

**THEME 9 ENVIRONMENTAL AND
SOCIAL CONSIDERATIONS IN
LARGE-SCALE PROJECTS:
SUPPORTING THE RECONSTRUCTION
OF SUBMERGED COMMUNITIES**

ABSTRACT

Large-scale projects, such as dam construction, could adversely impact local communities and ecosystems if appropriate measures are not taken. The entire community could be submerged and collapsed. After residents protested the construction of dams in Japan, the government recognized that environmental and social considerations were important and revised policies for constructing large-scale facilities. One lesson learned from the opposition movements was the necessity of involving local communities in planning and implementing the processes of rehabilitating their daily lives with sufficient explanation and thorough dialogue.

Resettlement may have led to difficult compensation negotiations. The Japanese government has compensated for the resettlement appropriately and fairly in accordance with uniform compensation standards and effectively supported the relocated residents to reestablish their daily lives by developing the relocation site as a part of the project. Furthermore, the involvement of the people residing downstream of the urban areas is important in revitalizing reservoirs and upstream water source areas, expecting to achieve a deep understanding and connection with the relocated residents.

The necessity and profitability of the project and its environmental impact must be considered in public works projects. Japan has established a system to define procedures for environmental assessment and provide opportunities for residents and related parties involved in providing their opinions as part of the assessment process.

The government implements various conservation measures to mitigate the impact of water resource development facilities on the natural and social environment. A sustainable economic society is achieved by incorporating environmental conservation into society's development as a social objective and internalizing it in society.

CHAPTER 1 INTRODUCTION

Large-scale projects, such as dam construction, may adversely impact local communities and ecosystems. The negative environmental and social impacts of large-scale projects should be managed and the livelihoods of communities and individuals be reconstructed, in addition to providing compensation, recognizing that entire settlements and communities could be submerged and collapsed.

Water resource management projects aiming to enhance quality of life should avoid adverse effects on ecosystems and societies. This theme introduces a system to reconstruct the livelihoods of communities and individuals of the areas that may be submerged when dam projects are implemented and explains the system used to assess and mitigate the impact of dam projects on the environment.


Large-scale water resource development projects may have adverse effects on the natural and social environment if the projects do not implement appropriate mitigation measures. Large-scale structures may change the way of life of residents and communities, dividing or dismantling communities, and prevent their cultural inheritance. Residents resettled from reservoir areas sometimes face difficulties in reconstructing their lives with a change in work style.

Construction projects often alternate the natural topography and adversely affect beautiful landscape. River-crossing structures such as dams and weirs change the flow of water and sediment. Such physical changes may threaten the habitat and behavioral range of plants and animals in the project area. Changes in the flow of water and sediment will also impact the downstream and sea areas.

In Japan, the movement opposing the construction of dams in the 1960s changed the mechanisms of land compensation, reconstruction of residents' lives, mitigation of the impact of reservoir areas, and revitalization of the areas around the reservoir. If efforts are not made to support and compensate residents who suffer losses due to dam development, this would lead to intensification of their opposition resulting from doubt and anxiety. Supporting people in reconstructing their lives would mitigate or eliminate their losses and promote project implementation and revitalization around reservoir areas.

Water resources management is closely related to the Sustainable Development Goals (SDGs), and the relationships between environmental and social considerations and the SDGs are shown in the following box.

Relationships between Environmental and Social Considerations and the SDGs:



- (1) Local education is provided through the Upstream-Downstream Exchange Project in which people submerged by the reservoir area and those residing in the downstream dam area benefiting from the project participate:
SDG4 “Quality Education” 4.7 “Knowledge and skills they need to create a sustainable society.”
- (2) Measures are being implemented to mitigate the environmental impact of discharges released from the dam on the downstream areas:
SDG6 “Clean Water and Sanitation” 6.6 “Protect and restore water-related ecosystems”
- (3) Legislation is in place to stabilize the lives and improve the welfare of residents in reservoir areas affected by submergence due to dam construction and others and revitalize these areas. The affected residents are supported by the national government and downstream beneficiary areas:
SDG10 “Reduced Inequalities” 10.4 “Introduce policies, including tax, wage, and social security policies.”
- (4) Legislation concerning the Forest Environmental Tax and the Water Resources Tax has been developed and financial resources from these taxes have been used for forest conservation and development:
SDG15. “Protect the richness of the land” 15.2 “Promote the implementation of sustainable management of all types of forests”
- (5) People outside the reservoir area, such as those in the area downstream of the dam construction and in the adjacent urban areas, are getting involved in the issues concerning the reservoir and water source areas, resulting in a deep understanding and connection with the affected residents and revitalization of the areas:
SDG17. “Partnerships for the Goals” 17.7 “Encourage and promote effective public, public-private, and civil society partnerships”

CHAPTER 2 PROMOTION TO DEVELOP WATER SOURCE AREAS AND SUPPORT FOR RELOCATED RESIDENTS

2.1 Measures for Local Communities and Residents who would be Submerged due to Dam Construction

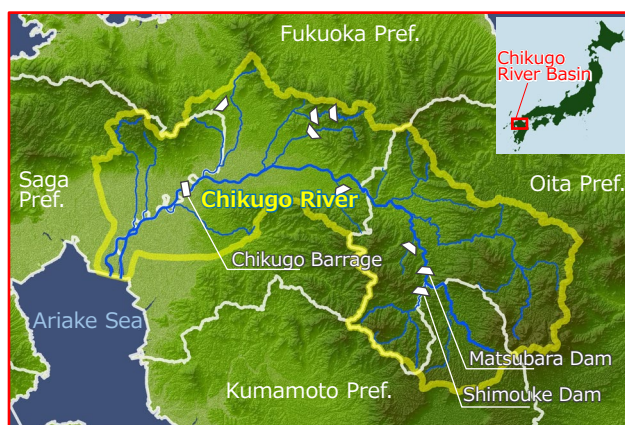
As dam construction may affect local communities, the government should reconstruct the submerged local communities and revitalize the livelihoods of affected residents.

Dam projects may divide and destroy local communities by creating reservoirs. This section explains how the Japanese government changed policies for supporting local communities submerged through learning from the epoch-making opposition movement against the Shimouke dam project.

(1) Opposition Movement against Constructing the Shimouke Dam “*Hachinosu-jo* Dispute”

In Japan, the *Hachinosu-jo* dispute over the construction of the Matsubara-Shimouke dams had an overwhelming impact on the environmental and social considerations of public works projects. It was the largest opposition movement in Japanese dam history and lasted for 13 years from 1958 to 1971.

The catalyst for constructing the dams came in 1953, when the Chikugo River basin was hit by torrential rains causing severe flooding that affected 1.7 million people and claimed 980 lives. As part of flood protection measures, the national government planned the Matsubara and Shimouke dams (Figure 2.1).



