



Survey and Research Activities and Publicity Work of the Japan Society of Dam Engineers

M. Honjo

Chairman of the Japan Society of Dam Engineers, Councilor of Obayashi Corporation

T. Tanaka

Vice Chairman of the Japan Society of Dam Engineers, Chairman of the Planning Committee of the Japan Society of Dam Engineers, President of the Japan Association of Rural Solutions for Environmental Conservation and Resource Recycling

H. Mori

Director of the Japan Society of Dam Engineers, Chairman of the Activity Promotion Subcommittee of the Planning Committee of the Japan Society of Dam Engineers, Senior Chief Engineer at CTI Engineering Co., Ltd.

T. Ikeda

Vice Chairman of the Planning Committee of the Japan Society of Dam Engineers, Managing Director of the Planning Department of the Japan Dam Engineering Center

ABSTRACT:

The Japan Society of Dam Engineers was established in 1990 to unite researchers in many academic fields including applied mechanics, geology, and concrete engineering, as well as researchers and engineers in government bodies and the private sector, in order to conduct research and exchange information concerning dam technologies. In Japan, due to environmental problems and economic factors, the general public does not adequately understand the construction of dams. The Japan Society of Dam Engineers, in addition to survey and research, also conducts various ongoing publicity activities to help people understand the roles of dams and the benefits of constructing dams. The major projects are (1) research activities by a committee established to examine the effectiveness, etc. of dams, (2) holding "With Dam Nights" where dam engineers and ordinary citizens who are dam enthusiasts jointly present performances, etc. to introduce the roles and effectiveness of dams to the general public, and (3) holding seminars at dam construction sites with the participation of local students, etc.

Keywords: Japan Society of Dam Engineers, JSDE, publicity, With Dam Night, dam enthusiasts

1. ESTABLISHMENT OF THE JAPAN SOCIETY OF DAM ENGINEERS

Dams are important public infrastructure and support people's social and economic activities by supplying water, controlling floods, and so on. Many dams have been constructed around the world. In particular, in the last century, rapid growth in the level of human activities was accompanied by a remarkable increase in the number of dams constructed, and technologies used to design, execute, and operate dams were developed accordingly. Another factor encouraging the development of dam technologies was the need to construct dams at sites with poor topographical and geological conditions.

Dam structures involve many fields of engineering including applied mechanics, hydraulics, hydrology, soil mechanics, rock dynamics, applied geology, concrete engineering, structural engineering, seismic engineering, and many others. Dam engineering therefore comprehensively applies these related academic fields to solve problems concerning the construction and operation of dams, thereby building more rational and economic structures.

In recent years, all fields of engineering have advanced

remarkably, but as a result of the broadening of engineering, it is becoming increasingly difficult for dam engineering to fully incorporate the latest research results. One solution is for dam engineers and researchers to work with those from other fields of engineering to exchange information, thereby advancing dam engineering, which is an integrated discipline.

In Japan, the period of economic growth from the 1950s to the 1980s was accompanied by the construction of many dams. In addition to its complex geological structure which causes frequent earthquakes, the country is located in the Asian monsoon zone and thus subject to heavy rain, typhoons, and other weather phenomena, and so advanced technologies are needed to construct and operate dams. The Japan Society of Dam Engineers (JSDE) was established in 1990 to meet the needs for dam engineering and progress to improve dam technologies in Japan.

The JSDE was established to bring together engineers employed by electric power companies, the Ministry of Agriculture, Forestry -Fisheries, and the Ministry of Land, Infrastructure, Transport and Tourism, and the Japan Water Agency, which undertake dam projects, as well as engineers of construction companies and construction consultants, to construct dams and perform

surveys and design work, with researchers working in universities. It now has about 860 members, with the affiliations broken down as shown in Table 1. The purposes of the activities of the JSDE are as follows.

