

# Reclamation cooperation between the Netherlands and Japan from the Samurai period. Thoughts through Samurai dream and recent water disaster.

by **Kengo Okada**, CEO of RIPRO Corporation, Japan

Japan-Netherlands reclamation engineering history

## OUTLINE

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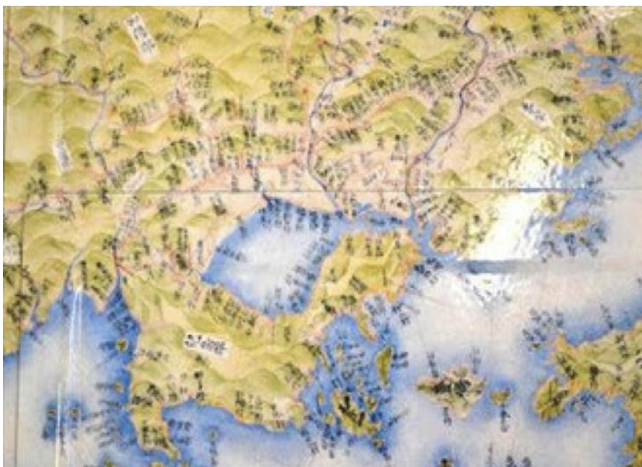
### 2. Sources and Images

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## SUMMARY

After the Meiji Restoration in 1869, the era of samurai and international isolation was at an end for Japan and Okayama Prefecture. Quick to embrace the advantages of Western technology, in 1872 the new Meiji government invited several Dutch civil engineers over to Japan. The ensuing collaboration between Dutch and Japanese experts gave birth to the foundations of Japan's modern erosion control techniques. The Dutch land reclamation plans were inherited and continued by successive generations of Japanese people; 140 years later



we still see the results beneath our feet every day. It has also protected many lives from the torrential storms of recent years. With great appreciation for Holland's technological aid and friendship we seek to preserve this story for future generations to hear.

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## 1.1 The Dutch Engineers

### 1.1.1 Antonie Rouwenhorst Mulder: A Plan for Okayama Land Reclamation (*April 28, 1848 - March 6, 1901*) (*1879-1890 in Japan*)



*Okayama during the Edo period*

*Post-reclamation of Kojima Bay (2020)*

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Mulder was a Dutch engineer and foreign advisor specializing in hydraulic engineering. He was born in Leiden, Kingdom of the Netherlands as the son of a tobacco trader. He obtained his degree in civil engineering in 1872 from what is now TU Delft. After his graduation Mulder served as a supervisor of water management on the River Waal at Herwijnen. However, after only one year, he was invited by Prince Henry, the son of King William II, to establish a trading post at the northern entrance to the Suez Canal, near Port Said in Egypt. Although his contemporaries advised against the venture, Mulder lived in Egypt from August 1873 to August 1876, and in time built up the post to include: the main house, a warehouse, a coal shed, a goods shed, service residences, two piers, the foundation for a water reservoir, and as a hotel. The trading post proved commercially successful but the venture was terminated with the unexpected death of Prince Henry in 1876.

Mulder returned to the Netherlands, where he built the Change Canal in The Hague as well as a steam-powered tramway in Haarlem. Mulder was then recruited by the Meiji government of Japan in late 1879. He was responsible for improving the course of the Tone [1], Kinugawa, Fuji, Yodo, and Sumida Rivers. He also became known, however, as a specialist in the redesign and improvements of ports and harbors. In addition to Port of Tokyo, where access had previously been hampered by large mudbanks, he also worked on ports in Okayama, Hiroshima, Hachinohe, and Shimonoseki.

After his contract expired in 1890, Mulder returned to the Hague. In 1897 he designed a system of steam-powered tram lines in Nijmegen. He died in Nijmegen in 1901.

### 1.1.2 Cornelis Johannes van Door: Working to Tame Japan's Rivers (January 5, 1837 – February, 24 1906) (1872-1880 in Japan)

Van Doorn was born on January 5, 1837 in Hall (Gelderland), Netherlands, the son of the Reverend P. W. van Doorn. Van Doorn studied at the Technical School of Dr. Grothe in Utrecht and then at the Royal Academy in Delft. He received his degree in 1860 as a civil engineer. In his early career, he went to Java in the Dutch



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East Indies, returning home in 1863 to work for the Maatschappij tot Exploitatie van Staatsspoorwegen railway company in North Holland. From March 1865 he worked as an engineer in designing the locks, pumping station, and dam on the IJ (Amsterdam).