Source: Preparation based on the Japan Water Agency's website

Figure 2.1 The Chikugo River Basin and Shimouke Dam

Hachinosu-jo (literally Beehive Castle) is the name of a series of watchtowers built at the planned site by residents opposed to the dam. The administrative lawsuit filed by Murohara, who spearheaded the movement, questioned the consistency between public works and basic human rights and stressed the importance of protecting the property rights of residents whose homes would be submerged. Murohara devised many unique ways of interference by releasing ducks into the river, forcing cows and horses to participate in the protests, stretching water pipes at various places, and attaching name cards of supporters to the surrounding trees (memorial trees for the struggle). The government clashed with the residents, removed the castle by force, and promoted dam construction. The dam lake was named Beehive Lake in 1988, referring to the conflict at Hachinosu-jo and expressing the hope that the movement would be remembered. The nameplate of Shimouke Dam was copied by the Ministry of Construction (now the Ministry of Land, Infrastructure, Transport, and Tourism (MLIT)) from a signboard written by Murohara. In addition to the Hachinosu-jo dispute, the following words by Murohara should be remembered in the context of public works projects: “Public works should be reasonable, lawful, and compassionate.”

(2) Establishment of a Support System for Residents of Submerged Areas

This movement had a big impact on the government, and the Act on Special Measures for Water Source Area was enforced in 1974 when the dam was completed. In 1962, the Outline of Standards for Compensation for Losses was issued, setting out standards for “general compensation” for land owned by individuals. A special income tax deduction system was established for expropriation and exchange. The details are discussed in Section 2.3.

The government supports the reconstruction of the lives of those involved in the submergence and to mitigate the impact on, and revitalize, the water source areas. These measures comprise four pillars that complement each other (Figure 2.2). The details are provided in Sections 2.2, 2.3, 2.4, and 2.5.

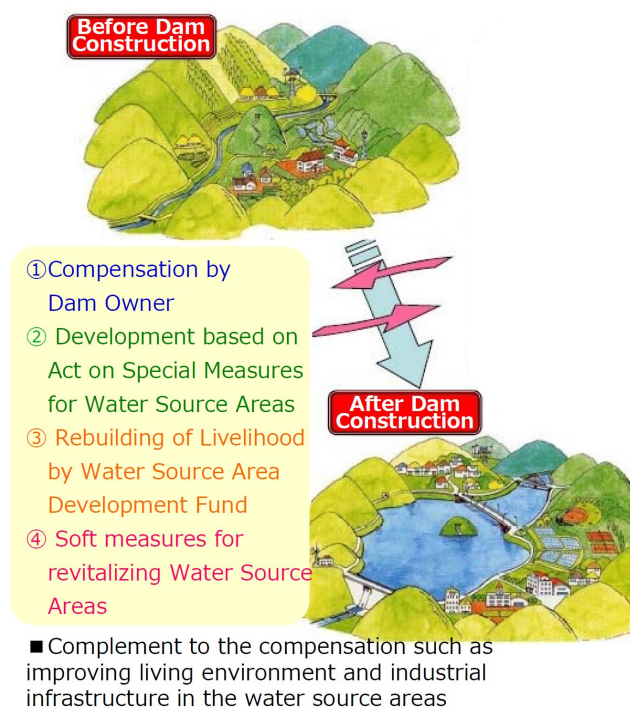
1) The implementing agency compensates by developing relocation sites for residents of the submerged land and by relocating public facilities.

2) The government implements projects for improving agricultural lands, roads, water supply, sewerage, public facilities, welfare facilities, and facilities for tourism and recreation in accordance with the Act on Special Measures for Water Source Areas, in the case that the construction of dams causes significant changes in the basic living conditions of the residents.

3) The Water Source Area Development Fund, with contributions by the downstream beneficiaries, is used to reconstruct the livelihood of residents, promote the development of water source areas, and maintain forests. The fund has been

established by local governments downstream since 1975 to supplement compensations provided by implementing agencies and projects under the Act on Special Measures for Water Source Area.

4) Soft measures include activities to support the area, such as a contest to design a tour to the water source area and introduction of its local specialty, establishment of a support network, and formulation of a vision. The support network is established by people and organizations that are willing to work for regional revitalization. The activities of the network aim to resolve problems and design new initiatives by sharing knowledge and information and expanding their relationships. The local governments and residents jointly formulate the water source area vision, which is an action plan to revitalize reservoir and water source areas. As of 2019, 120 dams had already formulated their vision.



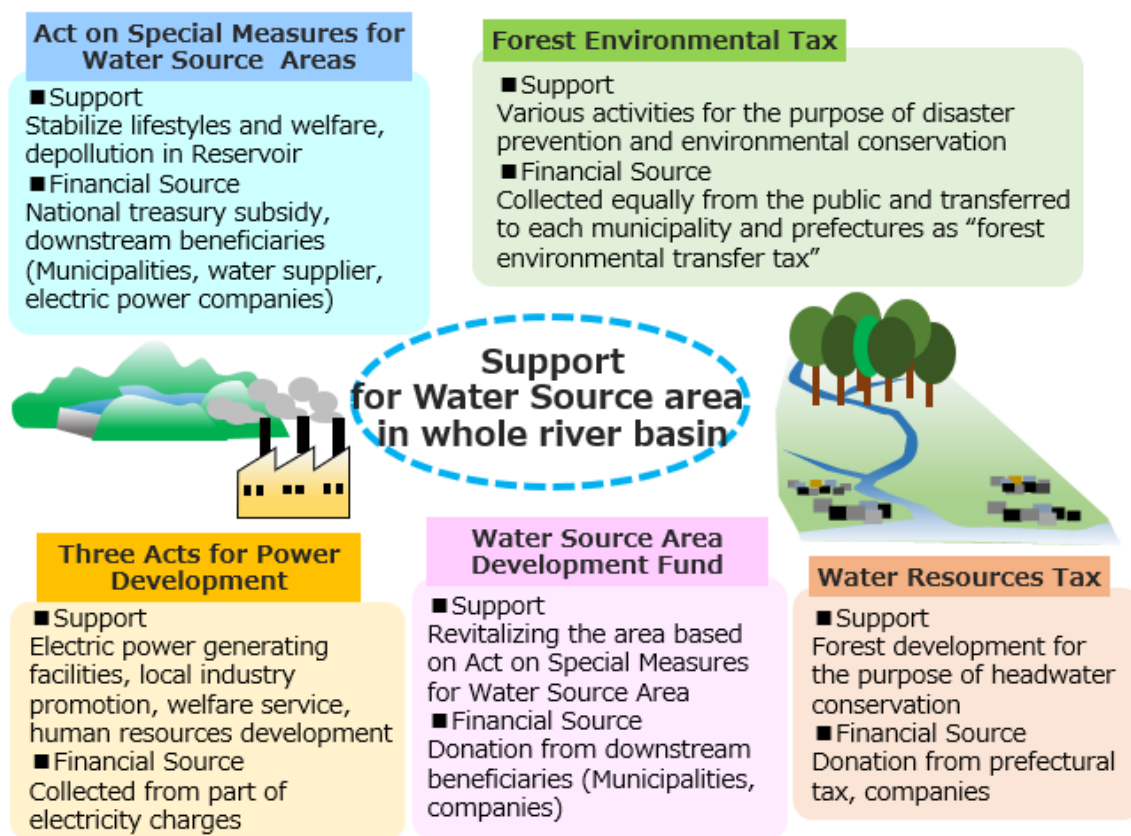
Source: Water Resources in Japan (2014)

Figure 2.2 Overall Picture of Measures for Water Source Areas in Dam Construction

2.2 Establishing Legal System and Securing Financial Resources

It is necessary to establish a legal system and financial mechanisms for developing the water source area.