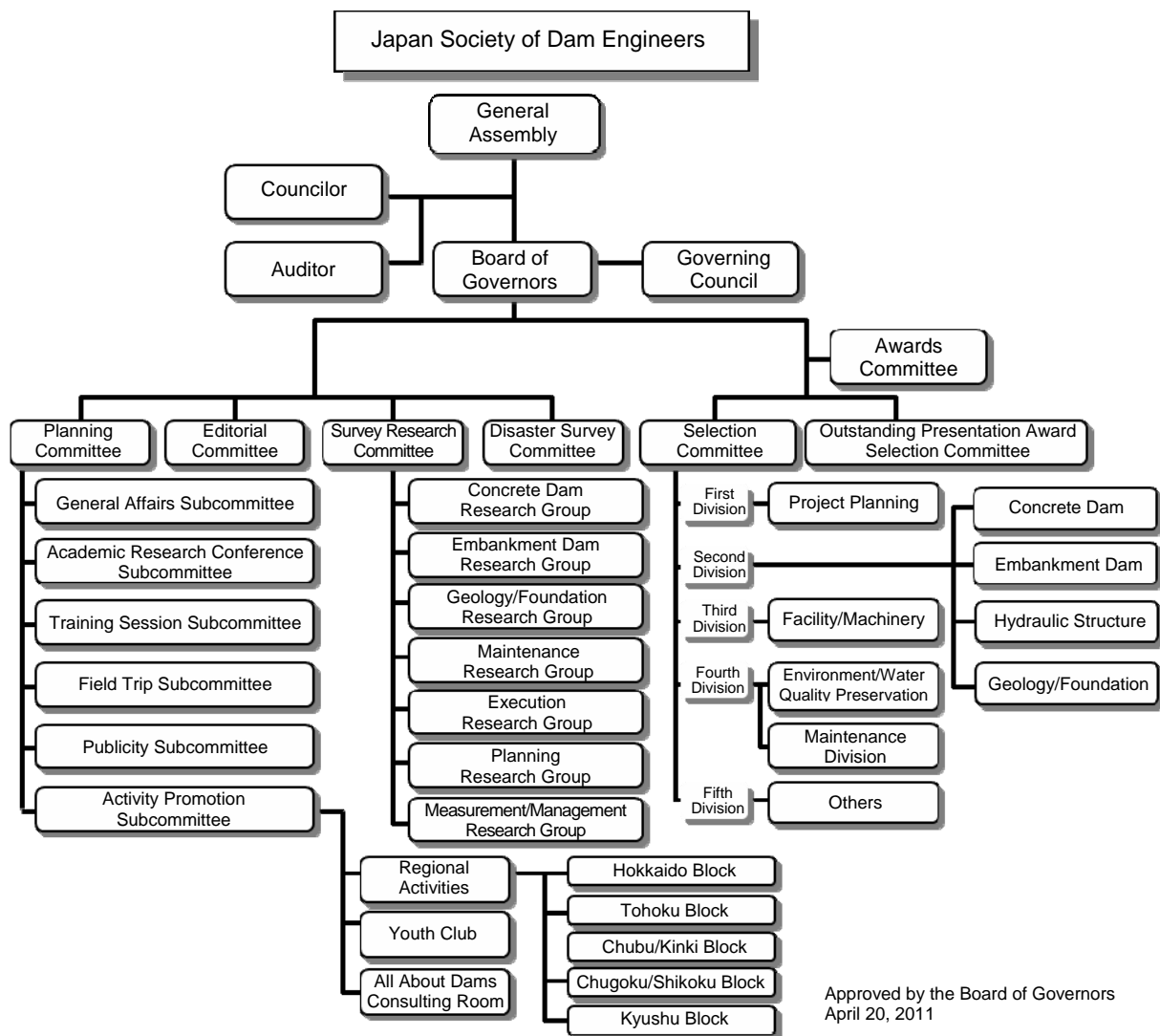
1. Survey research on dam engineering
2. Holding academic conferences, research seminars, and symposiums, training sessions, and field trips, etc. concerned with dam engineering
3. International exchanges of dam engineering related technologies
4. Publishing an academic journal
5. Collecting and distributing information about domestic and international research activities, and conferences, etc. concerning dam engineering

Table 1. Breakdown of Affiliations of Members of the JSDE

Industry	Members	Industry	Members
Education	64	Consulting	288
Government organs and regional governments	105	Steel structure makers	12
Electric power companies	37	Academic societies/public corporations	59
Construction	275	Others	24
		Total	864

2. ORGANIZATION OF THE JAPAN SOCIETY OF DAM ENGINEERS

The JSDE consists of the General Assembly as the top decision-making body, the Board of Governors which operates the Society, four committees formed primarily to handle activities of the Society under the leadership of the Board of Directors, and three committees to decide the dam engineering awards (see Fig. 1).



