# 3. PRESERVATION AND UTILIZATION OF HISTORIC SABO FACILITIES

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## ABSTRACT

Erosion and sediment control projects in Japan increasingly relied on technologies from foreign countries such as the Netherlands and Austria starting in the early Meiji era(100 years ago). Full-fledged construction projects of this nature began in earnest after the implementaiton of the “Sand Control Act”.
Many of the erosion and sediment control facilities dating from that time are still functioning at present, making them, in a way, historical heritage sites.
This paper introduces the facility preservation system of historical civil engineering structures in Japan, as well as giving atechonological background overview regarding theconstruciton of erosion and sedimentation control facilities. The technological standards of preservation and registration, techniques employed for facility preservation, utilization methods and a concluding summary is also provided.

**Keyword:** Construction works and their technical-economical expedience protective measures: Maintenance and economy

## INTRODUCTION

Historically, national land conservation has been one of the important elements constituting national policies in Japan, based on the concept that those who manage water shall manage the country. For national land conservation, measures against sediment-related disasters have been taken since ancient times at various locations by implementing sabo works. It was not until after the Meiji Restoration in 1867, when Japan joined the group of modern nations, that full-scale sabo projects were commenced under the leadership of the national government, while introducing technologies from Holland and Austria. The sabo facilities constructed formed the foundations for the modern nation, and it is considered that many of the facilities have historical value and can become part of the valuable cultural heritage of the regions.
Meanwhile, the Japanese people have been becoming increasingly concerned in recent years, not only with sabo facilities but also with historic civil engineering structures in modern times. Community development activities are underway in various places to preserve and use historic and cultural assets, and the national government has also just started to tackle policies for preserving and using them by taking measures such as revising designation criteria of cultural properties and introducing new systems.
Under these circumstances, the Agency for Cultural Affairs, which is in charge of administering the protection of cultural properties, and the Ministry of Land, Infrastructure and Transport, which is in charge of sabo administration, have cooperated to establish an

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investigational committee comprising experts, administrators, and others, and have carried out investigations and studies from the following four viewpoints, especially with regard to historic sabo facilities.

1. Historical trends of sabo, and grasping and organizing the present situation of sabo facilities
2. How to estimate historical, cultural, and scenic values
3. Securing safety and appropriate preservation schemes
4. How sabo should be used for regional activation

Moreover, based on the committee's conclusions, the Agency for Cultural Affairs and the Ministry of Land, Infrastructure and Transport have organized fundamental ideas and procedures for seeking to appropriately evaluate and preserve historic sabo facilities as beneficial assets that contribute to regional activation, and to use them appropriately while improving surrounding areas, into the "Guidelines for the Preservation and Use of Historic Sabo Facilities." This paper is an outline report focusing on the items studied by the committee, based on the historical background of sabo projects in Japan.

## 1. HISTORICAL TRENDS OF SABO PROJECTS IN JAPAN

In evaluating historic sabo facilities, it is also important to understand the historical trends and roots of sabo facilities. These are given in Fig-1 together with the trends of major technologies. A historical outline is described below.

### (1) From the age of Ritsuryo legal codes to the feudal age (up to the Edo period: before the Meiji Restoration (in 1867))

**No. 2 sand retainer of the Dodo River (built in the 1800s)**

The oldest records include a decree issued in 806 prohibiting the deforestation of Mt. Oi at present Arashiyama in Kyoto. In the 16th Century, after entering the feudal age under the rule of the warrior class, feudal lords carried out flood control works to protect against floods through water control and securing transportation by ship, in order to accumulate wealth and military strength. Sabo measures taken until the Edo period were forest protection in the main. Measures such as hillside works and debris retainers were partially undertaken as part of flood control works, but dam-like structures were limited in quantity, and small in scale, and poorly built, and it appears that they could not be expected to have sufficient flood control effects. At present, few sand-retaining works remain that were carried out at that time, and the sand-retaining works of the Dodo River in Hiroshima Prefecture (built in the 1800s) comprise one of the few valuable facilities that still exist.

### (2) Meiji period: 1868 - 1912

The Meiji Restoration in 1867 transformed Japan from a feudal state into a modern unified country. Sabo projects in the Meiji period, of which projects under direct supervision (projects of the national government) started with the sabo project conducted on Mt. Tanokami in the basin of the Yodo River basin, were launched in the Chubu area with its steep mountainous districts and in the surrounding areas of Osaka and Kyoto where there had been great man-made devastation of mountain ranges.