To support environmental conservation in the water source area and livelihood reconstruction for residents in submerged reservoir areas, various legal systems were established to secure financial resources in Japan (Figure 2.3) (Theme 3: Finance, Section 3.2).



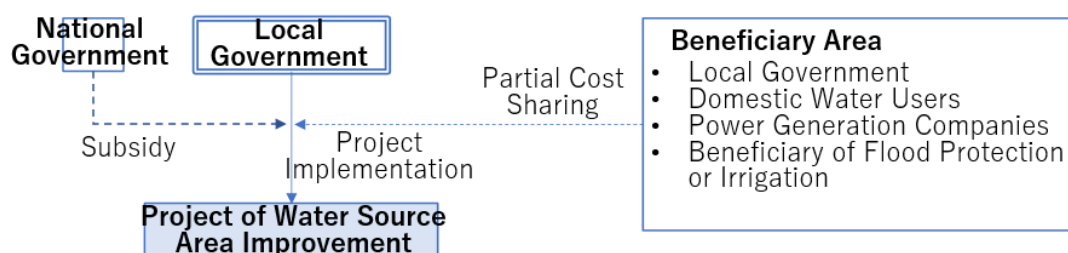
Source: Project Research Team

Figure 2.3 Support for Water Source Areas in the River Basin

- (1) The Acts Concerning Water Source Area Measures
 - 1) The Act on Special Measures for Water Source Area (Established in 1973)

The Act provides infrastructure improvement for people's lives and industries by supporting residents, communities, and related local governments in areas where residents suffer from submergence due to dam construction. The improvement work aims to revitalize the reservoir and upstream water source areas, and stabilize and improve residents' lives and welfare. The prefectural governor prepares a draft plan for the improvement of the designated water source area based on proposals from the municipal mayors. The MLIT decides on a "water source area improvement plan" covering 24 fields (Table 2.1). The percentage of national subsidies has increased. Part of the cost borne by the local government of the water source area can be covered by beneficiary organizations. The beneficiaries include domestic water users, power generation companies, irrigation associations, and local governments in the beneficiary areas. In many cases, the cost-sharing ratio is based on the cost allocation of the dam

construction (Figure 2.4). Tax incentives can also be granted for a certain period to manufacturers and inns to help revitalize the region.



Source: Project Research Team

Figure 2.4 Cost Sharing for Projects Related to the Water Source Area Improvement Plan

Table 2.1 Projects Covered by the Water Source Area Improvement Plan

Development Projects for Designated Dams	
1) Land improvement projects	13) Project for improvement of joint use facilities for modernization of management of agriculture, forestry, and fishery
2) Erosion control projects	14) Projects to improve facilities for the protection and use of natural parks
3) Flood protection projects	15) Projects for the development of community centers and other assembly facilities, or facilities for the preservation and utilization of cultural properties
4) Road improvement projects	16) Sports and recreation facility projects
5) Businesses related to small-scale water supply	17) Projects for the development of nursery schools, children's halls, and children's amusement parks
6) Projects related to the development of sewerage systems	18) Projects to develop day service centers for the elderly, welfare facilities, etc.
7) Projects related to the construction of compulsory education facilities	19) Projects to improve facilities related to the care, activities, and welfare of the elderly or physically disabled
8) Projects related to the development of clinics	20) Projects to improve wired broadcast telephone service facilities or radio telephone
9) Projects for the development of residential land	21) Projects to improve firefighting facilities
10) Projects for construction of public housing	22) Project for the construction of sewage treatment facilities for livestock management
11) Projects to improve forest roads	23) Project for improvement of sewage treatment facilities
12) Afforestation projects	24) Refuse Disposal Facility Improvement Project

Source: MLIT, Outline of the Act on Special Measures for Water Source Area

2) Three Acts for Power Development

Three acts for power resources is the generic term for 1) The Act on Tax for Promotion of Power-Resources Development, 2) The Act on Special Accounts for Electric Power Development Acceleration Measures, and 3) The Act on the Development of Areas Adjacent to Electric Power Generating Facilities. The main purpose of these laws is to promote power supply development, including hydropower dam construction, and to facilitate operations by helping the project areas. The special account designated in (2) above, of which the resources are taxes paid by the power company for promotion of power resources development, provides subsidies for employment of the residents and development of improvement projects around the project area. Until 2002, subsidies were restricted to public facilities. However, in

2003, the subsidy was expanded to include soft projects such as promoting local industries, welfare services, and human resources development, with the aim of revitalizing local industries and economies and improving the welfare of local residents.

(2) Establishment of Water Source Area Development Fund

The Water Source Area Development Fund is used for reconstructing residents' livelihoods and developing the community to supplement compensation undertaken by implementing agencies and projects implemented under the Act on Special Measures for Water Source Areas. The funds' resources are collected from beneficiaries located downstream, including local governments, power generation companies, water suppliers, and private companies. The government implements various measures for the reconstruction of the livelihood of submerged residents, such as dispatching counselors, providing interest subsidies for the acquisition of relocation sites, conducting community development, and maintaining water conservation forests. Fund resources can be used for projects that benefit a specific group, provided the projects are in line with the purpose of the donation. Generally, taxes are spent on the public and cannot be used to benefit a specific person or company.

In the Tone River System, the governments of the Tokyo Metropolitan Area in the downstream area, and Gunma Prefecture in the source area jointly implemented the upstream-downstream exchange project since the 1996 drought event. This exchange project aims to revitalize the water source area through a mutual exchange of opinions and activities of the residents. The main exchange projects conducted to date are listed below:

- Tours to the water source area during summer vacation (tours to dams, nature observations)
- Afforestation in the water source area
- Release of salmon fry and tour to river facilities
- Fair for the water source area in Gunma Prefecture (presentation to introduce water source area using display panel, sale of local specialty)
- Tours to understand the current situation concerning water in Tokyo (tour to water treatment plants, tour along river by water bus)

The website of the project introduces the exchange project, reports on the projects, essays by children participating in the projects, and various information to deepen the understanding of the project.

(3) Financial Support by Private Companies

The financial resources of private companies have been used, as well as public resources, to promote the development of water source areas. For example, financial support from private companies that have a company policy of social contribution based on corporate social responsibility (CSR) is expected to improve water conservation forests.