Approved by the Board of Governors
April 20, 2011

Figure 1. Organization of the Japan Society of Dam Engineers

The Planning Committee plans and operates academic research conferences, training sessions, and field trips of the Society, carries out publicity activities such as holding dam related events, and operates the website, and thus plays a central role in the activities of the Society. Six subcommittees of this committee have been established.

The Editorial Committee is in charge of editing the academic journal, *Damu-Kogaku* (Dam Engineering). The Survey Research Committee is in charge of survey research activities of the Society; there are seven research groups under this committee.

The Disaster Survey Committee dispatches survey teams and holds survey report conferences when dams have been damaged by a large earthquake or flood.

3. SURVEY RESEARCH ACTIVITIES OF THE JAPAN SOCIETY OF DAM ENGINEERS

Survey and research activities are led by the seven research groups established under the Survey Research Committee. The research themes cover a wide range of dam engineering fields, and the groups choose to study those that will help solve important problems in the construction and surveying of dams at that time. Five research groups had been established by 2009. In 2009, a new administration led by the Democratic Party took power in Japan and began to reassess the need for and cost-benefit of dam projects which were in progress at that time. The need for and suitability of public projects, including dam projects, had been evaluated since 2001 by government organs and regional governments based on the Public Project Reevaluation System which the government had established, but in addition to this, the new government reassessed dams, creating anxiety not only among government officials and local governments, but also among ordinary citizens, that the completion of essential dam projects would be delayed. The JSDE therefore set up a new research group, the Planning Research Group, in 2010, to begin studying policies to improve the clarity of dam project planning. The following paragraphs introduce the principal research activities already undertaken by the Society.

1. Use of precast forms (1994–1996)

When concrete dam construction work is executed by a method such as the RCD method or Extended Layer Construction Method (ELCM) which improves ease of construction, it is possible to improve the rationality of execution by using precast methods to construct the inspection gallery or elevator shafts, etc. This research examined the economic efficiency of design methods concerning the use of precast members.

2. Research on methods of placing pumps for use by dams (2005–2007)

Limits to and problems related to using pumps to place

dam concrete, such as the performance of the dam concrete, restrictions on concrete pumps, and challenges during work, were surveyed and reported.

3. Research on safety management of embankment dams (2000–2005)

This research examined accidents at embankment dams, causes of the accidents, embankment dam management guidelines, and long-term behavior of dams both inside Japan and overseas to propose effective methods of managing the safety of future embankment dams.

4. Research on optimizing the placing speed at concrete gravity dams (2005–2008)

Dams constructed by the RCD method or ELCM method offer great benefits regarding work safety or thermal stress of concrete, but due to the large number of structures inside the dam body, execution is not speeded up as much as expected.

This research gathered descriptions of the execution of seven recently constructed dams and analysis of the quantity placed per unit time and placing efficiency based on these descriptions, to consider the impact of structures inside dam bodies. Research on countermeasures to optimize the execution speed was also conducted.

5. Research on methods of boring surveys during dam construction (2001–2011)

This research examined the latest boring survey technologies required to survey the geology at dam sites, the analysis of boring-based dam site geological surveys, dam body material surveys, and slope survey methods. Past technologies used to perform boring surveys were also summarized, and methods of measuring and managing boring and storing data were surveyed. It is planned to summarize and publish the results of the research.

4. PUBLICITY ACTIVITIES

The publicity activities of the JSDE can be broadly divided into two categories. The first category is activities undertaken to disseminate information about research concerning the newest dam technologies and dam engineering directed mainly towards its members. This is done through special training sessions, research conferences, training sessions, field trips, disclosure screening sessions held to give Technology Development Awards, and public symposiums.

