400th

オランダと日本の架け橋として——

オランダ人技術者の残したもの

2000

1900

Working as a bridge over Holland and Japan,—
Accomplished great achievements of the engineers coming from Holland

1800

1700

1600

日蘭交流400周年記念

Japan-Holland Interchange 400th anniversary

国際協力の先駆者

Pioneer of International Cooperation

治水工事を通して日本の近代化に貢献

明治維新後、日本政府は国の近代化を目指して、科学や工学の分野に新しい技術を導入しようと、諸外国から多数の外国人を招きました。J・デ・レイケとG・A・エッシャーもそうした外国人土木技師として、明治6（1873）年、オランダから来日しました。
以後、エッシャーは5年間、デ・レイケは30年間にわたって各地の土木事業に従事し、日本の近代化に欠かせないインフラ整備に貢献しました。

彼らが最初に取り組んだのは淀川流域の河川改修で、日本初の近代的河川工事と言われるものです。デ・レイケはこうした淀川水系の治水事業のほか、木曽川、庄内川、吉野川、多摩川など多くの河川の改修に携わりました。デ・レイケは、他のオランダ人技師が次々帰国する中で、一人日本にとどまり、安全な河川の実現を目指して情熱的に難事業に取り組み続けました。

一方、エッシャーは九頭竜川、鳥取県の千代川、信濃川など河川の改修のほか、賀露港や三国港などの港の改修設計、山形や福島県の道路や架橋計画、横浜市の上水道送水管の設計など多様な土木工事に携わり、帰国後は、日本に残ったデ・レイケに技術的な助言を与えるなど、本国から支援を続けました。日本の近代化に大きく貢献した彼らオランダ人技術者の活躍は、400年にわたるオランダと日本の交流史のなかでも、特筆すべきものといえましょう。

Contributed to the modernization of Japan through water governance work

After the Meiji Restoration, the government of Japan has set its direction for the modernization of the nation and tried to invite many foreigners from foreign countries to introduce the new technology in the area of science and industrial engineering. J. de Rijke and G. A. Escher came to Japan on 1873 (Meiji 6) from Holland assuch foreign civil engineers. Since that time Escher has stayed for five years and J.de Rijke has continued to stay for thirty years long in pursuance of working for civil engineering projects in eacharea of Japan, and contributed to buildup of infrastructures that have to be the must for the modernization of Japan.
The first confronted project of them were the improvement work of the Yodo River basin, which is called as the first modern river work of Japan. Started from this water governance work at the Yodo River basin, J.de Rijke has engaged in various river improvement projects of the Kiso River, the Syonai River, the Yoshino River and the Tama River. Aside from other Dutch en-gineer's returning home one by one, he separately stayed at Japan for the purpose to challenge difficult undertaking projects energeticallyaiming for realizing the safety river governance.
On the other hand, Escher have engaged in various civil engineering works such as port improvement designing of the Karo Port, the Mikuni Port, the road and bridge construction projects in Yamagata and in Fukushima, the designing of the waterline of Yokohama city waterworks, other than the accomplishments of the river improvement works at the Kuzuryu River, the Chiyo River in Tottori Prefecture, and the Shinano River. After hisreturning to his homeland he continued the contribution through his engineering suggestionssent to de Rijke in Japan from his country. The footsteps of such engineers invited from Holland shall deserve special mention in the interchange history between Japan and Holland lasting 400 years.

J・デ・レイケ
J.de Rijke

G・A・エッシャー
G. A. Escher

オランダ人技術者の足跡

The footsteps of the engineers came from Holland

1872 (明治5) 年
明治政府は、大阪築港と淀川改修のためにオランダ人技師ドールンを長工師（いまでいう技術長）として招聘する。
以来、ドールンは、大河川の改修とその水源の砂防事業に従事する。

1873 (明治6) 年
ドールンの要請により、第二陣の技師団としてデ・レイケ、エッシャー、チッセンの3名の工師と4名の工手がオランダから招かれる。
オランダ内務省土木局の新進河川技術者であったエッシャーは、自ら志願しての来日であった。
着任後、ドールン、デ・レイケ、エッシャー、チッセンの4名は、共同して淀川と大阪港の測量調査を行う。