In 1871 van Doorn was invited by the Japanese government to act as an expert in hydraulic engineering. Arriving in Japan on March, 24 1872, he would end up staying until July 22, 1880. During his time in Japan he was involved in port development and river improvement projects in Tokyo, Osaka, Yokohama, and Sendai Bay. He designed Japan's first western-style waterway, the Asaka Canal, which reclaimed land for 52 kilometers around Lake Inawashiro in Fukushima Prefecture and made the development of the city of Kōriyama possible. Returning to the Netherlands after eight years, van Doorn died in Amsterdam in 1906.

In the Netherlands not much is known about his efforts in Japan. In Japan on the other hand, his name is found in schoolbooks, there are museums dedicated to him, and streets and squares named after him. In 1931, for instance, a memorial bronze statue of him was erected



beside the sluice gate on the Tone River. Even Van Doorn's grave in Amsterdam is maintained at the expense of Japanese city of Kōriyama. In 2002 the Japanese government designated Ishii lock in Ishinomaki (designed by van Doorn and notably the first western-style lock in Japan) as

an Important Cultural Property.

### 1.1.3 Johannis de Rijke (December 5, 1842 – January 20, 1913) (1873-1891 in Japan)

In September 1873, de Rijke arrived in Japan together with Van Doorn and George Arnold Escher. During the next thirty years, these three civil engineers developed a range of flood control and water management projects. De Rijke contributed to port improvements in Tokyo, Yokohama, Nagasaki, Ujina (Hiroshima), Hakata (Fukuoka), Mikuni (Sakai), and Niigata. His breakwater at the port of Yokkaichi is recognized by the Japanese government as an Important Cultural Property. De Rijke also developed plans to improve the riparian zones of several Japanese rivers. Notably, he planned the separation of the Kiso River into the Kiso, Nagara, and Ibi Rivers near its drainage point at Ise Bay in Nagoya. It is also known as the Kiso Three Rivers (木曾三川 *Kiso Sansen*). In 1891 de Rijke was appointed as an Imperial officer of the Meiji Home Ministry where he rose to the position of Vice Minister in this Japanese government bureaucracy. He later served as an instructor in the Imperial College of Engineering.

### 1.1.4 George Arnold Escher (May 10, 1843 – June 14, 1939) (1873-1878 in Japan)



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The Meiji government employed George Arnold Escher as a foreign advisor from September 1873 to July 1878, contemporary with fellow Dutchmen de Rijke and van Doorn. During his stay in Japan, Escher designed and supervised the restoration of the Yodo River (Osaka) and built a harbor in Mikuni (Fukui prefecture). After returning to the Netherlands he worked in Maastricht. During this time he recorded in his diary his difficulty as a Protestant in finding a suitable marriage partner in Roman Catholic Maastricht who would also be able to satisfy his equation  $v = 1/2m + 10$ , where  $v$  was the age of the woman and  $m$  the age of the husband. In 1882, Escher married Charlotte Marie Hartitzsch, with whom he had two sons. One of which, Maurits, became the famous graphic artist M.C Escher. George Arnold Escher became a widower in 1885 and worked as a hydraulic engineer in Leeuwarden.

現デルフト工科大学出身者

氏名	在学期間	関連事項 ( )内は日本の資格
C. J. Van Doorn	1855 ~ 1860	Gew. Hoofd-Ing in Japan (長工師)
G. A. Escher	1859 ~ 1863	Hoofd-Ing V/d Waterstaat (1等工師)
A. F. L. Rouwenhorst Mulder	1867 ~ 1872	Gew. Hoofd-Ing Openbare Werken in Japan (1等工師)
A. E. Lindo	1867 ~ 1870	Exploitatie S. S. in N. I. (2等工師)
A. H. T. K. Thissen	1863 ~ 1870	Civiel-Ingenieur (3等工師)

H. J. VERHELLOUW [GESCHIEDENIS VAN HET DELFTSCH  
STUDENTENCORPS]1898年より作成



*Van Doorn, Escher, and Mulder's years of school enrollment and Japanese titles (far right)*

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## 1.2 The Japanese Counterparts

### 1.2.1 Denzaburo Fujita: Samurai-turned-Entrepreneur and Benefactor of Okayama (1841-1912)



Denzaburo Fujita was born in Yamaguchi in 1841 as the son of a brewer. At the end of the Tokugawa shogunate Fujita joined the Choshu feudal clan's exclusion movement and joined the irregular militia (*Kiheitai*). In 1869, when the Choshu clan abolished the Land Transport Bureau and disposed of artillery, rifles, shells, and bullets, Fujita purchased all of them and made a large profit by delivering them to Osaka. Fujita then started shoe manufacturing in the same year and ended up becoming an army supplier of all types of equipment. He made tremendous profit during the final war against the rebellious samurai (*Satsuma rebellion*) and finally founded his company, Fujita-gumi, in 1881. In 1884 the company purchased the Kosaka coal mine using Fujita's personal connections in government, and was ever after heavily involved in the mining industry. Fujita also participated in the founding of Osaka Textile and Osaka Sakai Railway, eventually becoming the de-facto leader of the Kansai industrial world and official head of the Osaka Chamber of Commerce. He was made a baron in 1911.