The second category is activities undertaken to introduce the purposes and effectiveness of dams, mainly to the general public and to members, in order to increase their understanding of dams. In Japan, since the 1990s, negative opinions toward public works projects have spread due to concern about the effectiveness of investment in public works projects and conservation of the environment. Dam projects are often cited by the

mass media as typical examples of wasteful public works projects. This trend appeared at the time of the Nagara River Estuary Barrage Project, a multi-purpose project intended to develop water supplies and control flooding, which was completed in 1995. Beginning in 1989, activities in opposition to this project spread among the general public as a result of a desire to protect the environment for fish and doubts concerning the urgency or need to develop water supplies for urban use, which was the purpose of the project. The matter was discussed extensively in the Diet. The growing opposition movement was the result of incorrect understanding or misunderstanding of the project. These events reminded engineers and researchers involved in all dam projects that they must clearly explain the purposes of and need for dam projects to the general public. Such awareness is one of the reasons why the JSDE conducts publicity activities targeted at the general public.

Regarding publicity activities provided primarily for members, special training sessions are held once a year, involving technical lectures given by the current director-general of the organization or other expert on dam engineering. At research seminars, members' papers are presented and discussed. At training sessions, dam engineers and researchers discuss the latest dam technologies and engineering topics. Field trips are held to allow participants to view work sites where the dam body is being constructed, and recently, have included field trips to see dams being constructed overseas. The Technology Development Award and Disclosure Screening Committee provides the developers of new dam technologies with a public forum to present their achievements and discusses dam engineering technology development awards.

At the public symposiums, which are held in cooperation with government research institutes, key note lectures are given and papers presented concerning specified themes in the field of dam technology. In FY2010, it was held with "Newest measurement technologies for the safety management and inspections of dams" as the theme, key note lectures were given concerning GPS based dam body deformation measurement technologies, and importance of dam body measurements for dam safety management, and papers were presented concerning trends in the newest dam body measurement technologies and measurement cases, etc. Then in FY2011, with "Dam Foundation Grouting" as its theme, a public symposium was held including key note lectures concerning the state or theory of grouting technologies and geological structure and grouting planning, and the presentation of papers concerning rationalizing of grouting planning, evaluation of the effects of improving grouting materials, and cases of grouting executed during actual dam construction. These symposiums attracted large audiences, because their themes dealt with the most recent problems related to dam technologies in Japan. Events held primarily for the general public rather than members include "With Dam Nights", the All About

Dams Consulting Room, regional field trips and training sessions, activities of the Youth Club, and compilation of the JSDE e-Guide to Dams in Japan.

"With Dam Nights" are events consisting of lectures by dam engineers, dam engineering researchers, and other dam technology experts who explain dam technology clearly to members of the general public and dam enthusiasts involved in the so-called "dam mania" give presentations on dam related activities. These enthusiasts are ordinary citizens who are deeply interested in dams and carry out a variety of dam related activities. These activities are extremely diverse including, for example, individuals visiting dams throughout Japan to take pictures which they then publish on their websites, and some have published their collections of photos. Others, who like hydroelectric power dams, collect photos of old electric power generation water wheels and related documents displayed at the sites of electric power dams, while others who are interested in dam gates take photos of the discharge from gates or study the construction of gates. Some of them also like to experience simulated dam operations while viewing the actual operation of a dam during a flood, which can be viewed on the internet. Many of these dam enthusiasts, although not experts, achieve a level of knowledge about dams which startles even the experts. The purposes of this event are to let the public hear explanations by dam experts and learn about the activities of these dam enthusiasts who are ordinary people, and thus inform them of the attractions of dams which the experts overlook. Themes of With Dam Nights have included "Dams as historical structures", "Hydroelectric power generation", "RCD method, trapezoidal CSG method and other of the newest dam construction methods", "Roles of dams in flood control and water supply on the Tone River and Ara River in Japan". The program of a With Dam Night begins with a key note speech regarding the theme given by a leading authority in dam technology, followed by presentations by dam enthusiasts and speeches by dam technologists about their experience of actual dam construction. This event, which is extremely popular and evaluated as an interesting event by members of the public, will be held at locations outside of Tokyo beginning in 2011.



