gwajeon was only applied to Gyeonggi province and had the following contents:

- Susinjeon : When the owner of land dies his wife inherits the whole Gwajeon if

- she does not marry and has children, and one half of it without children.
- Hyulyangjeon : When both parents die the children inherit the whole Gwajeon
- Gongsinjeon : Gwajeon given to meritorious nobles
- Sajeon (granted land) : Gwajeon granted by King

This means that Gwajeon was allowed to be partially inherited and each grantee paid two du (grain measurement unit) per gyeol. Number of Gwajeon owners rapidly increased and in 1417 it expanded to Chungcheong, Jeolla, and Gyeongsang provinces. Because of the expansion of Gwajeon and the decrease of Gongjeon, Gwajeon system was abolished in 1406 and a new law of Jikjeon was established. In the law of Jikjeon, only currently employed officials were granted with lands without inheritance and the maximum size was reduced to 110 gyeol. Therefore, there was no guarantee after death or retirement of officials and it caused more officials' exploitation. To solve the problem in 1470, government directly started to collect the tax from the farmers and paid the Jikjeon owners for shared rent. For this system government prepared land ownership list as a database for land management and tax collection.

## 2) Expansion and Reclamation of Farmlands

In early period of the Kingdom farmland uses and expansion were the primary objective of the Kingdom. According to the land use policy any registered land not being cultivated for more than three years was allowed to other farmers to cultivate. If the original owner returned within 5 years of leaving from the land and the grantee did not have other land, it was allowed to return 2/3 of the given land to the returned person.

Farmers who voluntarily reclaimed a land were taxed based on the harvest but for reclaimed tidal flat and wetlands taxes were entirely exempted for the first year and 1/2 for the next year. The lands owned by naturalized people were tax exempted for three consecutive years. Such tax policy was used to promote new land development for agriculture. However, because most reclaimable lands had already been owned by powerful people it was difficult to promote farmland development using only tax benefits. The government recommended local officials to allow poor farmers, slaves, and low class people to develop reclaimable lands for themselves. As a national project government built irrigation systems and distributed developed farmlands to the landless farmers. At the same time, landless people were organized to develop lands and operated tenant farms.

Resettlement of people from highly populated southern region to less populated northern provinces of Pyeong-an and Hamgyeong provinces was used for land expansion and strengthening of the national security. To promote the resettlement

policy social prestige was used as an incentive. Some examples of such prestige are: a promotion or a position in a local government was given to a noble man; an opportunity was given to local officials to join the central government; and socially lower class people were promised to move out of the class. Undeveloped pieces of land were given to individuals based on their physical abilities. To effectively achieve this policy loyal families and nobles were requested to send their slaves to northern region to develop farmlands.

Another method used to develop farmlands was designating Dunjeon (group farm). Among such Dunjeon are; Gwadunjeon (official farm) developed by government owned servants to finance local government operation and Gundunjeon (military farm) developed by soldiers stationed on the border areas to provide their food supply. Farmland development was continued as an important policy during the late Joseon Kingdom for food self-sufficiency and national security. However, land development was restricted by law in some areas such as mid-slope of mountains for the protection of forests and prevention of erosion. When local chief official could not enforce the law, he would be punished.

### 3) Classification and Measurement Units of Farmlands

Measurement units of farmlands of Joseon Kingdom were primarily gyeol and bu. The units measured combination of yield, land size and tax, and started to be used since Silla Kingdom. Originally pa (or jum) was used to measure rice yield and one pa measured a grab of ripen rice plant and other units were based on pa as 10 pa equals one sok (or mut), 10 sok equals one bu (or jim) and 10 bu equals one chong, and 100 bu equals one gyeol (or mok). Then these units evolved to measure land sizes.