Of particular note is the reclamation project at Kojima Bay. This plan dated back to the days of the feudal Okayama clan and was partially begun before the Meiji Restoration. In the Meiji era the old clans tried to continue the project but were reliant on Fujita for capital and resources. Although Fujita had poor prospects for profit he took on the project anyway. Utilizing the plans drawn up by Mulder, the project finally began in 1889. However, due to local opposition, an economic recession, and a devastating flood, the first two sections of reclamation were not completed until 1913. Fujita-gumi finished the reclamation work for the first five districts by 1950, after which the Ministry of Agriculture and Forestry took over and completed the last two sections. In 1963 the Kojima bay project was completed, 65 years after construction began. In total 5,500 ha of the 7,000-ha bay were reclaimed and seven new wards were formed in Okayama.

As a result of Fujita's efforts villages built on reclaimed land in district two were named after Fujita. This remains as a ward name even after the village was later merged with Okayama City. In the Okayama City area Denzaburo Fujita is still often taught in elementary school classes as "the man who made Fujita village". He is recognized as a great benefactor of

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the area. The newly renovated Fujita History and Art Museum in Osaka will reopen in 2022.



*Fujita History and Art Museum in Osaka*  
[www.fujita-museum.or.jp](http://www.fujita-museum.or.jp)

### 1.2.2 Itsumu Takasaki (April 4, 1836 – May 6, 1896)



Okayama Prefecture is bordered to the south by the Seto Inland Sea. Along this coastline Okayama had a wide range of tidal flats suitable for land reclamation. Even before the Meiji period the amount of arable land had been gradually expanded by reclaiming these tidal flats. After the Meiji Restoration, Baron Itsumu Takasaki submitted a proposal for large-scale reclamation of Kojima Bay to the government, and sought an opinion from the Dutch engineer Anthonie Rouwenhorst Mulder. In 1881 the Ministry of the Interior, based on a field survey conducted by Mulder, planned to reclaim about 5,200 hectares from eight sections of the bay.

Takasaki requested that the Kojima Bay reclamation be implemented as a government project and receive a massive amount of public funding but was duly turned down. The project was subsequently tendered for private development and contracted by Denzaburo Fujita. Although development permission was granted to Fujita-gumi in 1889, due to numerous roadblocks including drainage problems, compensation for fisherman, economic recession, etc., the project was repeatedly postponed until construction began in earnest in 1899. Based on Mulder's plan, Fujita-gumi's advisory engineer, Ajiro Kasai, completed the first section in 1905 and the second section by 1912.

## 2. Sources and Images

Okayama Meisei Gakuin High School's *Mulder Research Book* and Okayama Prefectural Koyo High School Library

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**Okayama Meisei Gakuin  
High School**

Local sociology research club  
<http://www.meiseigakuin.ac.jp>

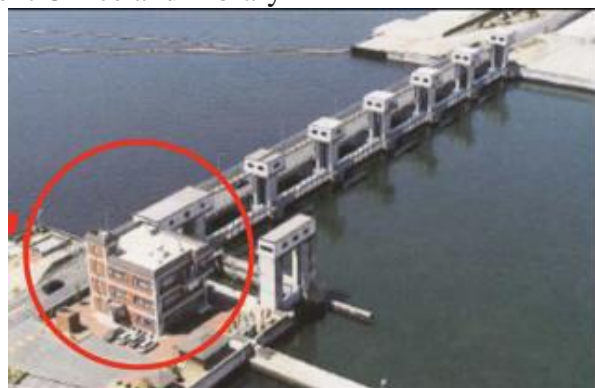
**Okayama Prefectural Koyo  
High School (est. 1946)**

Agricultural and technical  
history of the reclamation area



Photos of 20<sup>th</sup> century reclamation work from Koyo Okayama Prefectural High School Library