Figure 2. View of With Dam Night

All About Dams Consulting Rooms are set up during Water Week, which is held every summer with support by the Japanese Government to help people understand the importance of water resources, etc. In a corner of the venue, a model hydroelectric power plant which actually generates power is displayed, children do quizzes about dams, and visitors are given calendars with photos of dams. The event attracts more than 1,000 visitors every year, and is held with the cooperation of dam construction companies and dam construction consultants.



Figure 3. View of an All About Dams Consulting Room

Regional field trips or training sessions are held for dam engineers working in outlying regions and university students enrolled in regional civil engineering courses to stimulate their interest in dams by letting them tour dam construction sites in their region and by hearing presentations by lecturers from local universities or dam experts active in Tokyo. These are held in five blocks established throughout Japan.



Figure 4. Field Trip and Training Session Field Trip and Training Session

In addition, the JSDE has established an organization which it calls the Youth Club to hold events for young engineers and students planned by the younger members of the Society. It holds events on campuses in Tokyo to inform young people of dam technologies and the purposes and effectiveness of dams by conducting training sessions and discussions led by invited dam engineering experts or by university researchers active in dam engineering, plus field trips to dams in operation and under construction around Tokyo in order to foster understanding of dams.

The JSDE e-Guide to Dams in Japan is an electronic pictorial book about dams in Japan prepared to introduce the roles of dams, types of dams, and functions etc. of dams to the public in an easily understood format. This pictorial book can be viewed on the web site of the JSDE. Compiled as visually as possible by using many photographs and diagrams, it is a pictorial book which can be read enjoyably by everyone from elementary school children to adults. Its contents encompass the roles of dams, operating mechanisms of dams, dam construction methods, people who work at dams and machinery installed at dam sites, history of dams, the mystery of dams, secrets of dams, and new dam technologies. We have prepared an English edition on the occasion of the 80th ICOLD Annual Meeting and the 24th ICOLD Congress. We are counting on the JSDE e-Guide to Dams in Japan deepening the public's understanding of dams.



Figure 5. Front Cover of the JSDE e-Guide to Dams in Japan

5. FUTURE ROLES OF THE JAPAN SOCIETY OF DAM ENGINEERING

Dam projects in Japan include those intended to generate electric power, control floods, supply water to cities, and supply water for irrigation, and multi-purpose dams intended for two or more of these purposes. The numbers constructed for each purpose are tending to decline. On the other hand, in recent years weather phenomena have destabilized and short-intensive rainfall is occurring more frequently. There is also concern that as a result of global warming, the snow which falls on the Japan Sea side of Japan in the winter will begin to melt earlier than in the past, possibly eliminating the period of abundant water in early spring and severely impacting rice production. Furthermore, in response to the accident at the Fukushima Nuclear Power Plant caused by the Great East Japan Earthquake of 2011, demand is growing for hydroelectricity and other natural renewable energies.

However, the increasing number of dams in operation and number of dams that have been in operation for long periods have led to concern about the safety of deteriorated dam facilities and growing need to cut dam management costs. Also, the decreasing number of new dam projects in Japan is making it difficult to pass on dam technologies to future generations.

For the Japan Society of Dam Engineering, the new themes for the Planning and Research Group formed in 2009 will be to determine how effectively dams will mitigate the effects of global warming in the future, and to what degree it will be possible to generate hydroelectric power as a natural renewable energy. With the increase in the number of dams in operation, measurement technology for managing dams needs to be improved, so the Measurement/Management Research Group was newly established in 2011 and has begun research on dam body measurement instruments and systems.

The Japan Society of Dam Engineering must take

advantage of its unique characteristic as Japan's only organization for dam engineers and researchers from industry, government, and academia, to expand its scope of research. It must also expand and continue its publicity activities in order to help the general public understand the purposes and effectiveness of dams through effective public relations via the mass media.