Lands were classified in 1443 based on the land productivity with six classes. For lands with different productivity the classes were determined based on the yields. Table 4-1 shows equivalent sizes in a modern unit. For the same gyeol the 2nd class

Table 4-1 Land classification and size in ha per gyeol

Classification	Size per gyeol (ha)
1	0.91
2	1.07
3	1.30
4	1.56
5	2.28
6	3.60

land is larger than the 1st class land, the 3rd class land is larger than the 2nd class land, so on. One gyeol of the 6th class land is four times as large as one gyeol of the 1st class land. This means that the 6th class land requires four times as large as the 1st class land to produce the same yield. The purpose of this was to set up the equal tax rate per gyeol regardless of the land size.

However, this system bears numerous contradictions. First, land productivity does not remain constant. Even though the conditions of land did not change, the land productivity might have changed every year depending on rainfall, fertilization, pest damage, etc.

Second, as the productivity changed the classification should have been adjusted but the adjustment of land classification was conducted once every three years. If land classification was changed the size should have been also changed as the land size varied by the classification. However, land size survey was conducted once every 20 years and the results were documented at Hojo (Ministry of Revenue) and local government. Because of the discrepancy of the timing the statistics of yield and tax collection determined by the land size could be extremely different from the actual ones.

Third, the contradiction came from the system's assumption that the changeable land productivity and crop yield were set as constant values and non-changing land size was set as a variable value. For example if one gyeol of a 4th class land (1.56 hectares) was adjusted to one gyeol of a 2nd class land (1.07 hectares) because of its improved productivity according to the tax law, the tax rate should have been determined based on the 2nd land class. But if the land size was not adjusted according to the classification changes theoretically  $1.56 - 1.07 = 0.49$  hectares was not taxed. In other words 54.2% of tax based on the land size would not have been assessed and it would have caused an unfair tax system.

Fourth, land productivity may not be determined by the soil fertility only. It is true that soil fertility is important for high productivity but other factors such as time and method of sowing, and cultivation are as important especially with improved cultivation techniques. Due to these contradictions, when lands were surveyed in 1634 only the 1st class land listed in the record were used to determine tax rate and the lands below the 2nd class were not used.

As shown in Figure 4-1 total farmland during the early Joseon Kingdom was 600,000 gyeol, which increased to 1,708,000 gyeol immediately before the Imjin-waeran war through expansion of land development and irrigation systems. Farmlands were devastated during the war and the total land size rapidly decreased to no more than 300,000 gyeol. After the war the land size increased to 1,538,000 gyeol during King Injo (1630s A.D.) and maintained around 1,400,000 gyeol at the end of the Kingdom.

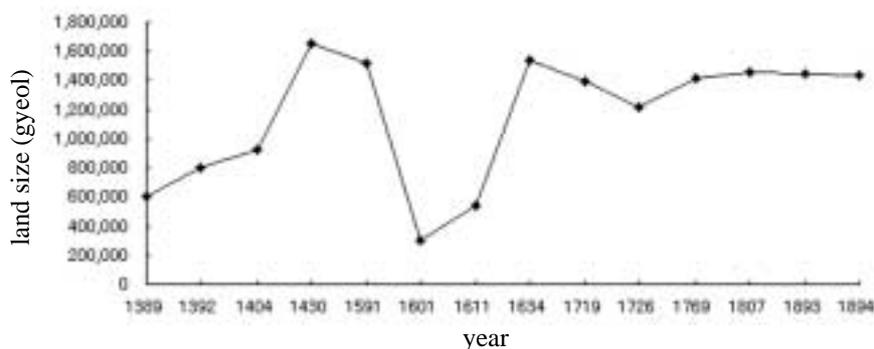


Figure 4-1 Changes of farmland area during Joseon Kingdom

#### 4) Land Tax Systems

During early Joseon Kingdom the taxes imposed on land were heavy loads to the farmers. Government dispatched officials to local areas in 1401 to inspect status of crop yields and 10% of the actual yield was imposed as tax. This method seems to be ideal but it was difficult to determine crop yield throughout the Kingdom in the short time period before harvesting. Because of the difficulties of dealing with cheating by local officials and assistants during inspection and technical and administrative difficulties the government decided to revise the tax laws in 1430. The new law used the average yield estimated from several years' harvesting to determine tax rate. But because of some flaws of this law it was abolished after Jeonpum Yeonbun law was announced in 1444. As shown in Table 4-2, the new tax law classified the land as 10 classes depending on yield. The maximum tax rate was 20 du per gyeol and the minimum was 4 du per gyeol, with exemption for the lowest yield class.

