RESERVOIR REGULATIONS IN 1662 BY THE GOVERNMENT OF JOSEON DYNASTY, KOREA

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1. INTROUCTION

Dynasty	BC 1 to 7C	7C to 10C	10C to 14C	14C to 20C
Silna	BC 57 – 668 (992 years)	668 – 935 (Unified)		
Goguryeo	BC 37 – 668 (705 years)			
Baekje	BC 18 – 660 (678 years)			
Goryeo			918 – 1392 (474 years)	
Joseon				1392 – 1910 (518 years)

History Book	The Chronicles of the Three States.		Goryeo History Book	Annals of the Joseon Dynasty
Reservoirs	Byokgolje Sije		Habdeokje Namdaeji	Chukmanje Manseokgeo Mannyeonje

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2. BACKGROUND OF THE JOSEON DYNASTY

2.1 Major Records of the Dynasty

1) Family name of the Dynasty: Lee (李)
2) Period of the Dynasty: 519 years (1392-1910)
3) Number of kings: 27 kings (Length of a reign per king in average is 19.2 years; Max. 52 years, Min. 13 months)

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2.2 Important Achievements of the Dynasty

1. World first rain-gauge (cylinder type)
Was invented in 1441 and distributed at each province and started to be used in 1442. It is 198 years earlier than the rain gauge invented by Benedetto Castelli (Italian) in 1639.

Rain-gauge (1837)

1441: Depth – 42.0cm, Diameter – 16.8 cm
1442: Depth – 31.5cm, Diameter – 14.7 cm
1770: Depth – 31.5cm, Diameter – 14.0 cm

Rain-gauge (1837)
- Made on 1837
- Material: Bronze
- Height: 31.5 cm
- Inside Diameter: 14.0 cm

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2. Rainfall measured in Seoul during 137 years from 1770 to 1907. The data are available (sample below).

Date	Contents	Rainfall (mm)
1770. 5. 13. (영조 46년)	○自卯時至未時, 日曇, 夜自二更始雨, 至十四日平明, 測雨器水深一寸。	1촌 (20.80)
1770. 5. 15. (영조 46년)	○自辰時至午時, 灑雨, 測雨器水深二分, 未時, 日曇。夜四更五更, 下雨, 測雨器水深七分。	2푼 (4.10), 7푼 (14.56)
1770. 5. 28. (영조 46년)	○自初昏至二十九日昧爽, 間間下雨, 測雨器水深四分。	4푼 (8.32)
-	-	-
1907. 9. 27. (순종 1년)	○自未時至申時, 灑雨下雨, 測雨器水深二分。 自申時至戌時, 灑雨下雨, 測雨器水深三分。	2푼 (4.16), 3푼 (6.24)
1907. 10. 6. (순종 1년)	○自子時至卯時, 灑雨下雨, 測雨器水深三分, 辰時雷動, 自卯時至酉時, 灑雨下雨, 測雨器水深七分。	3푼 (6.24), 7푼 (14.56)
1907. 10. 18. (순종 1년)	○自辰時至申時, 灑雨下雨, 測雨器水深五分。	5푼 (10.40)

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3. Yearly rainfall records for 8 years
The King Jeongjo told the concept of yearly rainfall data in 1799 (1.0尺=20.8cm)

辛亥以後, 雨澤多寡, 必錄置, 通一年計之, 辛亥則八尺五寸九分, 壬子則七尺二寸九分, 癸丑則四尺四寸九分, 甲寅則五尺八寸, 乙卯則四尺二寸四分, 丙辰則六尺八寸五分, 丁巳則四尺五寸六分, 戊午則五尺五寸六分 (승정원일기 정조 23년 5월 22일) (Ref. 1,370mm)

辛亥則 八尺五寸九分,	1,787mm in 1791 (Seoul)
壬子則 七尺二寸九分,	1,517mm in 1792
癸丑則 四尺四寸九分,	934mm in 1793
甲寅則 五尺八寸,	1,206mm in 1794
乙卯則 四尺二寸四分,	882mm in 1795
丙辰則 六尺八寸五分,	1,425mm in 1796
丁巳則 四尺五寸六分,	948mm in 1797
戊午則 五尺五寸六分,	1,156mm in 1798
Addition of 30 rainfall events	967mm in 1799 (by JCK)

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4. **Historical data sources**

Four Government Documents of the Joseon Dynasty

a) Annals of the Joseon Dynasty
- **Included in UNESCO's Memory of World Register**
- **Period of Recording: 472 years from 1392 to 1863**

b) Seungjeongwonilgi (Diaries of the Royal Secretariat)
- **Included in UNESCO's Memory of World Register**
- **Period of Recording: 272 years from 1623 to 1894**

c) Ilseongnok (Records of the Daily Reflections)
- **Period of Recording: 159 years from 1752 to 1910**

d) Bibyeonsadeungnok
- **Period of Recording: 276 years from 1617 to 1892**

Total number of Reservoirs: 3,527 in 1728, 3,378 in 1781, and 3,685 in 1808.