Dutch Dam
(on the right in the photo is a bust of de Rijke)

During this age, the national government hired foreigners to promote the introduction and the establishment of studies and technologies, and administrative systems from the West. Dutch engineers had great achievements in administering flood control and sabo, and van Doorn, de Rijke and others played active roles. In particular, de Rijke stayed in Japan for about three decades from 1873 and made great contributions to the development of sabo technologies.

From the middle of the Meiji period onward, in districts where problems of sediment-related disasters became tangible, sabo works were also carried out by local authorities. Hoffman, an Austrian who came to Japan as an apparent replacement for de Rijke, lectured at Tokyo Imperial University to transfer French and Austrian technologies to Japan.

With the successive enactment of the River Law in 1896 and the Sabo Law and Forest Law in 1897, fundamental laws concerning national land conservation, the so-called three flood control laws, were finally put in order. The First Flood Control Plan in 1911 set in operation sabo projects under direct supervision pursuant to the Sabo Law.

Ashiyasu dam
(built in 1917)

**(3) Taisho period: 1912-1927**

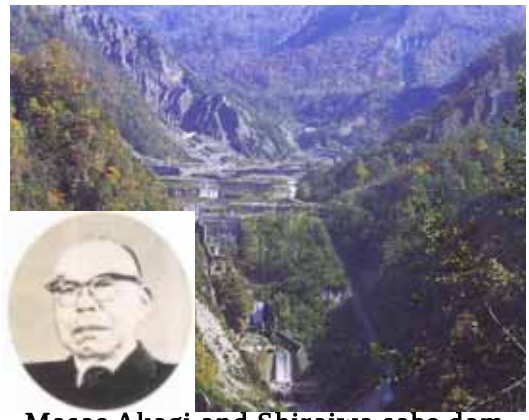
After the enactment of the Sabo Law, sabo projects advanced into the basins of torrents with greater discharges. However, the approach to sediment disposal and construction methods of sabo had been an extension of those of the Meiji period until around 1917, with the construction method of sabo dams being dry masonry, which had been washed away or repeatedly broken. It is considered that Kitaro Moroto, having finished his studies in Europe, had a great influence on technologies in the Taisho period, and his book, "Water Regulation and Sabo Engineering: 1916" systematically described sabo technologies during this period, summarizing the fundamentals of sabo engineering.

The introduction of concrete to the Ashiyasu dam works in 1917 was a revolutionary event that enabled sabo dam works to be carried out in larger torrents. The use of concrete was disseminated in a relatively short period, and torrent works became popular. In contrast, interest in hillside works decreased. In devising sabo plans, greater importance was now attached to the sediment storage function that stores the outflow of sediment in the sediment trapping space of a sabo dam, thereby preventing it from flowing downstream.

**(4) From the early Showa period until immediately after World War II: 1927 - 1947**

Since around 1927, as a result of improvements to technologies using concrete and the dissemination of the idea of sediment storage dams, various places competed with one another to build high dams. To disseminate sabo projects, sabo dams for joint use with irrigation water, water supply, dams for power generation, and other functions were promoted, with the result that the project costs of all sabo increased to bring about the heyday of sabo projects.

The rapid progress made in sabo technologies in the early Showa period owes much to Masao Akagi. Akagi went to Austria to study, and thought that the basis for flood control was the sabo, and also established sabo technologies that were suitable for the devastated topography



Masao Akagi and Shiraiwa sabo dam (his masterpiece)

of Japan by taking measures such as introducing hydraulics into the designs of facilities. Akagi visited various places throughout Japan to carry out investigations and give instructions, and many typical sabo facilities built and plans devised in the early Showa period were the result of services he rendered. Akagi's book, "Torrents and Sabo Engineering," established the engineering foundations of sabo that lead to the present, and Akagi is called the Father of Sabo even today.

Meanwhile, Makoto Kaba, a figure who worked to introduce concrete into sabo dams in the Taisho period, played an active role in about the same period as Akagi. Kaba thought, from his standpoint as a river engineer, that the most important way of stabilizing river channels was to build dams of greater height (sediment storage dams) in the main. The controversy between Kaba and Akagi resulting from the difference in their philosophies regarding sabo made great contributions to the development of sabo-planning theories.

Subsequently, during the World War II period from the Sina-Japanese War to the Pacific War, project costs, equipment and materials, and labor were in short supply, thus bringing a lull in sabo projects.