Table 4-2 Yield and tax rate in Jeonpum Yeonbun law

Class	Rate of yield	Tax rate (du per gyeol per year)
Best of best	Best bumper crop	20
Mid best	90% of best	18
Low best	80%	16
Best mid	70%	14
Mid mid	60%	12
Low mid	50%	10
Best low	40%	8
Mid low	30%	6
Low low	20%	4
Very low	10%	no tax

These tax rates were applied to Gangwon, Hwanghae and the southern provinces. The rates were reduced by 1/3 in northern provinces where yield was low and 1/2 of the rates in Jeju province because of low yield in the area.

The condition of yields was estimated and reported to local chief official by an agricultural official before August 15 in lunar calendar. The chief official documented a yield report based on this information and the results were reported to the next higher official by September 15. It was reported finally to Uijeongbu, the highest central government office and the related government units got together to determine final tax rates.

### **3. Development and Management of Irrigation Facilities**

#### **1) Development of Irrigation Facilities**

##### **a. Promoting agriculture and expanding irrigation projects**

After the new Kingdom was established King Taejo installed Office of Agriculture Promotion in 1395 in every local government of the country and ordered to repair or construct reservoirs. In 1415 King Taejong emphasized the importance of irrigation projects and restricted rice transplanting but promoted direct seeding of rice on rain-fed area. The reason was that if droughts take place during the transplanting season it might cause loss of the crop.

During this period, rehabilitation of the Byeokgol-je took place. Byeokgol-je had been damaged and repaired several times since its construction. But since the late Goryeo Kingdom it had been abandoned. However, the project finally started in 1415 following many years of discussion about rehabilitation of the embankment. The project took more than 2 months by over 10,000 people and 300 government officials mobilized from the surrounding areas.

In 1414 an agricultural book, Nongsangjib-yo of Yuan dynasty of China was translated into Korean and published as a reference for farmers. This book was referenced by many agriculturists for writing books about agriculture later. Farmers were uniformly benefited from irrigation through rehabilitation and repair of reservoirs during the King Taejong. The irrigation projects during this period were so famous that later rainfall during the memorial service day of King Taejong was even called "Taejong rain" .

The irrigation and agriculture oriented policy continued during the reign of King Sejong (1418 - 1450 A.D.). For example, the chief official of each province was evaluated based on how many reservoirs are repaired and constructed. Also, local

officials were ordered to document all reservoirs, and the documents were used to evaluate their administrative ability. Nul-je in Gobu (present Buan of Jeonbuk province) was restored in 1419. The project took a total of 1,158 people for 2 months to complete the total length of 1,054 m of the embankment. By using Jeongjeon (rectangular paddy field) principle, over 10,000 hectares of irregular shaped paddy fields irrigated by Nul-je were restructured in rectangular shape. This could be the origin of present day' s land consolidation project.

Also in 1429, Nongsajikseol, a book on agricultural technique written by Jeong Cho was published. This book compiled stories from local agriculturists collected by chief officials of provinces. In 1455 the King ordered to construct reservoirs and river embankments to prepare for droughts and floods.

In 1474, the Hapdeok-je was repaired under supervision of the central government official. And a river embankment was constructed to reclaim new farmland together with 5,500 meters or more canals to produce 5,000 to 6,000 seom (a unit to measure grain volume) of rice in Jaeryeong-gun, Hwanghae province in 1486. Also in 1489 along with restoration of Susan-je in Milyang of Gyeongsang province many river embankment projects took place to prevent drought and flood damages. Such projects continued until the end of the Kingdom. For timely cultivation of rice, the regulation of Je-eonsa (office of embankment) was changed to allow initiating such projects first and obtain permission later from the chief official of the province.