In 1992, during the construction of the Miyagase dam in Kanagawa Prefecture, the Miyagase Dam Area Promotion Foundation was established to support activities in water source areas. In addition to the relevant local governments, the foundation includes seven private companies as contributors, all of which are actively engaged in CSR activities in various industries, such as transportation, machinery, banking, and seedlings. The foundation manages and operates parks, training facilities, canoeing areas,

exhibition facilities, and other facilities in harmony with the natural environment. The foundation also organizes events, such as product exhibitions, marathons, and canoeing classes.

(4) Financial Resources for Water Source Area Conservation

1) Forest Environmental Tax and Forest Environmental Transfer Tax

The Forest Environmental Tax and Forest Environmental Transfer Tax were enacted in 2019, and local governments started using the tax to improve resilience against natural disasters, prevent soil erosion and excessive runoff, improve water resource conservation, conserve biodiversity, and increase carbon dioxide absorption. In Iga City, Mie Prefecture, the artificial forests without maintenance are increasing. A forest improvement project is promoted using a forest environmental transfer tax for water resource conservation and the prevention of soil erosion and global warming (Figure 2.5).



Source: Forestry Agency Website

Figure 2.5 Photos of the Forest Improvement Project in Iga City, Mie Prefecture (Left: Before Implementation, Right: After Implementation)

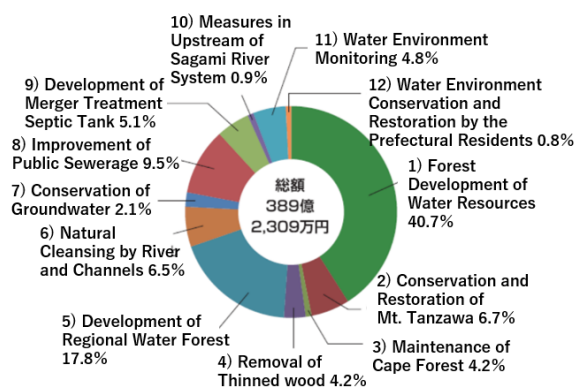
2) Water Resources Tax

The water resource tax is used to restore the forest function of water resource conservation. Local residents bear the tax burden. Kanagawa Prefecture formulated the Kanagawa Five-Year Plan to conserve and revitalize the water source environment. The prefecture has also promoted measures using the water source environment conservation tax. For example, the reforestation project aims to conserve forests upstream of dams, which serve as natural water reservoirs for cities. The project covers a forest area of approximately 60,900 ha, located mainly upstream of the Shiroyama, Miyagase, and Miho dams, which supply drinking water to metropolitan areas including Yokohama and Kawasaki (Figure 2.6). The prefectural government manages the private forests owned by individuals. The average annual contribution per prefectural resident is 890 JPY (8 USD), and the total annual



Source: Kanagawa Prefecture website

Figure 2.6 Forest in Water Source Area



Source: Comprehensive Evaluation (Interim Evaluation) Report, June 2020, Kanagawa Prefectural Council for Conservation and Restoration of the Water Source Area Environment

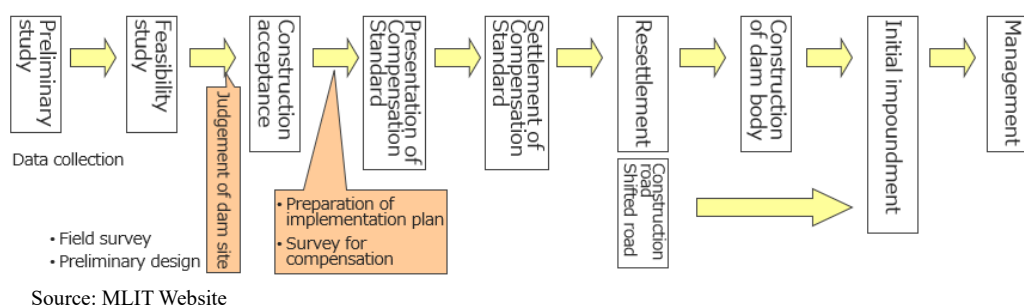
Figure 2.7 Projects Funded by Kanagawa Prefecture's Reservoir Environmental Conservation Tax

contribution is approximately 3 billion JPY (27 million USD), including donations from companies (Figure 2.7).

2.3 Fair and Satisfactory Compensation Process

The government should establish a system for appropriate and equitable compensation based on a unified standard.

Land compensation is provided for the expropriation or use of land based on the Land Expropriation Act and River Law. A survey for compensation is conducted, and compensation negotiations commence based on the survey results and by presenting the standards (Figure 2.8).



Source: MLIT Website
Figure 2.8 Process of Dam Project Implementation including Compensation Negotiations

Compensation includes general compensation for the land and buildings of individuals and companies and public compensation for public facilities. General compensation is based on the concept of compensating for property values. For example, the price of land is calculated by examining normal transaction prices for surrounding land, public notice prices, and standard land prices; benchmarking the appraisal value by a real estate appraiser; and examining various factors such as street conditions, environmental conditions, size, frontage, and shape of the land. Public compensation involves maintaining the function of the target public facility and does not constitute compensation for property value.

A land compensation process in dam projects covers a wide range of roles beyond merely acquiring the necessary land. This process can promote communication between the implementing agency and landowners, which may deepen mutual understanding. This process also helps underpin the livelihoods of affected persons by reflecting the thoughts of landowners.

2.4 Relocation Site Development as Part of the Project

From the perspective of ensuring continuity for the community and industry, development of the relocation site should be included as part of the project.

By preparing relocation sites, the local community and industry can continue their activities, and it is easier to reconstruct the livelihoods of relocated residents. Dam projects may result in the total loss of bases for living, such as the functions of the community for residents in submerged areas. Developing relocation sites is recognized as one of the keys to the reconstruction of livelihood for the residents and restoration of their loss.

In Japan, implementing agencies basically cover compensation. In recent years, however, affected persons expressed their wishes to relocate within their communities; thus, providing a relocation site has become a more popular option. The 2001 revised Land Expropriation Act stipulates that the implementing agency should make efforts to help residents acquire relocation areas when affected residents lose their bases for living. The provision clarified the role of implementing agencies in their efforts to reconstruct residents' livelihoods. If affected persons wish to relocate in groups, large-scale relocation sites are required. The related issues are as follows:

- Given the lack of suitable land for relocation, acquiring appropriate land might be difficult.
- Relocation plans involve uncertainty because the decision to relocate as a group depends on negotiations.
- There are restrictions on the price of the relocation site, and it is necessary to consider whether the price is within the range of compensation for losses.

The project provides relocation sites in cooperation with local governments, and activities under the Act on Special Measures for Water Source Areas support this process. Regarding (c), if the cost exceeds the assessed value of land compensation, the affected persons need to bear the difference.