**(5) From post-World War II to the early 1950s: 1947~1953**

In the period of confusion after World War II, the shortage of materials and labor continued, and there continued to be little sabo project activity. It was a time of postwar food shortages, and sabo projects were also implemented so that they would contribute to increasing food production, but there was also a shortage of funds and cement, so sabo were mainly dry masonry and soil dams. At the same time, deforestation was underway due to destitution after the defeat in war, and the search for fuels and building materials for housing, thus it was also a period of recurrent devastation of mountain ranges. It was not until the introduction after the war by the U.S. Government of Appropriation for Relief in Occupied Areas, the so-called GARIOA Fund, that there was some sign of recovery in sabo projects, and this triggered a restarting of full-scale sabo projects including the construction of high dams. Dr. Loudermilk, who was appointed chairman of the most senior technological committee by President Truman in 1951, was impressed by the sabo technologies of Masao Akagi, and proposed at the Universal Civil Engineering Conference held in Brussels in the same year that sabo should be incorporated into international technical terms as SABO.

The project investment effect at the time was always evaluated for a dam using the cost of works/amount of water storage, so sabo were also judged by the cost of works/amount of water storage. But, in sabo planning theories, there emerged a trend attaching importance to the effects of adjustment rather than attaching importance to the volume of water stored. Around 1951, Mr. Kotaro Kimura, Director of the Sabo Division of the Ministry of Construction, advocated the concept of the amount of adjustment instead of the concept of the amount of water stored, to explain the effects of sabo projects. It was at this time that the concept of sediment discharge was raised for the first time. In 1958, the Ministry of Construction enacted the sabo technical criteria for rivers to unify and standardize the criteria for investigating, planning, and designing sabo facilities since the Meiji period. In the latter half of the 1950s, the dissemination of cement was further promoted, masonry-structured facilities came to be rarely seen, with sabo facilities being built mainly using concrete.