An irrigation pump, Gyeoksugi invented by Lee Mal was tested. In 1491 Gang Himaeng introduced 12 crops and 80 varieties in his agricultural technology book. Especially, a total of 27 varieties of rice were introduced in this book, which shows the level of importance of rice cultivation during this Kingdom.

#### b. Wars and rehabilitation of irrigation facilities

The busy irrigation projects during the early Joseon Kingdom became idle from 1502, when King Yeonsan started to reign the Kingdom. Not to mention ignoring repair and rehabilitation of damaged reservoirs, embankments were demolished to cultivate the reservoir areas. From the late 15th century to the early 16th century (during the reign of the Kings Seonjo and Injo) foreign invasions such as Waeran war (Japanese invasion, 1592 - 1598 A.D.) and Horan war (invasion by Ching dynasty of China in 1627 and 1636) ruined heavily the country. It was such difficult times during these wars that farmlands were abandoned, people wandered around, and many reservoirs were damaged. The status of the country was so miserable that it was even difficult to encourage agriculture because of heavily damaged irrigation facilities.

After 1507, Secret Inspector-Generals of the King were dispatched to the eight provinces. They inspected the conditions of reservoirs and the provincial chief officials were censured if irrigation facilities were intentionally damaged or had not been adequately repaired. At the same time local officials were promoted if irrigation facilities were well maintained as an incentive policy. Even during these chaotic conditions Eojidun-bo was constructed at the Jaeryeong river in Hwanghae province, which was so large and complicate that it was the top level irrigation facility of the late Joseon Kingdom.

In the mean time, from late 1600 until early 1700 the slackened public order due to the Horan war was somewhat restored and returned to normal. In May of 1650 a kind of water pump called Sucha was devised and used to supply water from low areas to higher areas.

In 1655 a comprehensive agricultural book called Nonggajipseong was published to encourage agriculture. And Je-eon-samok (a regulation on reservoir construction) was proclaimed in 1662 to introduce methods to construct, repair, and restore reservoirs and to encourage reservoir construction. At the same time Je-eonsa (an office in central government to supervise all national irrigation projects) was restored. An improved method to transplant rice from seedbeds was introduced. This transplanting method was widely distributed. This method brought a leaping change in rice cultivation in the country and made it possible to grow double crops of rice and barley in the same fields.

In every January, King Jeongjo (1777 - 1800 A.D.) announced an instruction to promote agriculture. Summary of the instruction said "The foundation of the country is the people and the foundation of the people is agriculture." Among the seven primary duties of local chief officials agriculture was the first priority and promoting agriculture had to be the first thing to do before any other duties. Local chief officials had to do their best to achieve the following objectives; land reclamation, irrigation, construction and repair of irrigation facilities, improving soil productivity, mutual uses of plow oxen and agricultural tools, timely cultivation, readiness for poor harvesting, and eliminating farmers' laziness, etc. If these duties were not adequately performed they could be censured.

It was recorded that in 1729, the total number of reservoirs in the country was 3,527 and the number was 3,378 in 1781 as shown in Table 4-3. Chukman-je, the present Seocho in Suwon, was constructed in 1797.

### c. Decline of irrigation projects and conflicts against irrigation facilities

The irrigation facilities started to deteriorate as the Kingdom's fortune slowly

Table 4-3 Number of reservoirs in 1781 (the 5th year of King Jeongjo)

Province	No. of reservoirs	Province	No. of reservoirs
Gyeonggi	270	Hamgyeong	24
Chungcheong	503	Pyeong-an	55
Gang-won	65	Hamgyeong	26
Jeolla	913		
Gyeongsang	1,522	Total	3,378

declined. Major reasons of the deterioration include natural disasters, damages by heavy Mogyeong practices (cultivating other's land without permission), and damages by slash-burn farming, etc. Some of the reservoirs damaged by natural disasters are; in July of 1779 tidal wave damaged many agricultural fields, irrigation facilities, and river embankments in coastal region of the Gyeonggi province and a severe flood destroyed several embankments along the Nakdong river in 1780.