**Okayama City's Kojima Dam Management Office and Library**



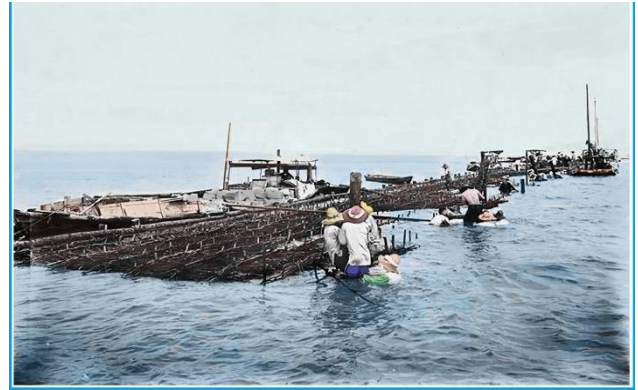
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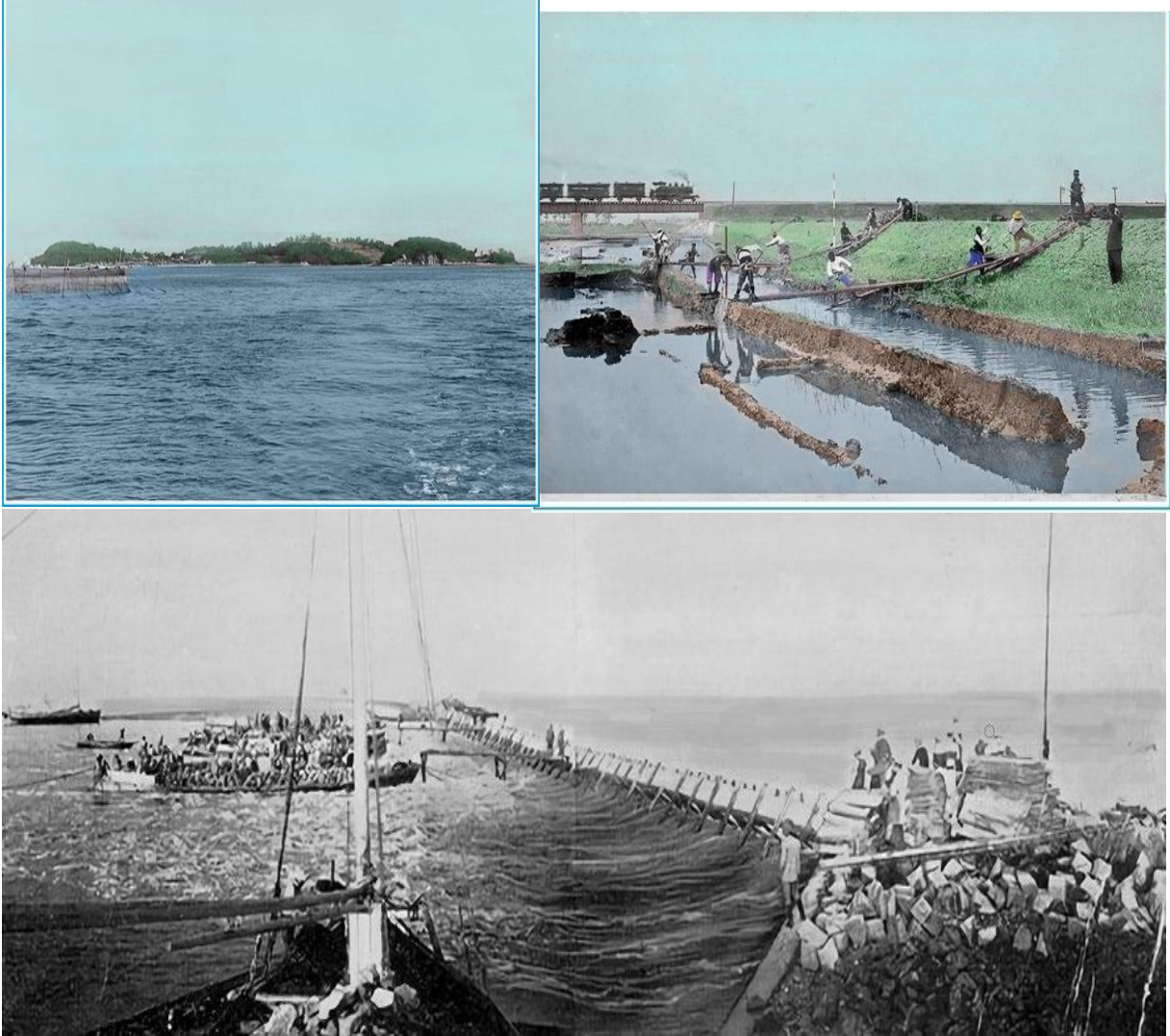
**Water channel, sluice, and dam construction (photos from around 1920-1940, courtesy of Okayama Prefectural Koyo High School)**



