

Nomination form of heritage irrigation structures

1. Details of irrigation structure nominated

- (a) Name: Inaoigawa irrigation canal
- (b) Year of commissioning: Since 1859 (Ansei 6, Edo Period)
- (c) Area irrigated (or area drained for drainage structures): 5,253 ha
- (d) Geographical coordinates: Lies at 40.59 ° north latitude and 141.09 ° east longitude
(Inaoigawa irrigation canal Headworks)
- (e) River basin where located: Sanbongihara area (left bank of Osaka River)
- (f) Name of the nominating national committee: Japanese National Committee of ICID

2. Management details of the nominated structure

- (i) Ownership (include both the owner and the management body if they are different)
 - a. Name of organization: Owner: Ministry of Agriculture, Forestry and Fisheries (MAFF),
Inaoigawa irrigation canal Land Improvement District
Management: Inaoigawa irrigation canal Land Improvement District
(under commission)
 - b. Address: 1-36, Inaoi-cho, Towada City, Aomori (Inaoigawa irrigation canal Land Improvement District)
- (ii) Person in charge and contact: Abe, Inaoigawa irrigation canal Land Improvement District
(Tel: 0176-23-5066)
- (iii) Present source of fund for operation and maintenance of the nominated structure: Fees charged by Inaoigawa irrigation canal Land Improvement District

3. Description of the overview and features of the nominated structure

Towada City, the fourth largest city and one of leading rice producers in Aomori Prefecture has developed through agriculture. "Inaoigawa irrigation canal" which serves as the lifeblood of agriculture in the city was created by the efforts of many people involved in the Sanbongihara reclamation project covering Inaoi-cho, a central area of the city, at the end of Edo Period (Sanbongi is the former name of the area including Towada City).

Sanbongihara was an alluvial fan covered with volcanic ash generated from the eruption of Mt. Towada (at Lake Towada) and a desolate plain with few fields. The volcanic ash impaired the soil's ability to retain water, resulting in immediate seepage of rainwater into the ground. Therefore, there were few trees which blocked summer sunlight. In summer, "Yamase wind" from the Pacific Ocean (cold and wet northeast wind brought by a high-pressure system over Okhotsk Sea) caused cold weather damage to agricultural products, and in winter, "Hakkoda Oroshi" (cold and dry northwest wind) blew up snowstorm. Sanbongihara had too severe conditions for human to live in.

The primary reason why a vast plain of Sanbongihara had few fields was that rivers running in the surrounding area lay at lower altitudes. People could not use river water sufficiently in areas at higher altitudes than rivers. They reclaimed small fields in lowlands along the rivers or in highlands relying on spring water. Tsuto Nitobe, a samurai of Nanbu Clan regretted it was a national loss that such a vast plain was hardly used as agricultural land. He had a grand vision of large-scale reclamation of Sanbongihara to take water from Oirase River^{*1} and newly construct a canal system reaching to the Pacific coast so that people ran farming in a vast highland. However, the highest place in Sanbongihara was 30 meters higher than Oirase River. The only way to take water was to build an intake in the upriver and build a canal through a tunnel weir^{*2} to Sanbongihara.

Tsuto Nitobe decided to put his plan into action and, in September 1855 (Ansei 2), launched a large-scale

Tsuto Nitobe decided to put his plan into action and, in September 1855 (Ansei 2), launched a large-scale reclamation project in Sanbongihara in cooperation with like-minded merchants. In the project, two tunnel weirs including Kuradeyama weir (1,412 ken or 2,540 m from Kumanosawa to Yagami) and Tenguyama weir (900 ken or 1,620 m from Horyo to Dannodai) and a land weir ³(3,980 ken or 7.2 km from Yagami to Sanbongi) were bored through. In the course of the project, Tsuto was assigned to Kanjo Bugyo (an accounting officer) and ordered to work in Edo. Instead of him, under the command of Jujiro Nitobe, a son of Tsuto, water was passed through the canal on a trial basis on April 24, 1858 (Ansei 5), but part of the canal were broken. After repair work, on May 4, 1859 (Ansei 6), about four years since the start of project, water was successfully taken to Sanbongihara.

In 1860, the canal was named “Inaoigawa irrigation canal” by Lord Toshihisa Nanbu and is familiar to people under the name.

Irrigation of Sanbongihara was successfully completed, but it was found that the canal was not supplied with sufficient water to pass it to the Pacific coast. Accordingly, the 2nd water-taking plan was developed under the initiative of Jujiro Nitobe. Jujiro planned to build an intake in the further upriver, dig three tunnel weirs and have an additional canal meeting Inaoigawa irrigation canal. He believed that this would increase river water and that more tributaries up to the Pacific coast would be supplied with water. His plan included the Lake Ogawara reclamation project such as excavation work on Mutsu Canal (a canal running from Lake Ogawara directly to Mutsu Bay) and other reclamation projects covering Noheji, Tanabu, Shimokita and Ohata areas. In 1866 (Keio 2), tunneling work was started from the north side of Kuradeyama tunnel weir, but had not been completed because of the chaotic times of the Meiji Restoration in addition to death of Jujiro. The 2nd water-taking plan was taken over as a national reclamation project and finally accomplished.