No less destruction of irrigation facilities by human actions took place than those by the natural disasters. One of these man-made disasters is Mogyeong, an illegal cultivation in reservoir areas without permit, which resulted in loss of storage capacity of the reservoirs. When Mogyeong in reservoirs became serious problems in 1777 Je-eon-jeolmok was proclaimed to protect reservoirs by restricting Mogyeong activities but it seemed that the law was not well implemented. Because the reservoir area was fertile by deposition of organic materials from the watershed the fields were badly wanted by the farmers.

Illegal cultivation was resumed by local landlords and influential families whenever they find opportunities. Especially, after the Imjin waeran war when the social moral was deeply down the reservoirs in many areas were forcefully occupied by the influential families. Sometimes the local landlords reported to government that reservoirs had been destroyed and later practiced Mogyeong in the reservoir areas. This kind of illegal activities caused serious damages to the reservoirs.

Slash-and-burn farming destroyed forested area and dried up the water sources which was an indirect cause of further damaging reservoirs. Therefore, government prohibited slash-and-burn farming in 1841 but the results were not satisfactory. In the late period of Joseon Kingdom taxes were even collected from slash-and-burn fields by the loyal families and the influential people.

Table 4-4 shows changes of irrigation facilities constructed in three southern provinces; Chungcheong, Jeolla, Gyeongsang and during Joseon Kingdom.

Talbe 4-4 Number of irrigation facilities during Joseon Kingdom in three southern provinces (Chungcheong, Jeolla and Gyeongsang)

Province	Early 15 <sup>th</sup> C.	1518	1782	Early 19 <sup>th</sup> C.	1908	1910
Chungcheong	-	500	503	518	248	318
Jeolla	-	900	913	912	745	800
Gyeongsang	721	800	1,522	1,666	1,317	1,752

During the Joseon Kingdom irrigation facilities were primarily managed by the government. But occasionally tyranny of Kings or oppression of local landlords or influential families allowed part of reservoirs to be illegally given or occupied by special interest people or groups, which drew farmers' complaints and eventually resulted in strong resistant movements. Around 1890 when the King's authority was not executed well in the country, local chief officials imposed water taxes with strong objection from the people. Examples of these conflicts are the Hapdeok civil disobedience and the Gobu farmers' resistance.

In 1893 a former civil defense commander of Jeolla province was living in Hapdeok area and became the head of the irrigation organization of Hapdeok reservoir. By using this power he cultivated shallow areas of the reservoir and imposed new taxes on irrigation water to the villagers of the irrigated areas. In addition he used his social status of Yangban (a noble status) to exploit the people. Because of these illegal and tyrant activities the angry villagers were organized to expel him, which became so called Hapdeok civil disobedience.

Two months after the Hapdeok incident Gobu farmers' resistance took place. Manseok-bo was an irrigation diversion dam built across the Dongjin river in Gobu-gun (present Jeong-eup-si), Jeonbuk province, which was a water source to irrigate Ipyeong plain. In 1893 the chief official of Gobu-gun forcefully drafted farmers from the area to build the Manseok-bo, but farmers objected the construction of the diversion dam and strongly resisted and destroyed it. This people's resistance was called Gobu farmers' resistance.

## 2) Management of Irrigation Facilities

### a. Management system

The records showed that during the first King Taejo each local chief official was

requested to appoint a local official to take care of agricultural promotion and irrigation facilities. During King Taejong era Santaeksa (a government office) belonged to Gongjo (Ministry of Construction) managed irrigation facilities and Dunjeon. And a temporary official was appointed to travel around provinces to promote agriculture and to manage and supervise irrigation facilities.

During King Sejo (1455 - 1468 A.D.) a minister level permanent position, Je-eon-jejo was installed in central government to administer irrigation projects and in local government a temporary position, Je-eon-gyeongchagwan (official name of supervisor for irrigation facilities) or Je-eon-byeolgam was dispatched.