1875 (明治8) 年
デ・レイケ、エッシャーは共同して淀川改修計画書を制作し、これを政府に提出する。
これによって、日本初の近代的河川事業として淀川修築工事が始まった。

デ・レイケの指導のもと、木津川支川の不動川に石積による砂防堰堤が施工される。
これが日本最古の近代堰堤とされ、「デ・レイケ堰堤」と呼ばれている。

1876 (明治9) 年
エッシャー、チッセンの両名は関東方面の事業を担当することになり、東京へ移る。エッシャーは、三国港の改修事業に着手し、以後、信濃川と新潟港の改修、山形県や福島県の土木工事の指導、横浜市の上水道送水管の設計などに取り組む。
一方、淀川に関する事業はデ・レイケが専任として行うこととなった。

1878 (明治11) 年
エッシャー帰国。オランダ内務省土木局に復職したエッシャーは、これ以降、日本に残ったデ・レイケに本国から支援し続ける。
デ・レイケの監修のもと、淀川修築工事の一環として淀川流域に砂防工事が施工される。また、デ・レイケの指導によって、草津川上流に堰堤がつくられ、現在は、「オランダ堰堤」と呼ばれている。

1880 (明治13) 年
技師のドールンが帰国。前後して、残っていた他のオランダ人技師たちも帰国し、デ・レイケだけが日本に残留する。松方内務卿が、不動川の砂防石積堰堤を視察。
デ・レイケ、京都に滞在していた天皇に、砂防及び河川改修の模型、図面をお見せする。

1884 (明治17) 年
デ・レイケの設計に基づき、東京の一部に日本初の洋式下水道が敷設される。

1887 (明治20) 年
木曽三川の改修事業に着工。

1889 (明治22) 年
デ・レイケの指導のもと、田辺義三郎の設計によって天神川に「総堰堤」が築造される。

1896 (明治29) 年
淀川の改良事業着手。

1903 (明治36) 年
60歳になったデ・レイケは、30年にわたる日本滞在に終止符を打ち、オランダに帰国。長年の功績に対し、日本政府から勲二等瑞宝章、オランダ政府からオランエナソウ章とオランダ獅子勲章が授けられる。

1913年 (大正2) 年
デ・レイケ死去。享年70歳。

1939年 (昭和14) 年
エッシャー死去。享年96歳。

1872 (Meiji 5)
The Meiji government invited the Dutch engineer Doorn as "Cyo-ko-shi", a chief engineer for the construction of the Osaka Port and the improvement work of the Yodo River. From this moment, he started his engagement for the large river improvement works and the Sabo (Erosion control) works of their water source areas.

1873 (Meiji 6)
By the request of Doorn, three chief engineers J. de Rijke, Escher and Thyssen were invited to Japan together with 4 engineers from Holland. Escher who was a budding engineer of river engineering at the Interior Ministry Engineering Bureau of Holland recommended his own person to be sent to Japan. After their arrival at Japan the four engineers Doorn, de Rijke, Escher and Thyssen started their research work in combination for admeasurement of the Yodo River and the Osaka Port.

1875 (Meiji 8)
De Rijike in cooperation with Escher have drawn up the project scheme of the improvement work for the Yodo River and submitted this to the government. This document pulled a trigger to start the improvement work of the Yodo River that was the first modern river project of Japan.

Under the instruction given by J. de Reijke, the stone masonry Sabo (Erosion control) aboideau bank has been constructed on the Fudo River that is the tributary river of the Kizu River. This is the oldest Japanese modern aboideau bank called "De Rijke aboideau bank".

1876 (Meiji 9)
Escher and Thyssen have moved to Tokyo as both were ordered to associate in charge of projects to be deployed at Kanto area. Escher have started to engage in the improvement project of the Mikuni Port, and after that he have contended with the improvement project of the Shinano River and the Niigata Port, direction of the civil engineering works at Yamagata Prefecture and at Fukushima Prefecture, and the designing of the waterline of Yokohama city waterworks. On the other hand, the project related to the Yodo River has been made to be supervised only by de Rijke.