For example, the Ministry of Construction developed the Miyanosato housing complex as a relocation site for the Miyagase dam project in Atsugi City, Kanagawa Prefecture. Of the 281 persons who relocated due to the project, 190 (68%) were relocated to the Miyanosato relocation site. In Kawarayu Onsen in Gunma Prefecture, the Yanba Dam submerged the hot spring resort, and many residents requested that their living infrastructure, including inns and public baths, be relocated en masse to a higher ground (Theme 1-3: Public Participation and Decision-Making Process. Chapter 2). This method is called the on-site reconstruction (slip-up) method. It enables relocation while retaining the existing local community to ensure that the living infrastructure remains unchanged. The construction of a relocation site was delayed due to prolonged opposition, and many residents had to leave their hometown. One lesson learned is that constructing relocation sites from an early stage, as a basis for reconstructing people's lives, could provide relief to people with submerged land. Smooth negotiations facilitate group relocation, which leads to early construction and shortens the construction period.

2.5 Involvement of People Outside the Water Source Areas

It is necessary to involve people residing outside the water source areas, such as downstream urban area, in revitalization of the water source area through deep understanding about, and connection with, people in the reservoir and water source areas with interaction and cooperation in various aspects.

(1) Supporting Livelihoods

Measures for revitalizing reservoir and water source areas include coordinating between people involved in revitalization, supporting human resource development, developing tourism programs, and expanding marketing channels for sales of local special products. Since 2009, the MLIT has been implementing the “villages support project in water source area” to revitalize villages in the water source area. This support promotes the creation of a mechanism to earn money in the area through economic activities such as sales and promotion of local special products and attracting tourists conducting PR nationwide. However, many villages have little human resources and expertise for revitalization, resulting in insufficient activities.



Source: Headwater Villages Support Project, MLIT

Figure 2.9 Contest to Design a Tour to Villages in Water Source Area

A contest suggests a trip to introduce the local resources of villages in the water source area (Figure 2.9). The MLIT organized this in cooperation with the tourism industry. In 2019, eight award-winning designs were selected from across the country using applied travel planning designs. The award-winning designs, including the past winning designs, are shown on the website. Also, the MLIT and food distribution industry have jointly promoted exhibitions targeting buyers nationwide to support the wider distribution of special products.

(2) Economic Revitalization Using Reservoirs

Utilizing reservoirs as tourism resources supports the local economy. According to an MLIT survey in 2014, 567 events were held during the year at 91 dams nationwide, with approximately 1.29 million participants. The events included sporting events, facility tours, and nighttime events, such as illumination, exhibitions, and performances.

Devising Ways for Facilities to Enhance their Appeal

Projection mapping on the dam body (Amagase Dam)

The event was planned based on an idea by a young employee of the Kinki Regional Development Bureau that many would enjoy a laser light source show at a dam. With the cooperation of a local university, a video was created, and 1,200 people visited the dam in two days.



Source: Yodo River Dams Integrated Management Office website

Ingenuity to Utilize the Space Created by the Infrastructure

◆ Triathlon tournament utilizing the dam environment (Obara Dam)

A triathlon event is held, optimally exploiting the dam environment. The reservoir hosts swimmers and bikers, and the run course covers the scenic circumference. With almost no waves, swimming is easy, and it is a popular course.

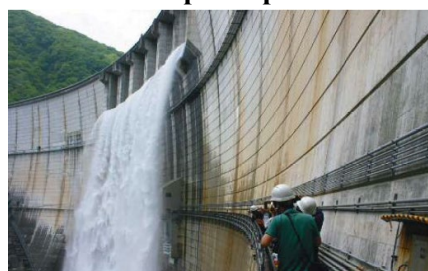


Source: Izumo River Office website

Devising ways to collaborate with the private companies to secure response personnel

◆ Backstage tour by private companies (Kawaji Dam, etc.)

A social experiment is underway to conduct dam tours by private companies. The tours are fee-based and take visitors to three dams located nearby. Since the tour takes visitors to the dam embankment and the catwalk, private operators are pre-trained in safety management and facility guidance by the facility manager. Some tours also include the reservoir tours by amphibious bus. Local travel agencies have been actively attracting foreigners to infrastructure tours. The tour is designed to meet inbound needs by combining a elements unique to Japan, such as experiencing kimonos, watching Japanese dance performances, and a dam tour using an amphibious bus.



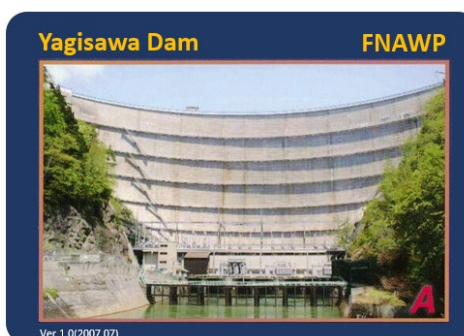
Source: Website of Kinugawa dam integrated management office



Source: Nikkou City website

(3) Dam Data Card Distribution

The dam offices of the MLIT and the Japan Water Agency (JWA) have been distributing “dam data cards” to visitors since 2007. Currently, prefectures and power generation companies also distribute these cards. The size of the cards and the information contained are standardized with the front side photographs of the dam and the rear showing the dam type, reservoir capacity, and technical features (Figure 2.10).



Source: MLIT Website

DAM-DATA

Location	: Minakami Town, Tone-gun, Gunma Prefecture
Name of river	: Tone River, Tone riverine
Dam type	: Arched Concrete Dam
Gate	: overflow type & 2 stages, 2 roller gates
bank height / length	: 131m/352m
Dam Volume	: 204 million 300 thousand m ³
Authority	: Japan Water Agency
Completion	: 1959/1967

Random Information

There's no road at the upstream of the Dam. Place around the reservoir is remained wild nature and treasure house of animals and plants. In winter, the place is covered with snow and snowfall accumulation becomes 12m, which is one of the heaviest snowfall area in Japan. These snow is important water resource for Tokyo metropolitan area.

Special Technology

The dam consists of 3 type materials, main part of dam is arch type concrete, Spillway is concrete of gravity, and cutoff is made with rockfill. The scene of discharge from ski jump type spillway which is 30m height is incredible.