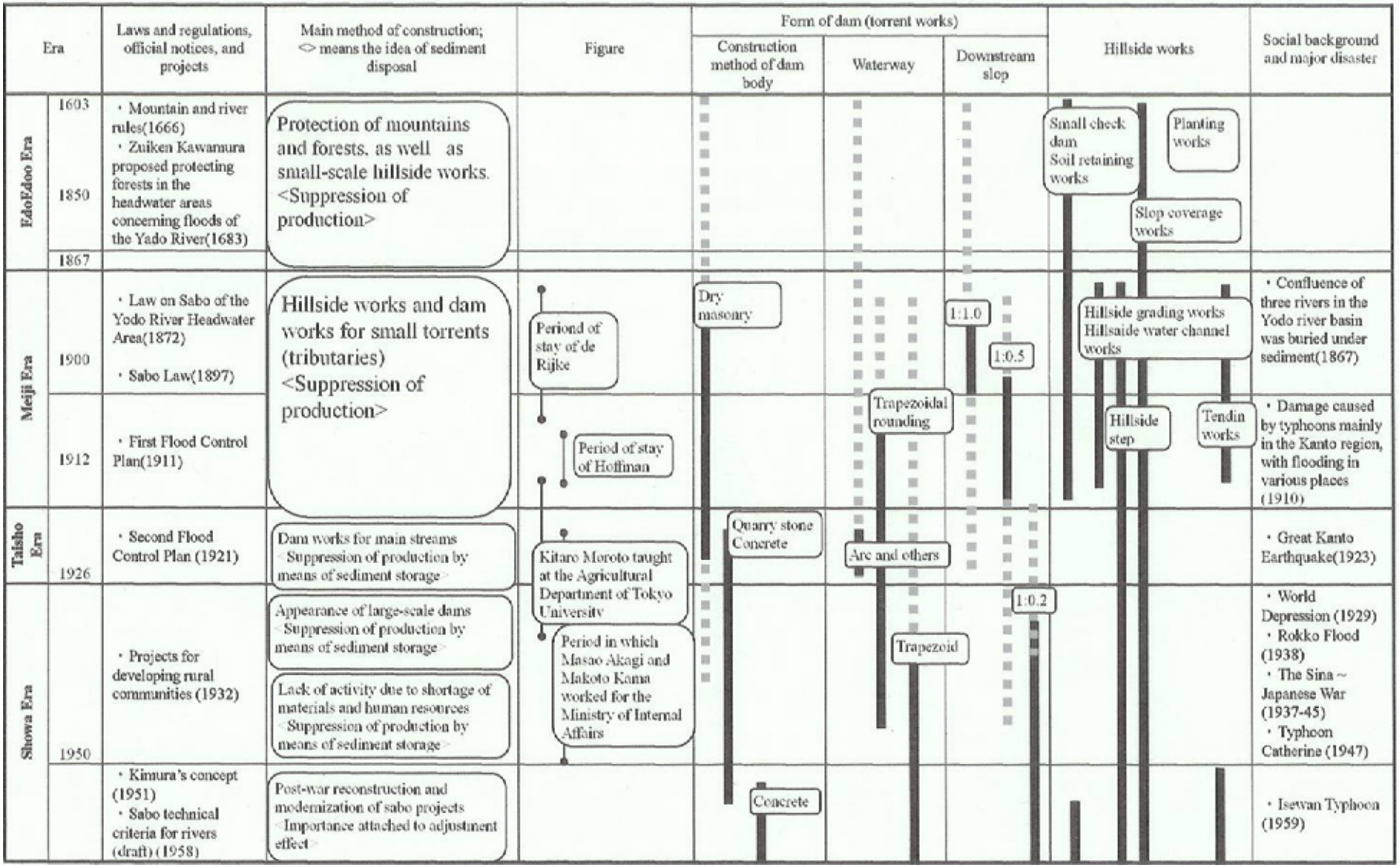



**Fig-1 Historical trends of sabo project**

## 2. JAPAN'S SYSTEM FOR PROTECTING CULTURAL PROPERTIES, AND THE PRESENT SITUATION AND FEATURES OF HISTORIC SABO FACILITIES

### (1) Japan's system for protecting cultural properties

#### 1) Conventional system for protecting cultural properties

Conventionally, Japan's Cultural Properties Protection Law has defined cultural properties as tangible cultural properties, intangible cultural properties, folk cultural properties, monuments, and traditional groups of buildings, and a designation system has been provided, in which, of these cultural properties, important ones have been designated, selected, and put under prioritized protection as important cultural properties, historic sites, places of scenic beauty and natural monuments, and others, thereby implementing the administration of protection and preservation. (the number of designated buildings as of September 1, 2003: 2238 important cultural properties; of which, 211 properties are national treasures).

In 1993, the modernization heritage (buildings related to civil engineering, transportation and industrial heritage that were built using modern techniques from the last years of the Edo period until the end of World War II) was created as a new classification type, and water supply facilities, railroad facilities, power generation facilities, water-use facilities, and other facilities have been designated as important cultural properties. However, modern buildings that exist in a great variety and in large quantities are in danger of extinction without being subject to any social evaluation because of recent advances of national land development and city planning, changes in life-styles and other factors; therefore, there has arisen the necessity for taking new measures to preserve and use these buildings, which should be handed over to future generations. The cultural properties registration systems, which are already in place in Europe and various countries throughout the world, play an important role in preserving cultural properties. It has become necessary in Japan also to create similar systems. In 1996, the following new system for registered cultural properties was established.

#### 2) Establishment of new registration system and its features

The national government partially amended the Cultural Properties Protection Law in 1996, and the registration system for cultural properties was introduced, under which cultural buildings requiring special measures for their preservation and use shall be registered by the Minister of Education in the original register of cultural properties.

Under this registration system, registration is carried out as a general procedure based on a notification made by the owner of a cultural property, and loose protective measures are taken, with instructions, advice, and recommendations being the system's fundamental measures. The regulations of the registration system are looser than the conventional designation system under which important properties are selected strictly and designated. Thus, they are strictly regulated, for example, under permit systems, and handled with great care.

Those considered in the registration system are buildings, which include not only houses, offices, shrines, and temples, but also extensive and numerous cultural properties, such as bridges, water gates, tunnels, and chimneys. Those considered are buildings built more than 50 years ago.

The types of registered tangible cultural properties (including those being processed for registration) and their number as of March 20, 2003 are as follows. Of the 60 cases of Sabo, etc., in the table, 59 cases are for sabo facilities.

**Table-1 The situation of registration of registered tangible cultural properties (as of March 20, 2003) and the classification of registered sabo facilities**

| Type | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Industry | | | Transportation | Governmental office buildings | Schools | Living related | Culture and welfare | Housing | Religion | Sabo etc. | Others | Total |
| Primary (agriculture, forestry and fishery) | Secondary (mining and manufacturing industries) | Tertiary (service industries) | | | | | | | | | | |
| 68 | 353 | 444 | 114 | 68 | 137 | 143 | 144 | 1525 | 353 | 60 | 40 | 3449 |

| Classification | No. of cases |
|---|---|
| Sabo dam | 50 |
| Step works | 1 |
| Channel works | 4 |
| Consolidation works | 4 |
| Total | 59 |

As a result of this newly established registration system, the present system of the national government for cultural properties is as given in Fig-2.