1878 (Meiji 11)
Return home of Escher. After his reinstatement at the Interior Ministry Engineering Bureau of Holland, he continued his backup to de Rijke stayed in Japan from his country. Under the instruction of J. de Reijke, the Sabo (Erosion control) works have been carried out at the Yodo River basin as part of its improvement work. Also, an aboideau bank has been built up on the upper stream of the Kusatsu River, that is called nowadays as "Holland dam".

1880 (Meiji 13)
Return home of the engineer Doorn. Other Dutch engineers have also returned about that time, only de Rijke separately kept staying in Japan. Matsukata, the Secretary of the Interior Ministry made a visitation of the stone masonry Sabo (Erosion control) aboideau bank on the Fudo River. De Rijke made the presentation of maquette and drawings of Sabo and river improvement project to the emperor who has been staying at Kyoto.

1884 (Meiji 17)
Based on the design of de Rijke Japan's first and western styled waterworks system has been furnished.

1887 (Meiji 20)
Started the improvement work of the Three Rivers of Kiso.

1889 (Meiji 22)
Under the instruction of J. de Reijke by the design of Gisaburo Tanabe, the "Yoroi dam" has been constructed on the Tenjin River.

1897 (Meiji 30)
Started the improvement work of the Yodo River.

1903 (Meiji 36)
De Rijke after his 30 years stay in Japan became 60 years old and decided to return home finishing his life in Japan. For his years of contribution Japanese government awarded him a decoration of the order of the Sacred Treasure, Gold and Silver Star. The government of Holland awarded him a decoration of "Oran-ena-sou" and the "Holland Lion Insignia".

1913 (Taisho 2)
J. de Rijke died at age 70.

1939 (Showa 14)
Escher died at age 96.

オランダ人技師と琵琶湖

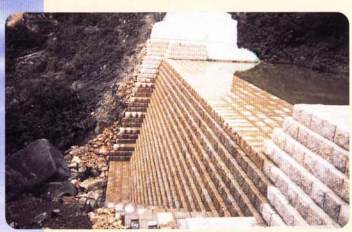
The Lake Biwa and the engineers came from Holland

淀川流域で行った治水工事とその影響

琵琶湖は、昔からしばしば洪水を引き起こし、流域の人々を苦しめてきました。そのため、先人たちは、琵琶湖、及び琵琶湖から流れ出る唯一の川・瀬田川をいかに治めるか、試行錯誤を繰り返してきたのです。瀬田川は、途中南郷村（現・大津市南郷）の辺りで川幅が狭く、水が流れにくい地形になっているうえ、雨が降るたびに禿げ山の田上山から大量の土砂が流れ込みそれが洪水の要因となっていました。流域の実状を調査したデ・レイケとエッシャーは、瀬田川上流の山林の保護を訴えるとともに、オランダの土木技術を駆使して各所に砂防堰堤をつくり、河川改修に力を注ぎました。こうしたオランダ人技術者の取り組みによって、淀川水系の治水安全度が向上していったのです。

Water governance works extended at the Yodo River basin and the influence

The Lake Biwa often triggered floods from ancient time and gave damages to the area. And thus, forerunners have worked out with considerable effort how to manage governing the LakeBiwa with its only one out flow, the Seta River by repeatedly making trial and error.
The Seta River has its geometric condition of narrow suffocating neck around the area at Nango village (Present Nango in Ohtsu City) and the volume of flow-in sediment has been dropped down whenever it rained from the Mt.Tanakami area where used to be the bald mountains, and such circumstances have easily generated rash of floods in these days. After finalizing their investigation of such conditions, de Rijike and Escher have started their action toward constructionof Sabo (Erosion control) dams in the key areas utilizing advanced engineering technology of Holland and carried out the river improvement work beside they persuaded to control destructive lumbering ofmountains at the upper stream of the Seta River. Such activities leaded by the Dutch engineers improved gradually the safety of water governance of the Yodo River basin.



▲日本とオランダの交流400周年を記念してつくられた新オランダ堰堤
The newly constructed Holland dam, which was build with the memories of Japan-Holland Interchange 400th anniversary

◀鎧堰堤
Yoroi dam
The word "Yoroi" means armor suits of feudal Samurai's weapon that is purposed to secure the body from external attacks. The name of this dam has been named after this episode.

▲木津川支川不動川の「デ・レイケ堰堤」
"De Rijke aboideau bank" on the Fudo River, a tributary river of the Kizu River.