Figure 2.10 Example of Dam Data Card

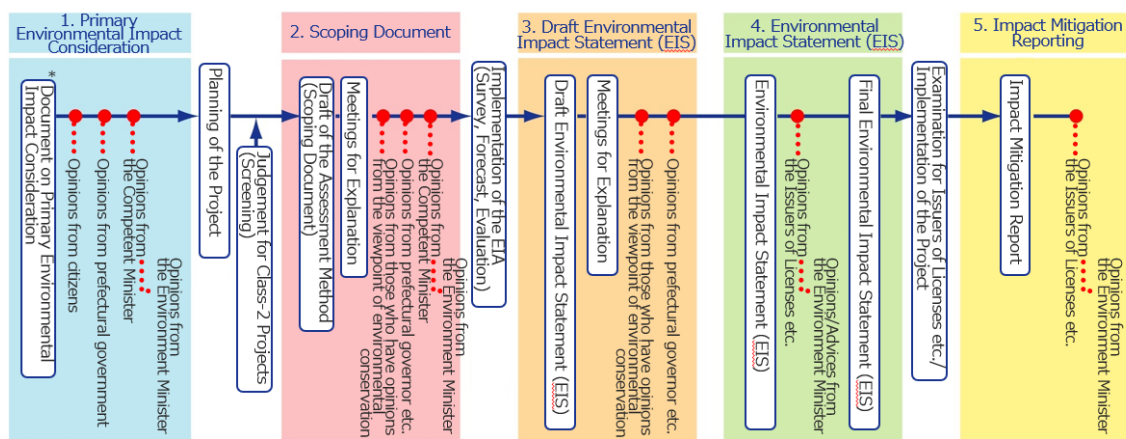
CHAPTER 3 ENVIRONMENTAL AND ECOSYSTEM CONSERVATION IN WATER SOURCE AREAS

3.1 Environmental Impact Assessment and Countermeasures

An appropriate project planning requires adequate assessment of the environmental impacts and preparation of environmental conservation measures to be undertaken.

(1) Environmental Impact Assessment (EIA)

To prevent serious environmental impacts caused by the project of water resource management, it is important to consider not only the necessity and profitability of the project but also the requirements of environmental conservation measures. The environmental impact assessment (EIA) system consists of an investigation, prediction, and evaluation of the environmental impact, disclosure of the results, and requests for feedback from the public. Based on the results, a better project plan is developed from an environmental conservation perspective. EIA were first institutionalized in the United States in 1969 and have since been rolled out in many countries worldwide. In Japan, EIA were introduced in 1972. Subsequently, the system was established for port and harbor planning, landfills, power plants, and bullet trains around 1980. The EIA Act was enacted in 1997. Water resource management projects subject to EIA include 1) dams and weirs, 2) floodways, and 3) lake development. They are divided into two types according to scale: Class-1 projects, which EIA are always conducted, and Class-2 projects, which it is individually determined whether EIA are necessary.



* Primary environmental impact consideration for Case-2 projects will be conducted voluntarily.

Source: Ministry of the Environment website

Figure 3.1 Procedure of Environmental Impact Assessment

A statement of consideration is a document that summarizes the review results prepared for a Class-1 project. This review includes issues for environmental conservation. This enabled environmental considerations at the early stage of the project. In 2011, the Act was revised to introduce the statement of consideration procedure as a strategic environmental impact assessment (SEA) before the project implementation stage (Figure 3.1). Before the revision of the Act, EIA was conducted at a stage when the framework of the project, including the general location and scale of the project, had already been decided. Thus, it was sometimes difficult for the project owner to respond flexibly to the consideration and implement the measures. The procedure for a statement of consideration introduced by the revision

of the Act covers the stage of consideration of individual project plans (the stage of consideration of the location, scale, layout, and structure of facilities of a project), which enables more flexible environmental considerations and is expected to avoid or reduce environmental impacts more effectively than before.

All prefectures and most major cities have EIA ordinances. The content varies according to the local circumstances and plays a key role in environmental conservation. However, duplicated procedures required by the EIA Act and the local government for one project may cause an excessive burden on project owners. Local governments can establish procedures for related items, such as communities and cultural properties, which the EIA Act do not cover.

To promote high-quality EIS, the Ministry of the Environment (MOE) has been operating the Environmental Impact Assessment Database (“EADAS”) since 2014. Various data related to environmental conservation can be viewed in an integrated manner through Web GIS, and a website for mobile devices such as smartphones has been established.

(2) Ensuring Consultation Processes with Residents

EIA requires a process that reflects the information and knowledge on conservation from many residents. In Japan, five EIA documents are specified by the Act according to the procedural stage: Consideration Document, Methodology Document (Scoping Document), Preparatory Document (Draft Environmental Impact Statement), Evaluation Document (Final Environmental Impact Statement), and Report (Impact Mitigation Report). There are three opportunities for residents to express their opinions to project owners. Any person with an opinion on the methodology document and preparatory document can express their views by submitting a written opinion within six weeks of the publication of each document. The opinions received on the methodology and preparatory documents were then summarized by the project owner before being sent to the prefectural governor and the mayor of the municipality. Information about the briefing session and the public inspection and publication of the EIA report is publicly announced through the official gazette, the PR magazine of the local government, or a daily newspaper. The information can be publicly inspected at places easily accessible to the public, such as the offices of project owners, relevant local governments, and websites.

The MOE has prepared a collection of best practices and made them available online. This reflects issues highlighted about the publication of documents and explanatory meetings held during the EIA process, such as “insufficient public awareness of the meetings,” “explanatory materials are not easily understandable,” and “insufficient time secured for questions and answers in explanatory meetings.” During the case studies, issues related to public awareness, EIA reports, and explanatory meetings were summarized, and the best practices were introduced.

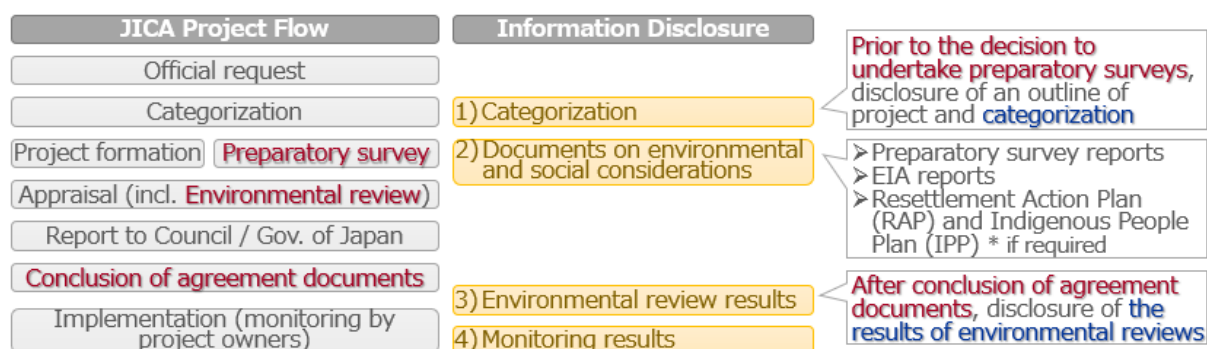
(3) JICA’s System on Environmental and Social Considerations

Guidelines for Environmental and Social Considerations of the Japan International Cooperation Agency (JICA) (2010) present the responsibilities and procedures for environmental and social considerations and the requirements for project owners. JICA applies SEA to the master plan and encourages project owners to ensure that environmental and social considerations are efficiently implemented. JICA recognizes the following seven principles:

- 1) Addresses wide-ranging impacts
- 2) Measures from the early stage to the monitoring stage of the project.
- 3) Responsible for accountability.
- 4) Ensures participation of stakeholders.
- 5) Discloses information.
- 6) Enhances its organizational capacity for environmental and social considerations.
- 7) Strives for achieving promptness.