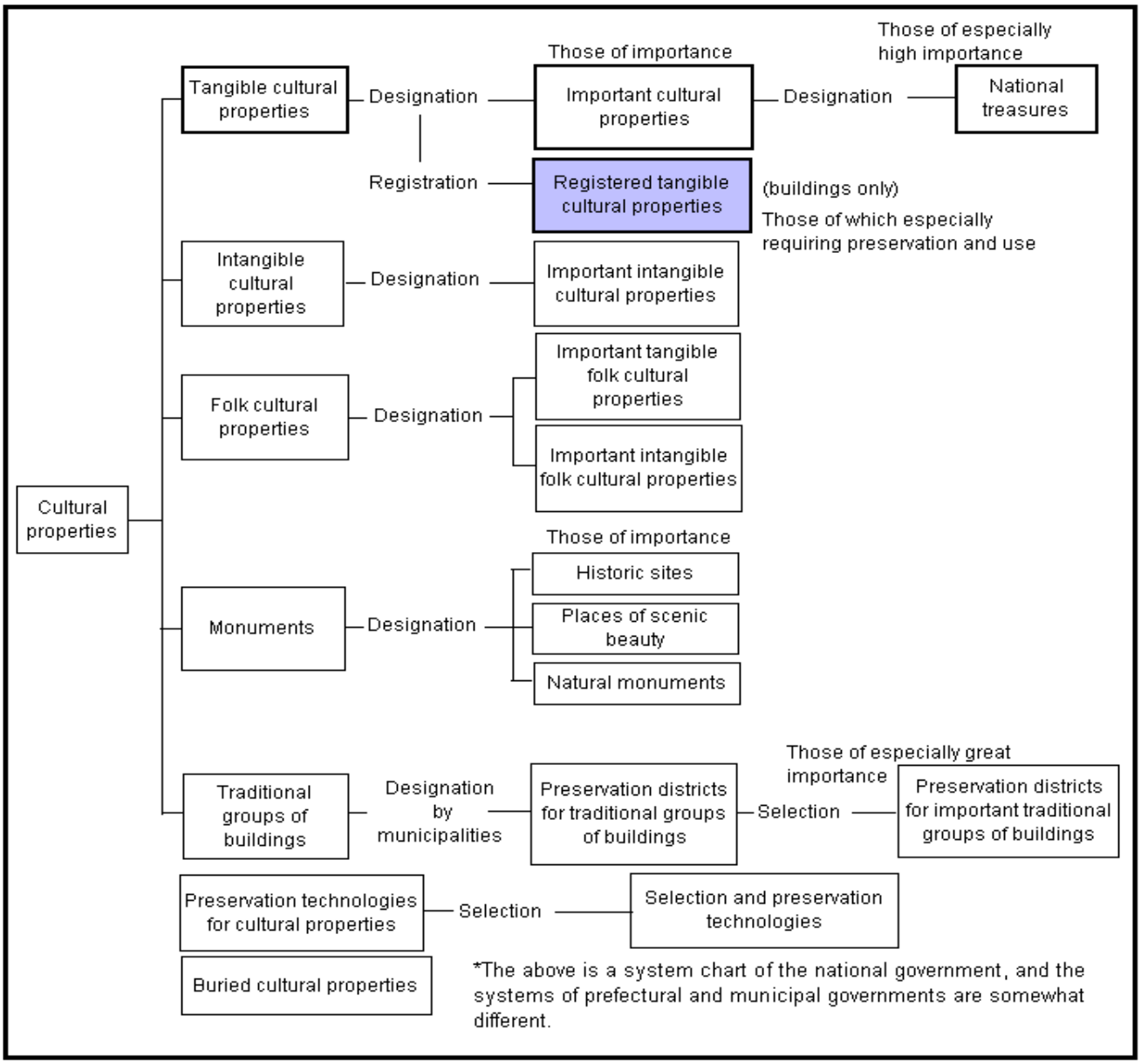



**Fig-2 System for cultural properties**

## (2) The present situation and features of historic sabo facilities

### 1) The situation of existing sabo facilities

The Ministry of Land, Infrastructure and Transport and the Agency for Cultural Affairs have investigated the actual situation throughout Japan of existing buildings that were built more than

50 years ago (sabo facilities completed not later than 1952). Consequently, the number of existing facilities clarified and calculated as of March 2003 totaled 6110, consisting of 740 facilities managed by the national government and 5370 facilities managed by prefectural governments. Notice that, of these facilities at approximately 6000 locations, there is no example of a designated important cultural property based on the designation system of the national government, and 59 facilities are registered as tangible cultural properties as mentioned above.