◀明治13年４月松方内務卿を不動川の石堰堤を視察した時の記念写真
Commemorative photo of April 1881 when Matsukata, the Secretary of the Interior Ministry made a visitationof the Sabo aboideau bank on the Fudo River.

オランダ人技師が淀川水系流域で行った主な治水工事
Major water governance works at the Yodo River basin extended by the engineers came from Holland

1 淀川改修・淀川砂防工事
Improvement work of the Yodo Riber and Sabo works at the Yodo River basin.

大規模な浚渫工事を行うとともに、危険個所に防御工事を、支流の河川には砂防工事を施しました。
Beside a large scaled dredge work was carried out, protective measures have been executed on the dangerous points and the sabo works have been made on the tribunal flows.

2 天神川右支川の鎧堰堤
Yoroi dam on the right side tribunal flow of the Tenjin River

デ・レイケの指導のもと、日本人技師（田辺義三郎）によって1889（明治22）年につくられた石堰堤。
The stone masonry dam constructed by Gisaburo Tanabe, Japanese enginner under the instruction of J. de Reijke on 1889 (Meiji 22).

3 木津川支川不動川の「デ・レイケ堰堤」
De Rijke aboideau bank on the Fudo River, a tributary river of the Kizu River

デ・レイケが自ら考案したオランダ式工法16工種を用いてつくった砂防堰堤。約100年にわたってその役割を果たし、近年改修工事が行われました。
The Sabo aboideau bank constructed by de Rijke utilizing 16 types of Dutch engineering method of his own invention. Having been performed its role for 100 years long and recently made improvement work.

琵琶湖と淀川水系

The Lake Biwa and the Yodo River basin

●滋賀県の中央部に位置する琵琶湖は日本一大きな湖で、面積674㎢。

The Lake Biwa located at the center of Shiga Prefecture is the argest lake in Japan having its surface area of 674 ㎢.

●琵琶湖が誕生したのは、いまからおおよそ600万年前。世界で三番目に古い湖とされており、生息している固有種の魚は14種にものぼります。

The Lake Biwa was born in about 6 million years ago and is nominated as the third oldest lake in the world, where 14 indigenes species of inhabitation are counted.

若狭湾
WAKASA BAY

福 井
FUKUI

岐 阜
GIFU

●琵琶湖はつねに豊かな水をたたえた天然の大貯水池。滋賀県、京都府、大阪府、兵庫県に住む約1300万人もの人々に生活用水や工業用水、発電用水、など多目的に水を供給していることから、近畿の水がめとも呼ばれています。

The Lake Biwa forms a natural water reservoir storing abundant resource that is to be supplied to the habitants of approximately 13 millions of the area, S higa, Kyoto, Osaka and Hyogo prefecture as life water, industrial water and electricity generating water, so the lake is called as "Water Bearer of Kinki".

琵琶湖
LAKE BIWA

滋 賀
SHIGA

京 都
KYOTO

三 重
MIE

●淀川流域は滋賀、三重、奈良、京都、大阪、兵庫の2府4県にまたがり、面積は824㎢にも及びます。

The Yodo River basin is expanded to six prefectures covering Mie, Nara, Kyoto, Osaka and Hyogo and the width of its area is reached to 8,240 ㎢.

●四方を山に囲まれた琵琶湖には、大小121本もの川が流れ込んでいます。

From the four side surrounding mountains various 121 rivers are pouring into the Lake Biwa.

桂川
宇治川
瀬田川
木津川
淀川
猪名川
神崎川
寝屋川
安治川

兵 庫
HYOGO

大 阪
OSAKA

大阪湾
OSAKA BAY

●淀川沿川流域は早くから開け、古来より淀川は水上交通路として重要な役目を担ってきましたが、現在では上水道をはじめ発電・潅漑等多くの目的に利用されています。

The Yodo River basin has been developed from the daybreak of the history and functioned as important water transport for long. Currently it is utilized as resource of water supply system for many purposes such as civil water, power generation and irrigation.