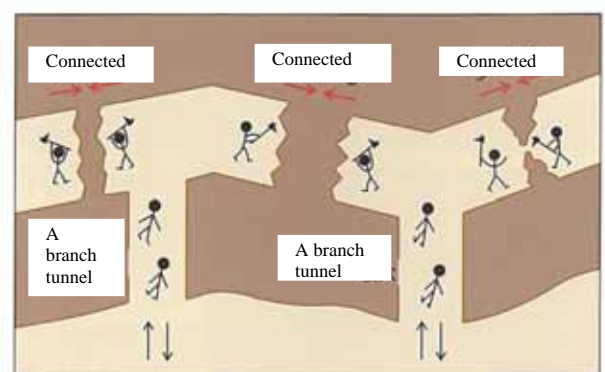
“Inaoigawa irrigation canal,” the water of life, has been gaining renewed attention as a community asset. It was selected as one of the best 100 canals in Japan by the MAFF and ranked at the top in the general poll for selection in 2006. In 2011, the river was registered as the 3rd Project Heritage for the Future of National Federation of UNESCO Association in Japan and, in 2013, selected as a Civil Engineering Heritage of Japan Society of Civil Engineers. Farmers, local residents and relevant organizations such as National Federation of Land Improvement Associations are working together to take new operation and maintenance measures for the canal. Inaoigawa irrigation canal is beloved by people in the community and handed down to the present generations as a structure which recalls achievements of predecessors.

^{*1}Water taking ^{*2}A canal tunnel ^{*3}A canal constructed by digging the ground

4. Justification for nomination

The history of Inaoigawa irrigation canal goes back to the time of reclamation by the three generations of Nitobe more than 160 years ago. In the times, most civil engineering works in Japan depended heavily on foreign engineers. But, it is significant that Nitobe reclamation project was carried out primarily by “Nanbu tsuchikatasyu,” a group of construction technicians and completed by Japanese techniques only. According to a record, the project costed Nanbu Clan 165,000 ryo (currency unit in Edo Period) and 220,000 man-hours.

The Nitobe project had many difficult hurdles requiring high technical capabilities to overcome such as construction of two tunnel weirs and a land weir which required embankment and cut earth.



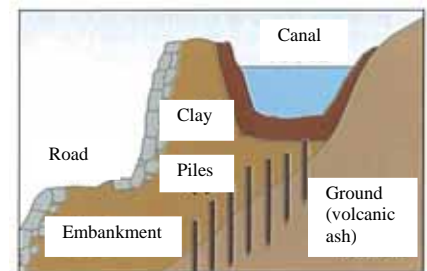
Excavation of a tunnel weir

In 1852 (Kaei 5), Tsuto Nitobe conducted land survey with five technicians including surveyors and

construction workers (a tunnel builder). Particularly in building the tunnel weirs, Tsuto arranged a “group of tunneling workers” having the most excellent special techniques in the Domain and carried out construction in an extremely organized manner. From the level, the Azimuth instrument and the rope measure used at that time, it is considered that the technician group used traverse calculation using Hassen table (a Japanese style of trigonometric function table).

The two weirs, a fundamental of the reclamation project were dug through completely with man power at a cost of 2,500 ryo. The total length of Kuradeyama tunnel was 2,540 m and that of Tenguyama tunnel was 1,620 m. According to a record, branch tunnels were used in the tunneling work. Kuradeyama tunnel had 16 branches and Tenguyama tunnel had 10. These branch tunnels were dug through individually to be connected and completed as tunnel weirs. The weirs at that time had an extremely winding structure. They have undergone a renovation to be a linear structure with lining concrete.

The embankment section has “Itakozuka” constructed by a “single-sided hill” method. It is a hill built on the single side of a mountain slope to construct a canal on the upper area of the mountain. The mountain’s soil with high content of volcanic ash made it impossible to dig tunnels like Tenguyama and Kuradeyama. Accordingly, the “single-sided hill” method was adopted, but the ditch had two meandering points side to side. The ditch was a hurdle in the project as said in a record that it had leakage in five out of six water passage tests.



Canal construction method used at Itakozuka (imagined)

In the cut earth section, on the other hand, Kyonodate was the most difficult part in construction. Kyonodate was located at higher altitude than the surrounding area and the canal needed to be built by digging the ground about 10 m deep. A record says that it was particularly difficult to maintain the gradient in the Kyonodate section and that took seven months for adjustment of the gradient. In the section, 300 workers at the maximum were engaged in construction at a time. The section required the largest number of workers in the reclamation project. Workers had to carry large amount of sand and earth to the ground from the canal deep under the ground. Hardworking workers were given towels and treated to sake to boost their morale.