In 1481 (during King Seongjong) a government office named Je-eonsa appeared in the history record. Je-eonsa was not belonged to any regular government system. It is assumed that this office administered new construction and issued permits or abolition of irrigation facilities and dispatched Je-eon-gyeongchagwan to inspect illegal cultivations. When Jejo (the chief official) of Je-eonsa visited local area the person was called Je-eon-sunchalsa. He inspected local irrigation facilities and management and the work status of local government officials.

Je-eonsa was abolished during the chaos of the Imjin-waeran war and the irrigation facilities were gradually occupied by local landlords and influential families. But Je-eon-sa was restored in 1662. The Je-eon-jejo, the chief official of Je-eonsa was jointly held by the Hojo Panseo (the Minister of Revenue). But because of the busy schedule of Je-eon-jejo, in 1665 a separate official was appointed to administer the work.

Since then Je-eonsa gradually lost farmers' confidence because Je-eonsa favored to the influential people by allowing them to construct, restore or repair reservoirs and neglected farmers. Because of these situations Je-eonsa did not work well but was not abolished.

After this period Je-eonsa was established, abolished, and restored depending on the need, under the office of Hojo (Ministry of Revenue). Later it was transferred to Bibyeonsa (an office administering defense of frontier areas) in 1683 and a high ranking official of Bibyeonsa was appointed as administrator of irrigation works.

In 1741 the duty of Je-eon inspection was given to the sub-chief official of each province. In 1744 Uijeongbu (highest administrative unit) was directly in charge of the Je-eon administration. This was the first time that agricultural administration unit was handled by Uijeongbu. Therefore, Je-eonsa moved around from Hojo to Bibyeonsa and to Uijeongbu but the problem was that none of these was not a permanent government unit for irrigation matters.

b. Management practices

Tangible guidelines for reservoir management were first introduced during King Taejong. The guidelines included structural details of reservoirs i.e., intake facilities and intake methods, installation of spillway, etc. This shows that design and management of reservoir were well developed at that time. The chief official of province supervised the work status of the official of agriculture promotion and reservoirs management.

The reservoirs belonged to the farmers' collective communities or the country. And the management and supervision of the reservoirs were conducted by the local governments because most of the land was owned by the government.

In late Joseon Kingdom demands for irrigation water continuously increased as rice cultivation and transplanting areas increased. In 1626, the reservoirs illegally cultivated after 1608 were ordered to be restored and two officials were dispatched to Honam, Gyeonggi, and Hoso regions to inspect the implementation.

In 1662 together with restoration of Je-eonsa, Je-eon-samok, a regulation similar to the current river law was proclaimed. The summary of this regulation included: 1) to restore reservoirs and expand irrigation canals; 2) to dredge the sediments from reservoirs and fill water in time; 3) any reservoir exploited by loyal families or local landlords must be restored under the authority of the chief official of local government; 4) to install diversion dams across streams to secure water for agricultural uses; 5) instead of clay soils alone, to reinforce embankments using large lumbars connected each other and supported by piles, and to cover the bottom of embankment with stones or pine tree branches to prevent overflow damages; 6) to mobilize farmers, soldiers, and monks and in case of shortage include people from surrounding areas; 7) to use the government grains to feed the laborers; and 8) depending on the results the chief officials may be awarded or penalized.

However, because of the poor restoration and repair of reservoirs, another regulation, Je-eon-jeolmok was written and proclaimed in 1778. In the regulation the first part emphasized the importance of construction of reservoirs and warned the negligence of local chief officials and provincial chief officials in protecting reservoirs. The following specific instructions were included in the regulation.

- (1) The sizes of existing reservoirs should be registered with Bibyeonsa or with each village's Je-eon book. Based on this information all embankments and reservoirs illegally cultivated must be restored and local officials will be reprimanded if found negligence of administering the restoration.
- (2) Sediments deposited in reservoirs must be dredged and moved far away to prevent reentering into the reservoirs and remove the temporarily stacked sed-