●琵琶湖から流れ出る川は瀬田川1本だけ。瀬田川は京都府に入って宇治川となり、京都府の山崎付近で木津川、桂川と合流。淀川となって大阪平野を西南に貫き、下流部で神崎川・大川を分流して大阪湾に注いでいます。

The out flow river from the Lake Biwa is the Seta River only. This river changes its name to the UziRiver in Kyoto prefecture, which is combined with the Kizu River and the Katsura River around Yamazaki, Kyoto then forms the Yodo River to flow down the Osaka plain to the southwest direction. Then it pours into the Osaka bay in combination withthe Kanzaki River and the Okawa River.

砂防工事における創意と工夫

Sabo works of ingenuity

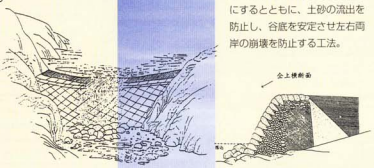
デ・レイケは、オランダの土木技術をそのまま日本の河川に当てはめるのではなく、日本古来の工法も積極的に取り入れ、その土地、その土地の立地条件に合わせた独自の砂防工法を考案しました。
新しい工法の創案に当たっては、エッシャーが技術面で助言したと伝わっています。

The work method applied by de Rijke were not simply adopting the methodology of civil engineering technology brought from Holland to Japanese rivers, but he introduced the traditional method positively and created his original methodology of sabo engineering which is best match to the location and geographical conditions of the site.
For such invention of engineering technology, it ismentioned that Escher gave him a great help from the technical aspect.

■オランダ式工法16工種

16 types of Dutch engineering method

1. 割石堰堤
   Aboideau bank made of macadam
2. 野面石堰堤
   Aboideau bank made of natural stone
3. 土堰堤
   Aboideau bank made of sand
4. 水筋柴工土堰堤
   Aboideau bank made of sand with water pass supported by lattice netting
5. 水筋石工土堰堤
   Aboideau bank made of sand with water pass supported by masonry stone
6. 柴工堰堤
   Aboideau bank made of netting lattice working of brushwood
7. 連束藁網工
   Jointed straw netting work
8. 棚止連束藁工
   Shelf stopping jointed straw netting work
9. 棚止連束柴工
   Shelf stopping jointed lattice netting work
10. 根石垣工
    Root stone masonry work
11. 棚止堰堤
    Shelf stopping aboideau bank
12. 土俵止工
    Sand straw bag stoppage work
13. 土俵止根固工
    Sand straw bag stoppage work with hardened base
14. 積苗木工
    Nursery tree lading work
15. 苗木植付
    Nursery tree planting
16. 柴工護岸
    Bank protection with lattice netting

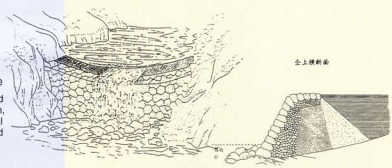


割石堰堤

渓流に設置する堰堤で、堰堤により雨水を貯留して山地を湿潤にするとともに、土砂の流出を防止し、谷底を安定させ左右両岸の崩壊を防止する工法。

Aboideau bank made of macadam

An engineering work method to settle an aboideau on the mountain stream that hold rain water and gives humidity to the area and stableness to the valley. It protects flow out of sediment and fall down of the hillside slope on the both side of the valley.

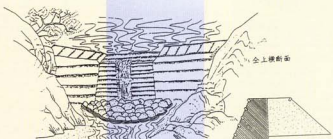


野面石堰堤

渓流の中に散在している石材をそのまま使う点を除いては、割石堰堤と同じ工法。

Aboideau bank made of natural stone

The same method with the method of aboideau bank made of macadam, except the point that uses the natural stone in the mountain stream instead of macadam.

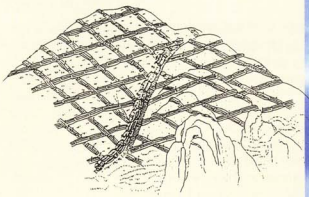


土堰堤

小さな谷筋や山腹の凹部へ設置する堰堤で、流れ下ってくる土砂を堰堤の上流部に堆積させ、下部渓流の河床の低下を防止する工法。

Aboideau bank made of sand

This is an aboideau bank to be settled on the mountain stream or the recessed surface on the mountain slope to hold the falling down sand on thew upper side of this to protect the depth of the river bed lower stream become shallow.