The reclamation project promoted by the three generations of Nitobe had been taken over by a variety of parties. The canal reaching to the Pacific Ocean was completed in the national Sanbongihara reclamation project from 1937 to 1966. Then, from 1978 to 2006, the national farm irrigation project on the left bank of Osaka River had been implemented to solve constant water shortage and poor drainage, ensure stable supply of water and reduce the workload for operation and maintenance. The project had new attempts at that time such as reflecting opinions from academic experts and local residents into facilities improvement in consideration of the environment and commissioning construction, operation and maintenance of part of the canal to local residents.

Furthermore, new field development had been started at the same time as the launch of the reclamation project. In the development work, irrigation ditches were built in the town area and land was redistributed into residential, agricultural and commercial districts from the perspective of hygiene and disaster prevention. The project is a pioneering example of modern urban planning.

In this manner, “Inaigawa irrigation canal” has helped transformation of Sanbongi from a barren plain 160 years ago to one of leading rice producers in Aomori Prefecture and contributed to development not only of agriculture but also of the entire region. The canal and a philosophy of Tsuto Nitobe have been handed down to the present generation including implementing bodies of public work, management bodies of the canal system and local residents.

The completion of Inaigawa irrigation canal and great achievements of predecessors such as Tsuto Nitobe are commemorated and honored in “Taiso Festival.” In addition, “Seseragi Association,” a group of local residents hosts a variety of events and is engaged in operation and maintenance of “Fureai Park” built along the canal. “Inaigawa irrigation canal” is beloved by local people as a spiritual home serving

as a place of communication, study and peace of mind.

In 1780 (Anei 9), before the launch of construction of Inaoigawa irrigation canal, Sanbongi had only about 51 koku (a unit of crop yield) of rice yield. Therefore, new field development was carried out at many places in parallel with the irrigation project which started in 1855 (Ansei 2). At that time, it was planned to develop new fields in Osaka Village (Koina, Takashimizu), Fujishma Village, Orimo Village, Yoshida Village, Momoishi Village (Fukazawa, Hitokawame, Futakawame, Mikawame) in addition to Sanbongihara and expected to have additional 2,500 chobu (a unit of area of paddy field, approximately 2,500 ha) of paddy fields and 3,000 koku of rice yield.

It is not well-known that field development was undertaken in Momoishi Village, far from the water intake, at the launch of irrigation project in 1855 (Ansei 2). The area was also included in the plan in the early stage with the aim of passing water to the Pacific coast.

In 1860 (Manen Gannen), the following year of the success of water-taking, rice seedlings were planted for the first time and 45 hyo (a unit of amount of rice) of rice was harvested. In the new fields survey in 1865 (Keio Gannen), five years later, it was confirmed that 300 chobu of paddy fields with approximately 930 koku had been developed. Jujiro developed the 2nd water-taking plan to increase the rice yield to hundreds of thousands koku, but the construction was suspended as a result of his death. Ultimately, his plan was accomplished through the national irrigation project completed in 1966.

Through the national reclamation project, the total length of Inaoigawa irrigation canal up to the Pacific coast is approximately 70 km with 5,900 ha of paddy fields (as of 2006). Sanbongihara covering two cities and four towns (Towada City, Misawa City, Shichinohe Town, Rokunohe Town, the former Kamikita Town and Oirase Town) has become one of leading rice producing areas in the prefecture.

5. Present state of conservation

The Sanbongihara area appears to be a flat plain, but it has a rugged hilly terrain. The fern leaf-shaped terrain has many windings, and hills and a chasm are faced with a steep slope or a cliff. This results in distributed beneficial areas and difficulties in agricultural water management. Fortunately, the introduction of a central management system under the national farm irrigation project on the left bank of Osaka River allows for close-knit water management. However, as with the situation nationwide, changes in the farming environment resulting from increase of part-time farmers are seen in the Sanbongihara area and there is much demand for water management accommodating the concentration of farming work. Accordingly, representatives from each area get together in advance to have in-depth discussion such as about rotation of water-taking to meet the peak demand from vast beneficial areas of 5,900 ha.

Part of Inaoigawa irrigation canal is a dual-purpose canal for irrigation and drainage. In the areas where more beneficial areas (agricultural land) are being converted into residential space, resulting in the mixed settlement of farming and non-farming residents, there are many complaints about sewage flowing into the canal. With the efforts of local governments to improve sewage and village drainage systems, the number of such complaints has declined. It is desired that such issues will be solved through further cooperation with local governments. The effects of the mixed settlement have also surfaced in the form of increased rainwater drainage. With the changes in the meteorological environment such as torrential rain, it is required to conduct drainage management such as operation of gates and suspension of water-taking in a more fine-grained manner. Water level is managed meticulously to prevent effects on farming such as by diversion of irrigation and drainage canals and water level adjustment and warning at early timing according to changes in weather conditions in cooperation with local governments.