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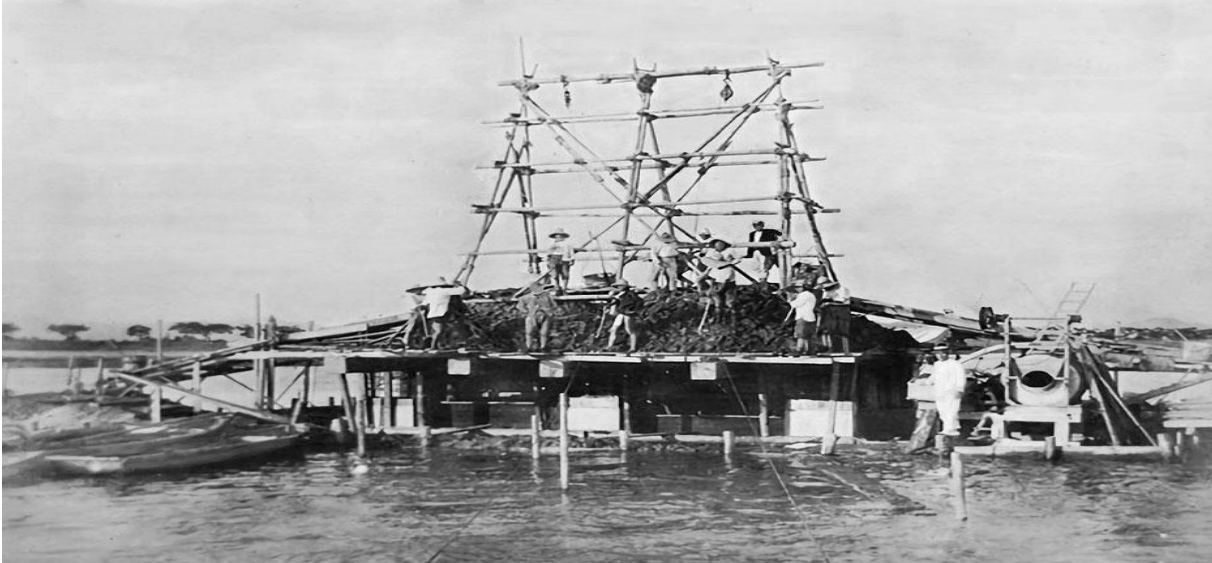
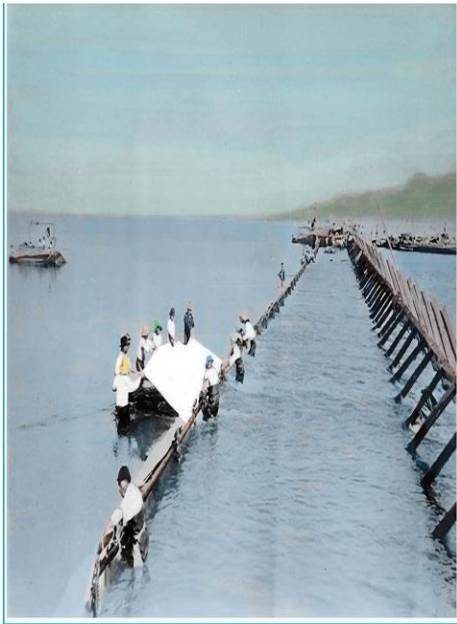
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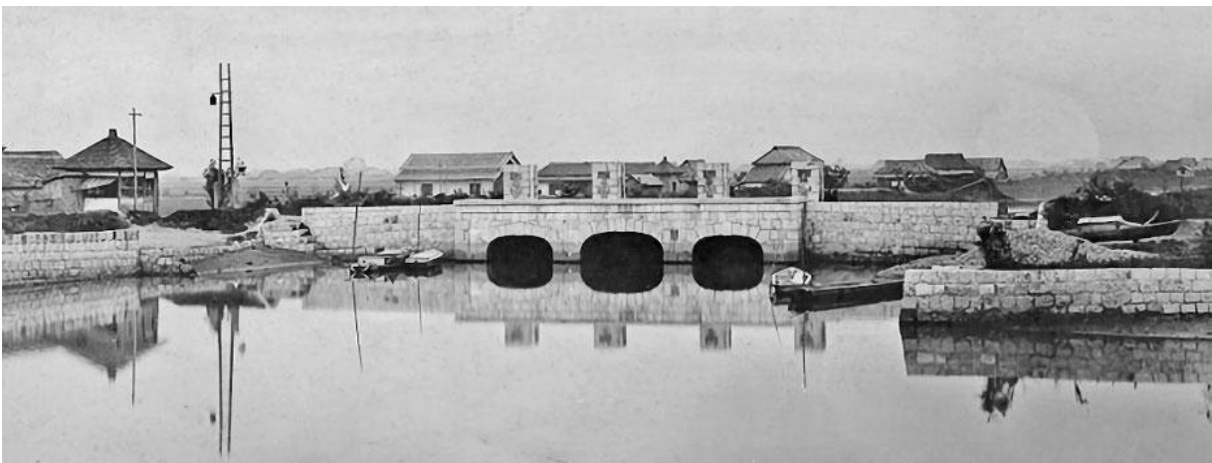
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**Economic development of the reclaimed land and the mechanization of Japanese agriculture**