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2.3 Relief Works and Yearly Rainfall

Date	Year of King Jeongjo	Number of people affected	Yearly rainfall (mm)
July 1789	13th	543,500	-
June 1790	14th	1,562,900	-
1791	15th	-	1,787
May 1792	16th	463, 400	1,517
May 1793	17th	1,703,700	934
May 1794	18th	155,000	1,206
May 1795	19th	5,585,900	882
1795	Construction of Manseokgeo Reservoir		
May 1796	20th	195,700	1,425
1797	21st	-	948
May 1798	22nd	1,308,700	1,156
1798	Construction of Mannyeonje Reservoir		
1799	23rd		967
1799	Construction of Chukmanje Reservoir		

1) Total population was about 7.4 ~7.6 million people.

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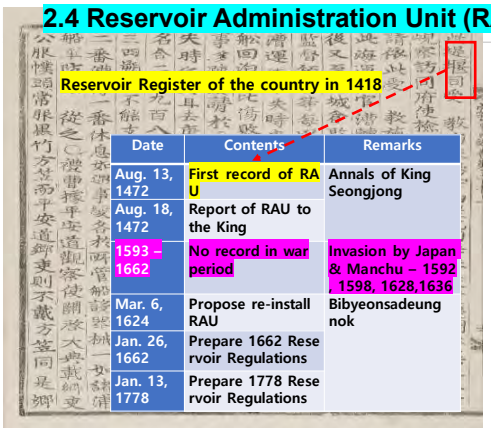
2.4 Reservoir Administration Unit (RAU)



Date	Contents	Remarks
Aug. 13, 1472	First record of RAU	Annals of King Seongjong
Aug. 18, 1472	Report of RAU to the King	
1593 – 1662	No record in war period	Invasion by Japan & Manchu – 1592, 1598, 1628,1636
Mar. 6, 1624	Propose re-install RAU	Bibyeonsadeungnok
Jan. 26, 1662	Prepare 1662 Reservoir Regulations	
Jan. 13, 1778	Prepare 1778 Reservoir Regulations	

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3. RESERVOIR REGULATIONS

3.1 Simple Reservoir Regulations

1 Gyeonggukdaejeon in 1485 (4 articls)	- Report bank works to Provincial Governor/King. - Protect bank slope by planting trees. - Prohibit logging or cultivation in the bank. - Confiscate all criminal proceeds.
2 Sokdaejeon Law Books in 1746 (7 articles)	- Prohibit reclamation of hilly area. - Reclaimed area shall be returned wasteland. - RAU shall inspect illegal cultivation in reservoir area - Negligence of officials shall be punished. - New canal site shall be compensated., etc.
3 Daejeontongpyeon in 1785 (3 articles)	- Prohibit mobilization of forced labours in works. - Bank area shall not be transferred to other use. - Anybody who offend shall be punished.

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3.2 1662 Reservoir Regulations (15 articles)

1 (RAU)	- Re-establish Reservoir Administration Unit (RAU). - Appointment of officials for the RAU (Chief Advisor: Premier level; Head: Minister of Finance or Head of Relief Agency; Official in charge: Staff of the Ministry of Finance).
2 (Importance of irrigation)	- Explanation of importance of farming. - Duty of the king and officials for leading people. - Explanation of importance of irrigation.

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3 (Illegal cultivation, duty and punishment)	- Local Chief should shall personally examine the reservoirs in his district area, and completely and firmly reconstruct the collapsed parts, excavate silted earth and store water in time. - Illegal cultivators of reservoir sites shall be reported, punished and relocated to the remote area. - Local Chief negligent in carrying out these regulations shall be punished heavily.
4 (Chinese example for irrigation)	- Chinese examples of irrigation development such as Dujiangyan Irrigation System (都江堰 –BC 256-BC 251 by Li Bing, 李氷), etc. were explained. - Recommend for Local Chief and people to construct and maintain dams and banks to prevent the drought disasters.