**2) Features of sabo facilities**

Sabo facilities that were built more than 50 years ago have the following features.

a) They are in many cases facilities with a history of having been built in response to individual disasters in the past, and are still demonstrating their disaster-prevention functions at present.
b)Their locations are in mountainous areas in many cases and hence are rarely seen by people, compared to general civil engineering structures.
c) They are structures focusing on practical use with importance attached to disaster-prevention functions, generally with few examples of consideration being given to design.
d) Other facilities of the same types/same modes exist in great numbers.
e) The facilities are structures that are unified with the topography and land.

**3) Actual situation of repair**

Questionnaires have been sent out to offices under direct supervision and prefectural governments throughout Japan on the actual situation of repair of sabo facilities that were built more than 50 years ago. As a result of collecting such questionnaires with the condition of those having been repaired within about the last 10 years, 40 examples of such sabo facilities have been investigated and organized.

[1] The types of works of sabo facilities among examples of repairs and sites of repairs

Of 40 cases in total of repaired facilities, the greatest number were dams, amounting to 34 cases, followed by consolidation works, amounting to 5 cases. Both dams and consolidation works were for structural collapses, and it is considered that flowing water had much to do with their damage. At sites of repairs as well, scouring of foundations was most frequent, amounting to 16 cases, followed by 9 cases of water leakage due to the degradation of concrete, with other examples of problems concerning the surfaces of facilities such as pitching stones coming off, and wear and erosion amounting to as many as 6 to 8 cases.

[2] Considerations and problems at the time of repair of the 40 cases in total, there are 18 examples of considerations having been given to sabo facilities as cultural properties. As a result of the survey, in conventional repairs, sufficient consideration was not necessarily given to the maintenance of cultural value. Besides, problems concerning repairs have also been clarified, which are given below.

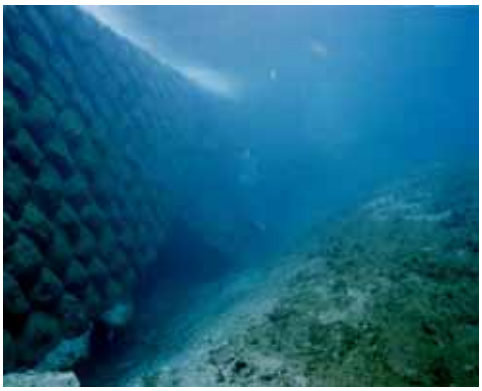


Photo showing scouring of the foundation of a dam

- It is difficult to evaluate and judge deterioration and safety of the facilities.
- Detailed construction methods and structures are unknown.

These circumstances suggest that each of the historic sabo facilities is likely to be subjected to different problems depending on conditions unique to it.

## 3. EVALUATION, INVESTIGATION, PRESERVATION, AND USE OF HISTORIC SABO FACILITIES AS CULTURAL PROPERTIES

As mentioned above, the Agency for Cultural Affairs and the Ministry of Land, Infrastructure and Transport have established a committee comprising experts, named Committee for the Evaluation, Investigation, Preservation and Use of Historic Sabo Facilities (Chairman: Aritsune Takei, Emeritus Professor of Kyoto University), and have carried out investigations and studies on the preservation and use of historic sabo facilities (those that have historical value and can be part of the cultural heritage of a region, hereafter called historic sabo facilities). Based on the report of studies conducted by the committee, the Agency for Cultural Affairs and the Ministry of Land, Infrastructure and Transport have summarized guidelines for the basic ideas and procedures for appropriately evaluating and preserving historic sabo facilities as valuable assets that contribute to regional vitalization, and to appropriately use them together with improving their surrounding areas, to provide guidance to responsible administrators. An outline is described below.

### (1) Investigations of historic sabo facilities

Various detailed prior investigations are required to appropriately repair and restore sabo facilities in ways that maintain and improve their functions, while maintaining their value as cultural properties. Such investigations and points to be noted are outlined below.