Projects are classified into four categories according to the extent of impacts: A) likely to have significant adverse impacts, B) likely to have fewer adverse impacts than those of Category A, C) likely to have minimal or little adverse impact, and FI) funding to a financial intermediary or executing agency. The sub-projects cannot be specified prior to JICA's approval of funding. The categorization was disclosed before deciding whether to undertake preparatory surveys (Figure 3.2) and revised as necessary. When the preparatory surveys were completed, relevant documents were disclosed for Category A projects prior to environmental review. An environmental review was conducted to confirm whether the environmental and social considerations of the project were appropriate.

To implement environmental and social considerations that are more in line with the actual situation and build an appropriate consensus, project owners should take the initiative in consulting with local stakeholders as a rule. In particular, for projects in Categories A and B, project owners are encouraged to consult local stakeholders at an early stage to identify development needs, locate problems, consider alternatives, and provide necessary support. Project owners should provide timely and adequate compensation and assistance for those affected by involuntary relocation and loss of livelihood. A relocation plan and sufficient information should be disclosed in advance, and consultations with the affected communities should be conducted. JICA supports project owners through cooperative projects when necessary. Recipient countries must establish procedures to handle complaints arising from communities affected by a project.



Source: Advisory Committee on Revision of JICA Guidelines for Environmental and Social Considerations, The 1st Meeting materials (August 2020, JICA)

Figure 3.2 Environmental and Social Considerations Process in JICA Projects

JICA established an environmental and social consideration advisory committee to gain support and advice on the environmental and social consideration processes. The committee comprises external experts sufficiently familiar with JICA projects, and support and advice are available during the preparatory surveys, environmental review and monitoring phases, full-scale studies, and emergencies (Figure 3.3).



Source: JICA

Figure 3.3 Advisory Committee for Environmental and Social Considerations.

3.2 Environmental Conservation Measures

By incorporating environmental conservation as one of the project objectives, water resource management projects can be realized in harmony with the environment to build a sustainable society.

Environmental, social, and economic aspects are intricately intertwined. Thus, environmental considerations should be incorporated into socioeconomic systems to maintain a healthy, bountiful, and sustainable environment. Various measures have been implemented to construct and manage infrastructure to avoid or mitigate undesirable impacts on the environment in Japan.

(1) Conservation of Ecosystems by Biotopes and Fishways

When rare species or natural treasures are found inhabiting a construction site, the related parts of the construction are changed to ensure that the habitat remains undisturbed, and conservation measures are implemented. These measures include creating a biotope and transplanting the species. Since the construction of the Miyagase dam was predicted to have a significant impact on the natural environment owing to changes in topography and other aspects, extensive conservation measures were planned to restore and create the environment. These measures could conserve habitats for diversified organisms, such as streams, ponds, and stone masonry. A variety of organisms of various sizes are now inhabiting the reservoir, including large mammalian animals (deer and wild boar), aquatic insects (tadpoles and cybister japonicus), and wild birds (mountain cicada and pied flycatcher) (Figure 3.4).

A fishway is installed for a weir and dams to avoid impeding the movement of migratory fish. To further improve the environment in which fish can easily travel upstream and downstream, natural stones in fishways are installed for wide-ranging aquatic organisms, including benthic fish and amphibians. Some fishways are installed in the sidewalls so that the run-up and fall of organisms can be observed. Figure 3.5 shows the features of the fishway at Pirika Dam.



Source: Website of the Sagami River Wide Area Dam Management Office, Kanto Regional Development Bureau, MLIT

Figure 3.4 Higashizawa Biotope Created in the Miyagase Dam Area



Fishway

Full view of fishway
When the dam was completed in 1991, a fishway was not installed. After various studies were conducted based on the request from the basin municipalities, the fishway with an extension of 2.4 km was completed in March 2005.



Lower channel in low flow channel

In the section of about 360 m from directly downstream of the dam, the river channel was dug down to secure the fish migration. Its shape meanders to imitate a natural river.



Refuge pool

A refuge space was created by placing channel bars and fallen trees for variety so that fish passing through the fishway can rest or overwinter.



Fish ladder

By installing an overflow bulkhead with a notch in a staircase pattern at the part where the height difference is large, the fish can run upstream with stops along the way.



Nature-oriented fishway

The fishway is designed to have the same conditions as the natural environment as much as possible. Cobblestones are laid on the bottom of the fishway and trees providing food and shade for the fish are planted on both banks.



Observation window

Observation windows are provided on the fishway so that people can observe the process of fish migration.

Source: Website of Hakodate Development and Construction Department, Hokkaido Regional Development Bureau, MLIT

Figure 3.5 Characteristics of the Pirika Dam Fishway

At the water source area of the Tone River, the private companies worked with residents to improve the environment. They regularly conducted landscaping and greening using flowers and other plants and cleaned up the river, targeting an attractive, beautiful, and comfortable water source area. They also built a resource recycling system by planting field mustards as educational and enlightening activities in the local environment (Figure 3.6).

(2) Reduction of the Impacts on the Natural Environment

1) Maintenance of Normal River Flow Functions

Multipurpose dams can maintain the normal functions of river water during droughts. A decrease in river flow adversely affects the river environment, including narrowing the habitat of fish and causing water deterioration. It is necessary to maintain a normal flow that satisfies both the environmental and water use requirements, determined by considering the following factors:

water rights, navigation, fisheries, tourism, maintenance of clean water flow, prevention of damage by salt, prevention of blockage of river mouth, protection of river management facilities, maintenance of groundwater levels, landscape, protection of animal and plant habitats, and securing close contact between people and rivers (Theme 1-2: Water Rights and Theme 2-2: River Basin Planning).

Hydropower generation dams released insufficient environmental flow downstream, resulting in improper river management. Power companies have secured appropriate environmental flow when water rights are renewed (Theme 3-1: Public Participation and Decision-Making Process, Section 3.2).

2) Measures for Water Quality Deterioration Caused by Dam Discharge

The environmental impacts of discharge from the dam on the downstream include the cold-water phenomenon, prolonged turbid water phenomenon, and eutrophication. Countermeasures to mitigate these issues are presented below.