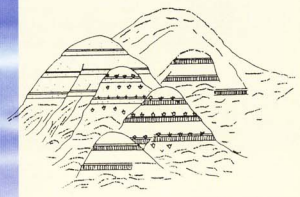


連束藁網工

崩壊しやすい斜面より落下する土砂を防止するとともに、連束藁に雨水を含蓄させて山地を湿潤にする工法。日本の伝統的な工法である「柵留連束藁工」をもとに、本国にいるエッシャーの助言を受けて作りだしたもの。

Jointed straw netting work

Provided to prevent the sediment from sliding down on the slope where the sediment crumbles easily as well as to make mountains wet by impregnation of rainwater with straw layers.This is created on a basis of the Japanese traditional technique "Terracing works with straw" in addition to Escher's advise in his native country.



積苗木工

土砂の流出しやすい斜面に設置し、土砂の落下を防止するもの。

Nursery tree lading work

Provided to prevent the sediment from sliding down on the slope where the sediment discharges easily.

デ・レイケが警告した山林保護の重要性

Importance of forest conservancy warned by de Rijke

デ・レイケが砂防において、いかに山林保護を大切に考えていたかを伝えるエピソードが残されています。

明治14年1月、デ・レイケは木津川、宇治川等の流域へ行った時に南桑田郡亀岡町(現・京都府亀岡市)あたりの山がすべて禿げ山となっていたのを見たデ・レイケはひどく嘆き、途中で木こりにあうたびに、彼らが担いでいる薪炭をにらみつけては山肌を覆うのに必要な樹木を乱伐していると激しく役人を責め立てた。また、沿道の人家の戸の前に薪が積み上げられているのを見てしきりに嘆くので、役人は、これを見るに忍びず、デ・レイケを茶店で休憩させておいて、その間にこっそり薪を隠させたという。

The episodes are brought down telling us that how respectfully de Rijke thought the forest conservancy.

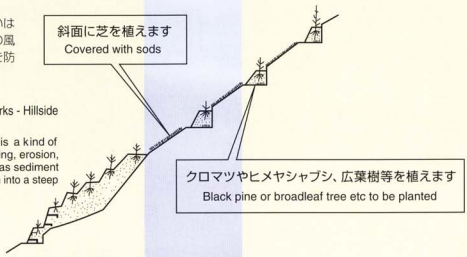
One of his episodes,it is heard, when he went to see the Kizu River and the Uji River basin (area of current Kameoka city, Kyoto Pref.) in January 1881, he was very disappointed to see all the surrounding mountains that had been bare mountain. On the way,whenever he met a woodcutter who shouldered a bundle of coppice,de Rijke glared it. Then he strongly blamed an officer for their \destructive lumbering of woods necessary to cover the mountain surface. And he also lamented frequently to find piles of coppicein front of each house along the route. The officer was affected to see it and had let habitants hide away coppice while leaving de Rijke to rest at a teahouse.

代表的な砂防工事―山腹工

山腹工とは、とくしゃ地あるいは崩壊地に植生を導入し、表土の風化、侵食、崩壊や土砂の流出を防止するための工法。

Typical Sabo (erosion control) works - Hillside slope vegetation works

Hillside slope vegetation works is a kind of constructions to prevent weathering, erosion, and crumbling of topsoil, as well as sediment discharge by introducingvegetation into a steep slope or a crumbled slope.



日本の近代に生かされたオランダの技術

Technology of Holland utilized into modernization of Japan

オランダ人技師たちは、進んだ西洋の土木技術を生かして日本各地でさまざまな事業に取り組みました。こうしたオランダ技師団の活躍の足跡は随所に残っており、三国港の弧形突堤のように、いまもなお現役で役割を担っているものもあります。
これらは、オランダと日本との交流の歴史を物語る記念碑ともいえましょう。