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旭川のケレップ水制



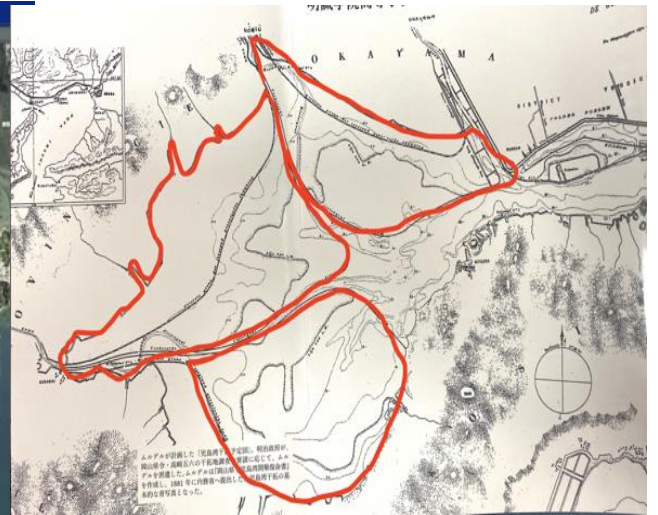
7区潮止め後の全景(備南農協所蔵)

Okayama now and then

2020



1892 Mulder Plan



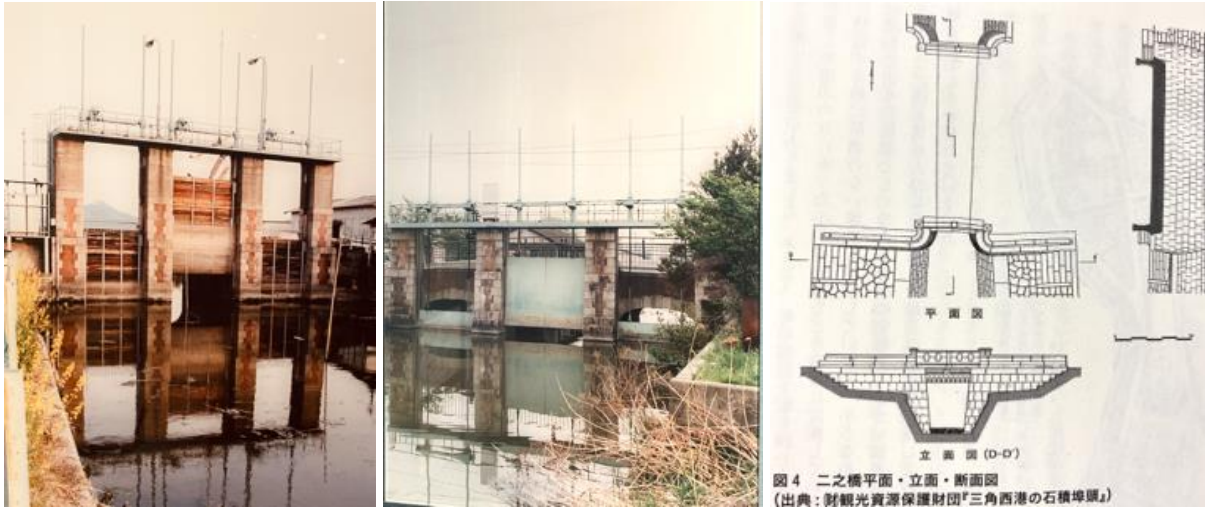
Even over 100 years later you can see how closely the reclaimed land in Kojima Bay resembles the Mulder Plan! Okayama stuck to the Mulder Plan through many decades of construction and land reclamation.

**Currently remaining Dutch-style channel gates that are still in use!**

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### 3. 2018 Floods in Western Japan and Okayama