**1) Material items related to historic sabo facilities and their collection**

Material related to the construction of facilities such as design documents, specifications, photos, and drawings at the time of construction shall be collected extensively, and interviews shall be carried out with engineers, local people concerned, and others engaged in construction. After having organized such materials, history of construction, materials, and technologies used in construction, repair history after completion of construction, and other items shall be clarified.

**2) Grasping present situation of facilities**

Structure, form, and scale of buildings shall be accurately grasped, and their remaining state shall be investigated in detail. Measurements and outline investigations at the level of visual and other inspections shall be carried out based on a ground plan with a scale of about 1/2,500, whereby relations with the topography of surrounding areas can be understood, while preparing, whenever necessary, additional plans at about 1/500 scale, as well as structural and other drawings.

**3) Organizing materials related to the region**

Materials shall be organized showing how the facilities should be positioned in the history of sabo technologies and projects, or in the local history of the region, thereby allowing and appropriate evaluation of the facilities, while at the same time using the results in the communication of historic and cultural information about the facilities.

**4) Others**

To have region-building that focuses on how the historic sabo facilities appropriately reflect the needs of the region, questionnaire and other investigations shall be carried out.

Note that the whereabouts of various materials are unclear in many cases, and searching for materials may be time-consuming. Besides, there will be more difficulties as time goes by concerning the collection of material from the time of construction and interviewing the persons concerned; therefore, it has been judged that investigations should be commenced promptly for facilities that are deemed to have most importance as cultural properties.

**(2) Ideas for evaluating historic sabo facilities**

Because historic sabo facilities have the features described in "**2. Japan's system for the protection of cultural properties and the present situation and features of historic sabo facilities**" above, some aspects of them cannot be fully evaluated under the existing registration criteria of the Agency for Cultural Affairs for registered tangible cultural properties; therefore, new examples that are unique to sabo (colored portion) have been added to those making contributions to the historic landscapes of the national land contained in the existing registration criteria.

Also, it is considered that, roughly 2 viewpoints are important as to how the value of historic sabo facilities as cultural properties should be regarded. One is the value of the facilities themselves and the other is the value of the relations between the facilities and the land. In particular, the latter?value of the relations between the facilities and the land?is important when considering the values of historic sabo facilities. This is based on the basic recognition that the value of a historic sabo facility as a cultural property is inseparable from the earth on which the facilities are built, and can only be generated by existing in such a way that is integrated with the topography.

**Table-2 Registration criteria for registered tangible cultural properties and examples of concepts for evaluating historic sabo facilities**

| Buildings built more than 50 years ago that fall under either of the following requirements | | |
|---|---|---|
| Registration criteria | Evaluation points of historic sabo facilities | Concrete example |
| 1. Those contributing to the historic landscape of the national land | In the case of being popular and have special pet names | Bearing a name that communicates the historical background related to construction method, construction type, historic figure, and other factors Called in the region by a special name or a pet name |
| | In the case of being helpful in knowing the region | |
| | In the case of appearing in a work of art such as a painting | |
| | In the case of having created new scenic beauty | • Having become the region's landmark or symbol<br>• Creating a magnificent landscape that symbolizes the region's scenic beauty<br>• Being integrated with the surrounding environment, thereby contributing to the creation of a rich natural landscape |
| | In the case of contributing to the development of the region | • Contributing to land use of the region, such as development of farmland |
| 2. Those that have become the models for molding arts | In the case of being superior in design | • Dam bodies, waterways, or similar structures that are superior in design<br>(The mode of masonry, mode of waterways, shapes of arches, linear shapes, and others) |
| | In the case of famous designers or constructors being involved | • Famous engineers are involved who have contributed to the development of sabo and other technologies |
| | A work at an initial stage that has been made later in great numbers | |
| | In the case of showing features of the times and types of building | • Those featuring existing construction types and construction methods that symbolize the characteristics of the times in the history of sabo |
| 3. Those that are not easily reproduced | In the case of superior technologies and skills being used | • Having introduced valuable structural forms from other countries<br>• Superior plans or design and construction technologies being used<br>• The region's traditional techniques being used |
| | In the case of technologies and skills that have become rare being used | • Valuable construction methods and materials that have not been superceded to the present |
| | In the case of having a form or a design that is uncommon, and there are only few other similar examples | |