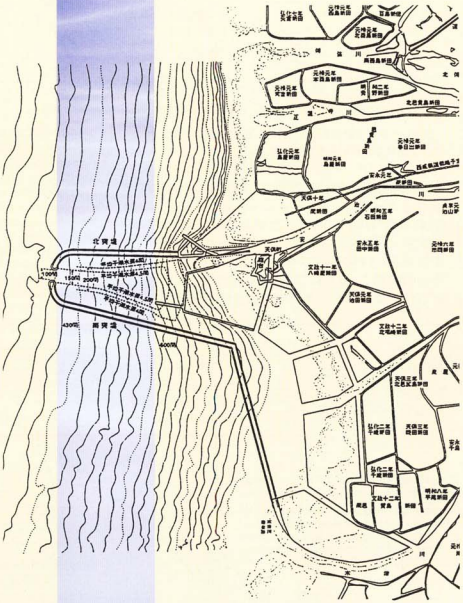
Hollander engineers were engaged in various works in various locations across Japan by utilizing European civil engineering techniques. The traces of activities of such Hollander engineers still remains at every place, some of which have been playing a role in active service such as at arc-jetty of Mikuni port.
Each of them may represent a monument that tells us the history of interchange between Holland and Japan.

大阪港の計画設計

明治初期、日本で最大の商都として栄えていた大阪の港は、安治川河口から3キロメートルも上流に遡ったところにあり、外国の大型蒸気船は入港できませんでした。
このため近代的な港の築造にのりだしたのです。デ・レイケは、淀川改修事業が一段落したのち、時の大阪府知事建野郷三の要請を受け、大阪港築港計画に取り組みます。
1894（明治27）年に『大阪湾築港計画書』を提出しました。

Design planning of Osaka Port

Osaka port had not allowed foreign large steamships to enter into the port due to its location 3 km upstream of the mouth of the Aji River, thriving as the largest mercantile city in Japan in the period of later of 19th century. For this solution, the construction of a modernport had been started. De Rijke had approached about design planning of Osaka Port requested by Gozo Tateno, the governor of Osaka pref. at that time, after settled forthe time being of the Yodo River improvement work project.
He submitted the "Design Planning of Osaka Port" in 1894 (Meiji 27).



▲1894（明治27）年にデ・レイケが作成した『大阪湾築港計画図』
"Design planning of Osaka Port" drawn by de Rijke in 1894 (Meiji 27)

木曽三川の改修事業

木曽川・長良川・揖斐川の完全分離、洪水の防御、停滞する水を流して舟運を確保するという3つの目的のために行われた大改修で、調査、計画、設計のすべてをデ・レイケが担当しました。

1887（明治20）年から1912（大正元）年まで、25年を要した一大事業で、これによって今日の木曽川の姿となったのです。

こうしたことから、デ・レイケは、「今日の木曽川の基礎をつくった人」とも称されています。

Improvement work project of three rivers of Kiso

This was a big project that were intended to realize three purposes: the perfect separation of the Kiso River, the Nagara River, and the Ibi River, the prevention of flood, and the availability of water transport by flowing the stagnated water; of which investigation, planning, and designing are totally organized by de Rijke.
This was a major work taken for 25 years from 1887 to 1912, resulting to the current aspect of the Kiso River.
From such history, de Rijke is called to a "Creator of foundation of the current Kiso River".

▲木曽川下流
The downstream of Kiso River

三国港の改修事業

1.三国港口に弧形の突堤を築き、河流を導流して土砂の堆積を防ぐ、西風を防ぎ船舶の出入りを容易にする
2.内港では、武田川の流勢を復活させ、九頭竜川右岸の水深を維持する
3.九頭竜川河口左岸にT字水制を設置し、航路を維持する

という3つの目的で行われた改修で、エッシャーが1876（明治9）年に計画を立て、エッシャーの帰国後はデ・レイケがその事業を受けついで工事指導を行いました。
このとき築造された突堤は、現在も防波堤、導流堤としての役割を果たしています。

▲現在の三国港
Present Mikuni port

Improvement work project of three rivers of Mikuni Port

This was an improvement work planed by Escher in 1876 (Meiji 9) for following three purposes:
1. Building the bow shaped jetty to guide the river flow to prevent sedimentation intercept the window blow from west to ease the traffic of vessels in the port.
2. Restore the stream force of the Takeda River inside the internal port to maintain the depth of the right bank of the Kuzuryu River.
3. Settle the "T" shaped crib on the left bank of the Kuzuryu River to maintain the smooth trafic of the vessels.

After Escher returned to his country, de Rijke followed this project and led to complete this work. The jetty constructed at that time has been playing its role even today as a breakwater and a guidewall.