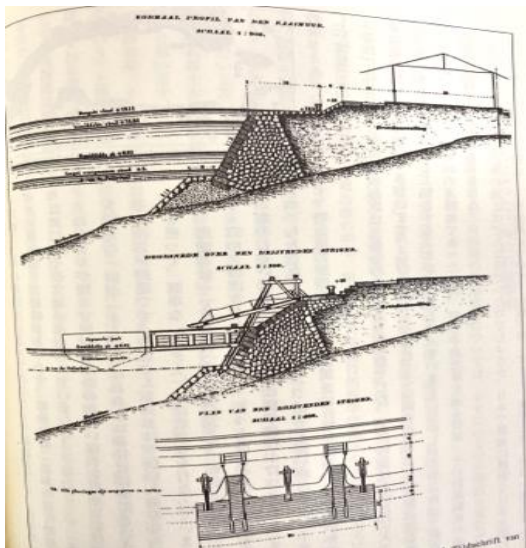
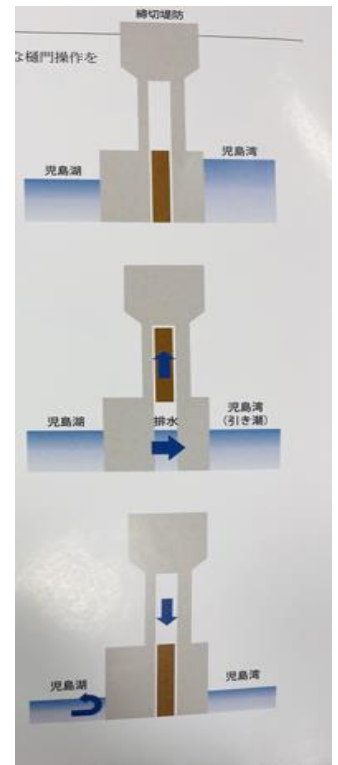
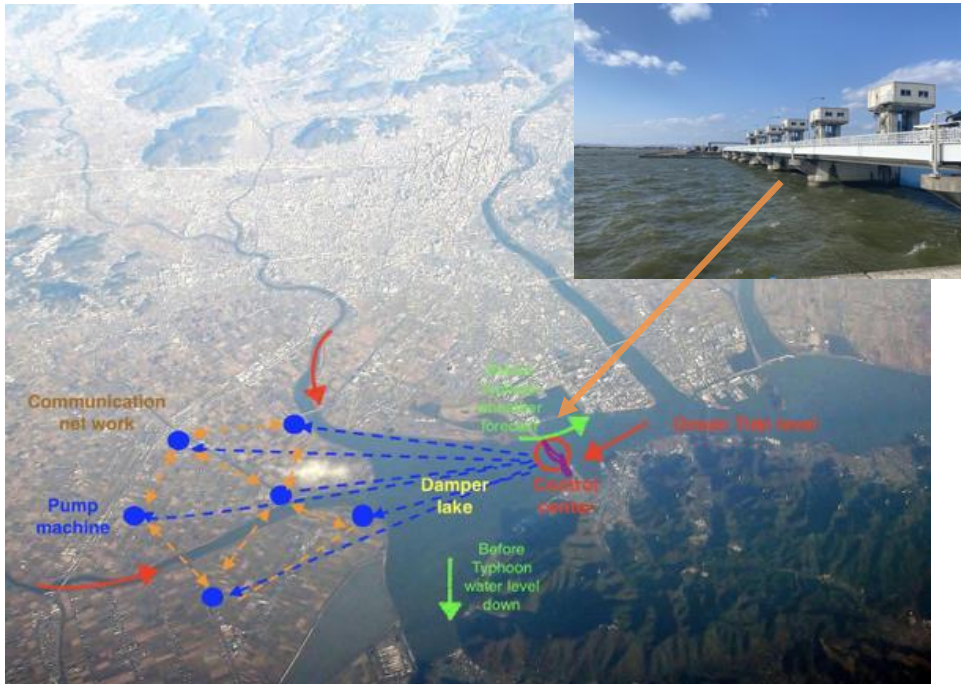
In 2018 regions of western Japan including Okayama Prefecture received over 500 mm of rain in one week, peaking at nearly 2000 mm in Kochi Prefecture. Of the three major rivers running through Okayama Prefecture from north to south the Takahashi River burst its banks, killing 64 people. For the other major rivers flowing through the land reclaimed by Dutch engineers there were no injuries or fatalities to the 600,000 citizens of Okayama City.

What was different about the reclaimed land areas of Okayama Prefecture that saved them from damage in the 2018 flood disaster? Primarily, it was the dams, irrigation ditches, and other water management installations which allowed them to weather the storm. Through the opening and closing of water gates the authorities managed to prevent flooding from the rapidly rising rivers.