Note) The colored portion shows additional examples

### (3) Concepts for securing safety and preserving historic sabo facilities

Because sabo facilities that have been registered as cultural properties are also disaster prevention facilities that are still in service, it is required to consider that they shall be preserved by making efforts not to devalue them as cultural properties, nor to damage them after having given high priority to the conservation of the disaster-prevention functions of the facilities. Also, because a long time has passed since such historic civil engineering structures were built, if they are still to be used in the future, it is required to grasp their present situation, such as deterioration, and it is also required to consider maintaining their value as cultural properties upon repairing and restoring them. Special features of facilities such as their constituent materials and structural forms should be identified in advance, and a plan for their preservation, maintenance, and management that reflects the foregoing should be prepared. Moreover, it has also been judged that repair and other measures need to be in place in advance in case of an emergency. Considering the features and the roles of sabo facilities to adjust the facilities themselves and the environment created by such facilities under strict environmental conditions, the value of historic sabo facilities is integrated with, and is inseparable from, the land in many cases, so it is important to study preservation measures based on this fact as well.

Desirable repair methods for application to historic sabo facilities having value as cultural properties are shown below for each type of facility.

**Table-3 Points of preservation so as not to impair value as cultural properties**

| VALUE | | CONTENT | PROBLEMS |
|---|---|---|---|
| ■ Matters related to facilities themselves | | | |
| Materials: | Constituent materials | Material and tones of colors | Procurement of materials and matching of colors |
| Mode: | Restoration of structural forms | External appearance and structure | Collection of old drawings, old photos, and other materials |
| Technologies: | Communicating and reproducing techniques | Preservation of technologies | Securing and training technicians |
| ■ Matters related to relations with the land | | | |
| Characteristic mode with geographical features and geologies being considered | | Preservation of land inclusive of facilities | Measures to ensure preservation and management of land inclusive of the facilities |
| Landscapes integrated with nature in surrounding areas | | | |

### (4) Ideas for using historic sabo facilities

How historic sabo facilities should be used while increasing their value as cultural properties has been summarized from the following 3 viewpoints: <<value>> of historic sabo facilities, <<principle of use>> and << points to be noted as seen from the procedure for use>>.

#### 1) Value of historic sabo facilities

[1] Academic value

Historic sabo facilities are living witnesses to the history of sabo projects, and have academic importance related to historic technologies, materials, construction methods, and design concepts of sabo construction.

[2] Value of landscape

Historic sabo facilities form the foundation for creating a rich nature in upland rural areas in many cases, in such a way as promoting the recovery of vegetation in the surrounding areas by managing devastated mountain ranges and torrents. The landscapes formed by facilities unified with the surrounding environments are valuable regional resources, and when using them, it is required to minimize construction of new surrounding facilities and study how the value of such superior landscapes can be maximized.

[3] Value of public relations

It is important to inform citizens in general and future generations of the historical roles played by historic sabo facilities in the conservation and the modernization of the national land, and it is considered that this will lead to the attachment of residents to sabo facilities in the region.

**2) Principle for using historic sabo facilities**

It should be considered a principle for using historic sabo facilities to inform the historical context whereby sabo facilities have made contributions to the safety of the national land through the management of devastated mountain ranges and torrents, and played a role in the development of modern Japan. Such a principle is especially important for historic sabo facilities that function as disaster prevention facilities still in service, of which direct use or use as facilities themselves is difficult, and it should be considered fundamental upon devising a usage plan to widely communicate their roles until now as sabo facilities, and the adroitness of technologies used for such roles.

Excessive improvements to facilities in the areas surrounding sabo facilities or landscaping may deprive them of the original meaning of informing the historical context, therefore, sufficient attention needs to be paid to this.

## CONCLUSION AND PROBLEMS TO BE SOLVED

The results obtained this time were summarised as "*Guidelines for the Preservation and Utilization of Historic Sabo Facilities*" in May 2003 under the joint signatures of the Minister of Land, Infrastructure and Transport and the Commissioner of the Agency for Cultural Affairs, and it is considered that results up to a certain level could be obtained by the study. Since a long time has elapsed concerning historic sabo facilities under consideration, it being 50 years since their construction, it is expected that historic information will be found, collected, and organized promptly by referring to these guidelines. This study basically considered how historic sabo facilities are positioned among registered tangible cultural properties, but not all historic sabo facilities are in accord with such system, and it is considered that a category of cultural properties that is more suitable for the historical value of such facilities also needs to be studied. Besides, there still remain some issues on system operation and problems (such as how facilities should be evaluated and preserved when recovering from disasters), and it is considered that investigations and studies based on examples need to be continued in the future.

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