オランダ人技術者の功績

Accomplishments of the engineers coming from Holland

日本が鎖国をしていた江戸時代、オランダは日本と西洋をつなぐ唯一の窓でした。幕末まで、欧米の知識や技術はすべてオランダを通じて伝えられ、これが医学をはじめとする自然科学の分野での学問の発展に大きな役割を果たしました。明治維新後に来日したデ・レイケやエッシャーらオランダ人技術者もまた、日本に多くのものを伝え、その近代化に貢献しました。

During the Yedo period when Japan has closedits gate to the world, only one window opened to the western world was Holland. Up until the end of this era all the western technology and knowledge have been transported through Holland, that played a greatrole for the development of medical science and natural sciences. The engineers as J.de Rijke and Escher,came from Holland to Japan after Meiji reformation also transferred many to Japan and havecontributed to the modernization of Japan.

国際協力の先駆者として

デ・レイケやエッシャーは、技術者として事業に携わるだけでなく、「砂防攻略図解」「砂防略述」などの著作を著して、日本人技術者を指導しました。

またエッシャーは、日本に残ったデ・レイケに本国から最新の「構造物の安定計算方法」を教えるなど、デ・レイケの活動を支援し、その活動を助けています。さらに、デ・レイケは砂防などを行う際、オランダのやり方をそのまま踏襲するのではなく、日本の実状に合わせ、また日本に伝わる方法の良いところを取り入れて新しい工法を編み出しています。

このように、オランダ人技術者の活動は、技術協力に行った先の国が自立していけるようその国の指導者を育てる、現地に派遣された技術者を本国から支援する、相手の国の実状に合わせた支援策を考える、というもので、現代の国際協力のあり方にも通じるものです。

いわば、彼らは国際協力の先駆者ともいえるのではないでしょうか。

▲デ・レイケ直筆による古文書（1873年）とその翻訳本
De Rijike's original handwriting old book (1873) and its translation.

Accomplishments of the engineers coming from Holland

Not only simply carried out the works in the engaged projects the engineers, de Rijke and Escher have authored their books such as "Sabo Koryaku Dukai", an illustrated guidance of Sabo technology and "Sabo Ryakuiyutsu" Summary of sabo technology to nurse following Japanese engineers.Moreover, Escher helped the activities of de Rijke in Japan from his homeland such as to coach him the most advanced " Stable calculation method of structure" When de Rijke executed the engaged Sabo project, he have not just simply adopted the methodology of civil engineering technology brought from Holland to Japan, buthe introduced the good points of traditional method positively and created his original methodology of sabo engineering which is match to Japanese conditions. As such the methods taken by the Dutch engineers were nursing the leaders of the relative country of their assignment in order that they canstand alone, assisting the technician stayed at his assigned country from his homeland, and considering, creating the backup method that is suitable to the actual conditions of the assigning country, that are the common method to today's international cooperation activities. In this sense, it might bementioned that they were the pioneers of the international cooperation activities.

▲デ・レイケの指導のもと、日本人技術者田辺義三郎によって設計された草津川上流の「オランダ堰堤」
The "Yoroi dam" constructed on the upstream of Kusatsu River by the design of Japanese engineer Gisaburo Tanabe, under the instruction of J. de Reijke.

科学的、合理的な事業計画

例えば河川改修を行う際、日本のそれまでの経験的、即地的な計画に対して、オランダ技師団は、まず綿密な現地視察を行ったあと、測量の実施、距離標の設置、地図や水路図の作成、水位、流量観測などの科学的な資料をもとに検討し、さらに経済性を考慮した上で河川計画を立案しました。このような科学的・合理的な事業の進め方は、それ以後の日本の土木事業に大きな影響を与えました。

Scientifically and rationally planned project

For example, to the start up of river improvement project, it has been traditionally carried out in Japan to fit the need of the moment, at the site, on the ever-obtained experiences. But the Dutch engineer delegation carried out it very logically to set up the project economically after executing minute field investigation, taking a metrical survey, putting distance indication plates, making up of maps and hydrographic chart. Such scientific and rational way to carry out the project gave a great influence to Japanese civil engineering project after that.

建設省近畿地方建設局 琵琶湖工事事務所

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