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

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Lee, Seok-Woo (KCID)

1. INTRODUCTION

<table>
<thead>
<tr>
<th>Dynasty</th>
<th>BC 1 to 7C</th>
<th>7C to 10C</th>
<th>10C to 14C</th>
<th>14C to 20C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silla</td>
<td>BC 57 ~ 668 (992 years)</td>
<td>668 ~ 935 (Unified)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goguryeo</td>
<td>BC 37 ~ 668 (705 years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baekje</td>
<td>BC 19 ~ 660 (678 years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goryeo</td>
<td>918 ~ 1392 (474 years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Joseon</td>
<td>1392 ~ 1910 (518 years)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

History Book: The Chronicles of the Three States.
Reservoirs: Byokgolje, Sille

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)

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 (1442)
- Made on 1397
- Material: Bronze
- Height: 31.5 cm
- Inside Diameter: 14.0 cm

2. Rainfall measured in Seoul during 127 years from 1770 to 1907. The data are available (sample below).

<table>
<thead>
<tr>
<th>Date</th>
<th>Contents</th>
<th>Rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1770. 5. 13</td>
<td>自卯時至未時, 日露. 朝自二时雨至. 午至十四日雨中. 浅河入水深一寸。</td>
<td>18.80</td>
</tr>
<tr>
<td>1770. 5. 15</td>
<td>自卯時至未時, 日露. 浅河入水深二分. 朝自四时雨至. 午至十四日雨中. 浅河入水深二分。</td>
<td>16.10</td>
</tr>
<tr>
<td>1770. 5. 26</td>
<td>自卯時至未時, 日露. 浅河入水深四分。</td>
<td>14.50</td>
</tr>
<tr>
<td>1907. 9. 27</td>
<td>自卯時至未時, 日露. 浅河入水深三十分。自卯時至未時, 日露. 浅河入水深三十分。</td>
<td>14.24</td>
</tr>
<tr>
<td>1907. 9. 26</td>
<td>自卯時至未時, 日露. 浅河入水深二十分。自卯時至未時, 日露. 浅河入水深二十分。</td>
<td>14.56</td>
</tr>
<tr>
<td>1907. 10. 18</td>
<td>自卯時至未時, 日露. 浅河入水深五分。</td>
<td>10.40</td>
</tr>
</tbody>
</table>

3. Yearly rainfall records for 8 years

The King Jeongjo told the concept of yearly rainfall data in 1799 (1.0F=20.8cm)

- 1787: 1,787mm in 1791 (Seoul)
- 1788: 1,317mm in 1792
- 1789: 934mm in 1793
- 1790: 1,206mm in 1794
- 1791: 882mm in 1795
- 1792: 1,425mm in 1796
- 1793: 948mm in 1797
- 1794: 1,156mm in 1798

Addition of 30 rainfall events 967mm in 1799 (by JCK)
2.4 Reservoir Administration Unit (RAU)

<table>
<thead>
<tr>
<th>Date</th>
<th>Content</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug. 13 1472</td>
<td>First record of RAU</td>
<td>Anvils of King Seongjong</td>
</tr>
<tr>
<td>Aug. 18 1472</td>
<td>Report of RAU to the King</td>
<td></td>
</tr>
<tr>
<td>1591</td>
<td>No record in war period</td>
<td></td>
</tr>
<tr>
<td>Mar. 6, 1624</td>
<td>Propose re-install RAU</td>
<td></td>
</tr>
<tr>
<td>Jun. 26, 1662</td>
<td>Prepare 1662 Reservoir Regulations</td>
<td></td>
</tr>
<tr>
<td>Jan. 13, 1778</td>
<td>Prepare 1778 Reservoir Regulations</td>
<td></td>
</tr>
</tbody>
</table>

2.3 Relief Works and Yearly Rainfall

<table>
<thead>
<tr>
<th>Date</th>
<th>Year of King Jeongjo</th>
<th>Number of people affected</th>
<th>Yearly rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>July 1789</td>
<td>13th</td>
<td>543,500</td>
<td></td>
</tr>
<tr>
<td>June 1790</td>
<td>14th</td>
<td>1,562,900</td>
<td></td>
</tr>
<tr>
<td>1791</td>
<td>15th</td>
<td>-</td>
<td>1,787</td>
</tr>
<tr>
<td>May 1792</td>
<td>16th</td>
<td>463,400</td>
<td>1,517</td>
</tr>
<tr>
<td>May 1793</td>
<td>17th</td>
<td>1,703,700</td>
<td>934</td>
</tr>
<tr>
<td>May 1795</td>
<td>18th</td>
<td>155,000</td>
<td>1,206</td>
</tr>
<tr>
<td>May 1795</td>
<td>19th</td>
<td>5,585,900</td>
<td>882</td>
</tr>
<tr>
<td>1795</td>
<td>Construction of Manseokjeong Reservoir</td>
<td>195,700</td>
<td></td>
</tr>
<tr>
<td>May 1796</td>
<td>20th</td>
<td>21st</td>
<td>946</td>
</tr>
<tr>
<td>1797</td>
<td>22nd</td>
<td>1,308,700</td>
<td>1,156</td>
</tr>
<tr>
<td>1798</td>
<td>Construction of Mannyeonjeong Reservoir</td>
<td>23rd</td>
<td></td>
</tr>
<tr>
<td>1798</td>
<td>Construction of Chukmanjeong Reservoir</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. RESERVOIR REGULATIONS

3.1 Simple Reservoir Regulations

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.

3 (Illegal cultivation, duty and punishment) - Local Chief should 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, 李冰), etc. were explained.
- Recommend for Local Chief and people to construct and maintain dams and banks to prevent the drought disasters.
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 th e 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 o ne-labour-per family of the district should be additionally mobilized. If more labours are re quired to complete the construction works, la bours from adjacent districts should be mobili zed.

8 (Relief works & construction works)
- Mobilization of labour shall be made according t o 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 tim e.
- In olden days, Chinese scholar such as Fânwen zhêng (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 fami ne to give food grain to the hungry people in his c hapter of relief work. We should follow the lessons

6 (Monk soldier mobilization)
- Monk soldiers shall be mobilized, because t hey depend on grain offerings from farmers f or 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 詢, 1037-1101, 北宋) gave monk license card s for their participation in the construction wor k of the bank for the West Lake (西湖).
- Mobilize monk soldiers as forced labour for t he 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.

9 (Compensation of canal site)
- Where irrigation canals are constructed, there a re many benefits and fewer losses, even if there i s land loss because of canal sites.
- Land owner may oppose canal construction beca use of the loss of his own farmland. In such cas es, construct canals according to law, but compen sate for his farmland to be included in the canal site.

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

10 (Use of trees, branches and stone for bank constructio n)
- Most of the large riverbed materials are usually sand, so bank will be easily destroyed in a small f ood.
- Large trees should be placed slant, entwine the m horizontally and then support them so that the y do not swing, like the shape of a house.
- There should be lots of stones at the bottom of t he bank, and if there are no stones, a lot of pine branches will be built up to prevent destruction d ue to overflowing water.
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 Sangyon (上元), he mobilized 1,000 workers and made a big reservoir, bringing good harvest year by year, and Fánwénzhèng (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.

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.

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 off an 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.

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

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CAK: Construction Association of Korea
CERIK: Construction & Economy Research Institute of Korea