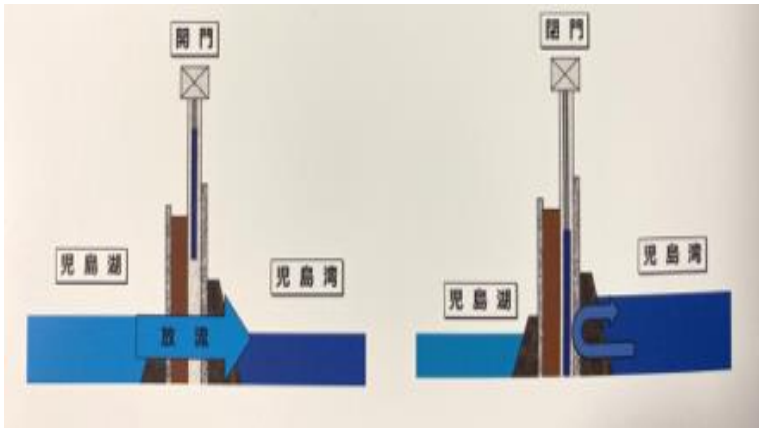
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Water control in Kojima lake (formerly Kojima bay)

#### 4. Continued Friendship with The Netherlands

Post-World War II, Professors Pieter Philip Jansen and Adrian Volker visited Okayama from TU Delft University in order to tour the dams in a sign of friendship. Japan has had a strong and peaceful relationship with the Netherlands ever since the end of the war. “When Professor Jansen and I visited Japan for the first time in 1954 we were very much impressed by the history of land reclamation in Japan and the projects that were under execution. One of those was Kojima Bay (Okayama) and we were glad to hear that about 80 years earlier a Dutch engineer, Mr. Rouwenhorst Mulder had worked together with his Japanese colleagues.”

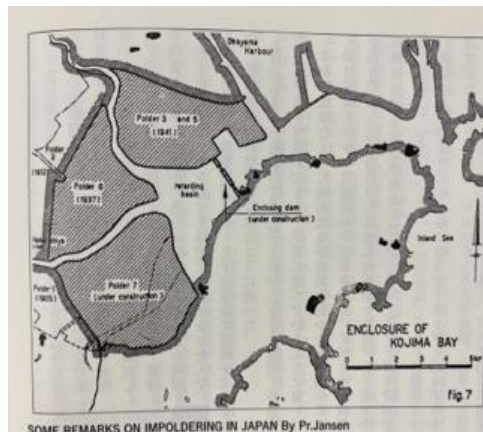
When Professor Jansen and I visited Japan for the first time in 1954 we were very much impressed by the history of land reclamation in Japan and the projects that were under execution. One of those was Kojima Bay (Okayama) and we were glad to hear that about 80 years earlier a Dutch engineer, Mr. Rouwenhorst Mulder had worked together with his Japanese colleagues.

Fijnacker, 2 september 1954  
 Helwim Volker

フォルカー先生のサイン



後楽園にて、フォルカー先生(左)とヤンセン先生(右) (1954.3.26 茶谷仁氏所蔵)



SOME REMARKS ON IMPOLDERING IN JAPAN By Pr.Jansen

#### RIPRO Corporation Information

RIPRO produces information stake markers protect us by marking our boundaries, monitoring earthquake and landslide activity, aiding in disaster recovery, etc. A comprehensive land protection system incorporates terrain interpretation by aerial photographs and satellite imagery, risk classification/map creation, and disaster situation planning.

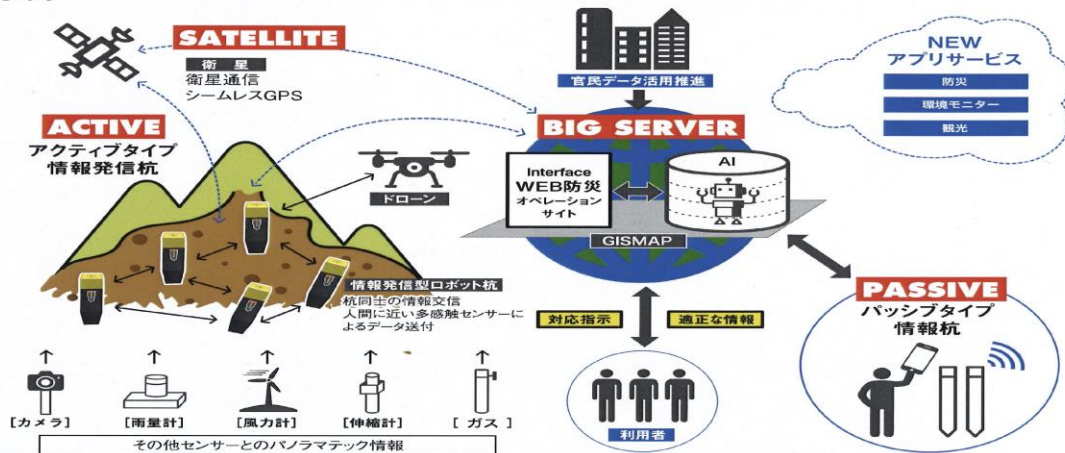
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**Thank you very much to The Netherlands!**

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