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5 (Survey & labour mobilization)	- Local chief shall survey all the rivers to find proper locations to construct diversion weirs and report to the Provincial Governor, and the Governor report to the Reservoir Administration Unit. - Local beneficial farmers shall be mobilized as construction workers in force. - If the local farmers are not enough, all the one-labour-per family of the district should be additionally mobilized. If more labours are required to complete the construction works, labours from adjacent districts should be mobilized.

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6 (Monk soldier mobilization)	- Monk soldiers shall be mobilized, because they depend on grain offerings from farmers for their living. It is no wonder that each monk is mobilized to assist farmers in preparing for the drought. - There was a history in China that Su Shi (蘇軾, 1037-1101, 北宋) gave monk license cards for their participation in the construction work of the bank for the West Lake (西湖). - Mobilize monk soldiers as forced labour for the construction, within the limit of 20 days for the monks with condition of providing license cards. For the monks who have license cards, work period should properly be reduced.

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7 (Construction material collection)	- Usually, many timbers and stones are used to construct banks on large rivers. - Local chief should establish a separate temporary marketplace near construction work site, and report to the Provincial Governor and prohibit people from going to other neighbouring markets. - Everyone who comes to the marketplace should gather timbers and stones.

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8 (Relief works & construction works)	- Mobilization of labour shall be made according to customs in the areas, and for the hungry people in poverty-stricken areas, relief grain supply shall be made according to the number of families. - Relief grain shall be supplied to accomplish both relief policy and construction work at the same time. - In olden days, Chinese scholar such as Fànwén zhèng (范文正, 989-1052) proposed construction work together with relief work at the same time. A famous Chinese scholar, Zhu Xi (朱子, 1130-1200) also proposed to construct big banks during famine to give food grain to the hungry people in his chapter of relief work. We should follow the lessons.

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9 (Compensation of canal site)	- Where irrigation canals are constructed, there are many benefits and fewer losses, even if there is land loss because of canal sites. - Land owner may oppose canal construction because of the loss of his own farmland. In such cases, construct canals according to law, but compensate for his farmland to be included in the canal site.

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10 (Use of trees, branches and stone for bank construction)	- Most of the large riverbed materials are usually sand, so bank will be easily destroyed in a small flood. - Large trees should be placed slant, entwine them horizontally and then support them so that they do not swing, like the shape of a house. - There should be lots of stones at the bottom of the bank, and if there are no stones, a lot of pine branches will be built up to prevent destruction due to overflowing water.

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11 (Duty of Local Chief & good examples)	- The first thing for the Local Chief to do is to develop irrigation facilities and encourage farming. - When Myeongdo (明道程), Chinese official, ruled the town of Sangwon (上元), he mobilized 1,000 workers and made a big reservoir, bringing good harvest year by year, and Fànwénzhèng (范文正, 989-1052) also benefited the people with the construction of big reservoirs. - We should follow their good examples as responsible government officials. I ask you, local governors, to initiate beneficial irrigation works and relief works for the people, and those who made good achievement will be rewarded.

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12 (Skilled & talented good construction supervisor)	- For successful construction, it is necessary to assign skilled and talented supervisor to the site. The Local Chief shall select good supervisors. The Provincial Governor shall find good engineers in the Province and send them to local districts. - The title of the selected personnel will be Supervisor of RAU, and each of them should be sent to work site and provided with food. If you find any person among your officials who can cope with the responsibility, give them the assignment of the supervisor. - Also, if you know any talented person who can manage successfully construction supervision for banks and canals, you should employ them as officials, so that they can do their assignment with responsibility.

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13 (Reporting, inspection & completion)	- The construction process of the dams and banks shall be reported to the Provincial Governor and the Reservoir Administration Unit. - The Reservoir Administration Unit will send often inspector to check the construction processes, examine the diligence and negligence of the Local Chief and construction supervisor for reward and punishment. - The frozen land is gradually being melted and farming season is approaching, therefore, dam or bank construction work is urgent. Provincial Governor and Local Chief should be alert to the completion of the work within designated time without any delay.

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14 (Seal of the RAU)	- Use the old seal of the Reservoir Administration Unit, kept by the Ministry of Economy and Finance.
15 (Others)	- Other items will be arranged later

3.3 1778 Reservoir Regulations (11 articles)

- 114 years later after 1662, new reservoir regulations were prepared.
- It will be reported sometime later.

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CERIK	Construction & Economy Research Institute of Korea

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