As for operation and maintenance, Inaoigawa irrigation canal Land Improvement District is responsible for the main canal by use of support programs such as the main irrigation facilities management project. Branch canals are managed by members of Canal Land Improvement District. As for a park area which features a canal with a beautiful view, both farming and non-farming residents in the community work together to establish a management body and maintain the canal. In this manner, Canal Land Improvement District, farmers and non-farming residents share and fulfill responsibilities for canal management. In recent years, some private companies are interested in participation into conservation activities of Inaoigawa irrigation canal. A continuous cooperation framework has been established with those companies under a river management agreement.

6. Documents attached

- a. Location map
- b. Old and the latest photos

7. Certification by the National Committee/Committee

(i) Authentication:

a. It is certified that the above information is correct to the best of our knowledge and the relevant institutions/departments have been contacted or informed about this nomination.

b. ational Committee will undertake the actions required to disseminate the information befitting the listed Heritage Irrigation Structure.

(ii) No Objection:


We have no objection to ICID using the information provided with this nomination form for marketing and to give publicity to the historical irrigation structure nominated.

a. Signatures 佐藤洋平

Chairman/ Secretary of Nominating National Committee/Committee

b. Name Yohei SATO

c. Address 1-2-1, Kasumigaseki, Chiyodaku, Tokyo 100-8950, Japan

d. Seal 



Sanbongi before a reclamation project (1)



Sanbongi before a reclamation project (2)



A surveying instrument --Level



A surveying instrument --Leveling stave



Inaigawa irrigation canal before the implementation of the national project



The current Inaigawa irrigation canal (the highest intake in the upriver)



The current Inaigawa irrigation canal



The current Inaigawa irrigation canal (an agricultural park near the entrance of Tengu-yama tunnel, which tells the history of Inaigawa irrigation canal)

稲生川全体図

INAOIGAWA

日本
JAPAN

6



Seinosei No. 379

June 24, 2014

Mr. Yohei Sato, Chairman
Japanese National Committee of the ICID

Re: Application for heritage irrigation structure status (supplemental application)

I hereby attach this opinion in response to a request that was received from the applicant mentioned below.

1. Applicant

Inaogawa Irrigation Canal Land Improvement District

2. Opinion

We view the Inaogawa Irrigation Canal as having historical value as a facility that has contributed to the development of agriculture in Aomori Prefecture, and we therefore support the application for its registration as a heritage irrigation structure.

Shingo Mimura
Governor
Aomori Prefecture

Contact:

Naoya Matsuki
Planning and Development Group
Rural Development Section
Department of Agriculture, Forestry and Fisheries
Aomori Prefecture
Tel.: 017-734-9545
E-mail: naoya_Matsuki@pref.aomori.lg.jp

Todokaihatsu No. 39

June 23, 2014

Mr. Shingo Mimura
Governor
Aomori Prefecture

Re: Submittal of application for registration as an ICID “heritage irrigation structure”

Thank you very much for your special understanding and cooperation in promoting the operations of our land improvement district as well as our various agricultural and rural development projects.

I am sending you the attached application form pertaining to the matter presented in the title above. I kindly request that you please attach your opinion to the form and then submit it to the International Commission on Irrigation and Drainage (ICID).

Yutaka Marui
President
Inaoigawa Irrigation Canal Land Improvement District



青農整第379号
平成26年 6月24日

国際かんがい排水委員会日本国内委員会
委員長 佐藤 洋平 殿

青森県知事 三村 申吾



かんがい施設遺産の申請について（副申）

このことについて、下記の者から申請があったので、意見を添えて提出します。

記

1 申請者

稲生川土地改良区

2 意見

稲生川は本県農業の発展に寄与し歴史的にも価値があるため、かんがい施設遺産に申請することに賛同します。

【担当】

青森県農林水産部農村整備課

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稲土改発第39号
平成26年 6月23日

青森県知事
三村 申吾 殿

稲生川土地改良区
理事長 丸井 裕



国際かんがい排水委員会「かんがい施設遺産」の登録申請について

平素より当土地改良区の運営並びに各農業・農村整備事業の推進につきまして格別なる御理解と御協力を賜り厚くお礼申し上げます。

標記について、別紙のとおり申請書を送付しますので、御意見を付して国際かんがい排水委員会へ提出くださるようお願いいたします。

分類番号	J30-1
保存期間	5年・未設定
保存期間満了日	32.3.31