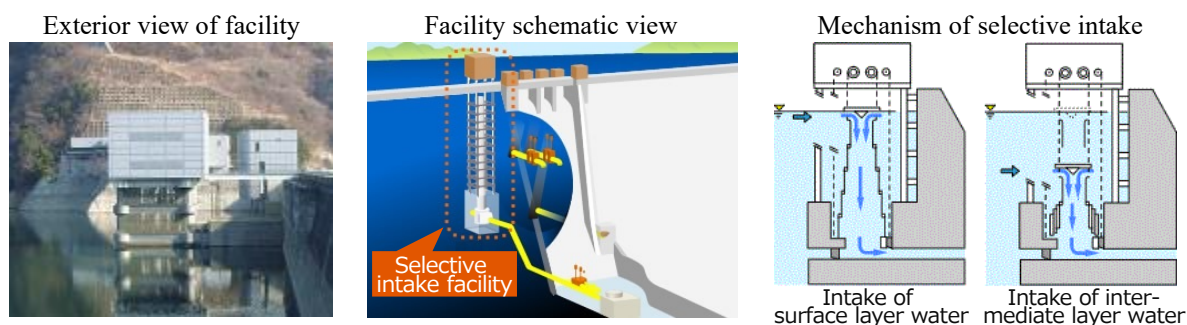
(a) Measures against Cold Water

A selective intake facility is installed on the dam to release warm surface water in the reservoir (Figure 3.7). Japan has four seasons, and in summer, reservoir water forms a temperature stratification with high water temperature in the upper layer and low water temperature in the middle and lower layers. Because of the different densities of the upper high-temperature water and middle/lower low-temperature water, the water does not mix easily. If the water intake is located only at the lower part of the reservoir, low-temperature water with low oxygen concentration is discharged downstream, which may affect irrigation, river ecosystems, and social activities in the downstream areas. An aeration system is also used to prevent temperature stratification (Figure 3.9).



Source: The Tone River Dams Integrated Management Office website

Figure 3.6 Activity of Environmental Conservation with Residents in the Water Source Area of the Tone River

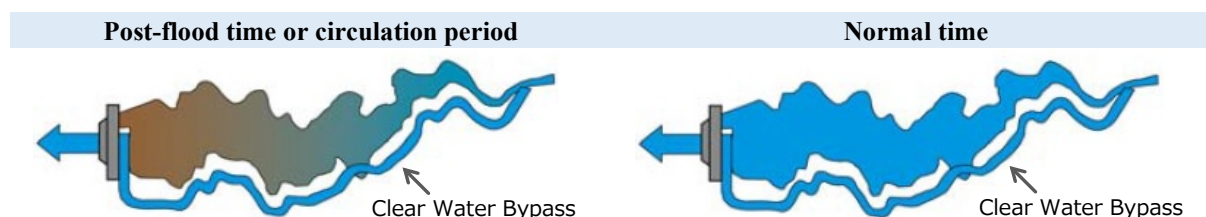


Source: Website of the Sagami River Wide Area Dam Management Office, Kanto Regional Development Bureau, MLIT

Figure 3.7 Selective Intake Facility of the Miyagase Dam

(b) Measures against Turbid Water

During flooding, turbid flood water may be retained in the reservoir owing to the fine-grained sediment. The release of turbid water causes long-term turbidity of the river water downstream. Selective intake facilities are installed to reduce the period of turbid water release. Selective intake facilities can release reservoir water from the highly turbid layer during floods, minimizing the amount of suspended solids to be deposited in the reservoir. At the Urayama Dam, a pipeline system of the clear water bypass was installed in 2007 to take the clear water near the upstream of the reservoir after flooding, thereby diverting, and releasing the water downstream of the dam (Figure 3.8).



During the post-flood time or the circulation period, turbid water spreads over the entire layer of the reservoir. Therefore, inflow water with low turbidity is taken in and released using the bypass.

Even in normal time, the bypass is used to maintain equal water inflow and outflow temperatures.

Source: Website of Kanto Regional Development Bureau, MLIT

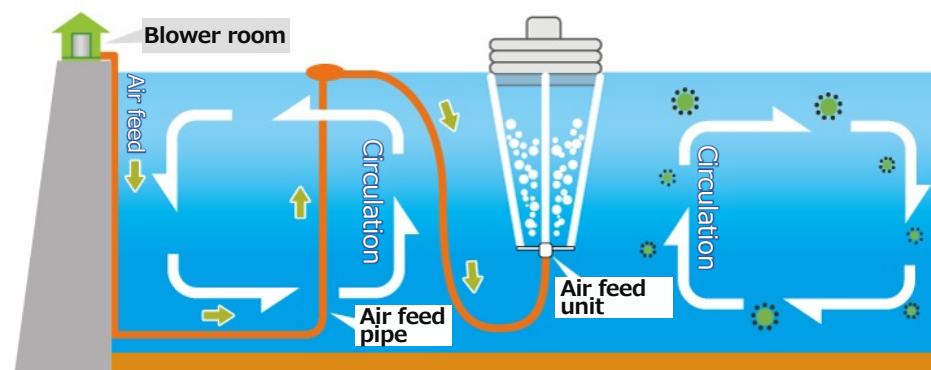
Figure 3.8 Clear Water Bypass at the Urayama Dam

(c) Measures against Eutrophication

Large reservoirs are prone to the abnormal occurrence of plankton and blue-green algae. Reservoirs have an extended retention period because of the large storage volume against a small inflow of considerable pollutants from the watershed. This causes musty odors in domestic water and increases trihalomethanes and other pollutants during chlorination and other processes.

Aeration suppresses the generation of plankton by circulating stored water and moving plankton downward. Aeration also suppresses the elution of nutrient salts from the bottom sediment by channeling oxygen to the deeper layers of the reservoir (Figure 3.9).

Fences are installed to channel nutrient-rich inflow water to the deeper layers and bypass channels to prevent polluted water from flowing into the reservoir. Measures were taken to prevent the upstream area of the reservoir from becoming polluted.



Source: Website of the Hijikawa River Dam Integrated Management Office, Shikoku Regional Development Bureau, MLIT

Figure 3.9 Mechanism of the Aeration System

3) Environmental Monitoring

Continuous environmental monitoring is needed because a dam project is expected to cause environmental changes in the habitat and ecosystem. The MLIT has implemented a follow-up system to improve the efficiency and transparency of the management process. The effects of the project and its impact on the environment were analyzed and evaluated, and the necessary measures were implemented. Follow-up committees comprising academic experts were established in each region to scientifically review the results of various surveys. The results were periodically disclosed.

(3) Forest Development in Water Source Areas

Forests play a key role in the preservation of water resources in water source areas. Rain falls on the forest, and its water infiltrates and recharges the forest area, eventually flowing out over an extended period. The ability of forests is indispensable for maintaining and restoring a sound water cycle. To ensure sustainable restoration of the recharging function of forests, forest management is required with human intervention. Artificial and countryside forests would be healthy through continuous maintenance.

Forests that are critical for the recharge function in the water source area are designated as water source area conservation forests under the Forest Act. Deforestation and other changes are regulated. Conservation forests are located in areas important for basin protection to stabilize river flow, mitigate floods and droughts, and secure water for various purposes. In 2018, the designated area was approximately 9.2 million ha, which is equivalent to approximately 23% of the national land area and 35% of the forest area. The Act requires permission from the prefectural governor when the development area exceeds 1 ha in private forests. The act requires a notification to the municipality mayor in advance regarding logging, afforestation after logging, and owing new forests.

Prefectures and municipalities' forests are often located in more remote areas than private forests. Prefectures and municipalities maintain forests to secure recharge functions in the water source areas. They have introduced a taxation system and the ownership of forests by citizens and fostered citizens' understanding of the importance of maintaining the functions of forests (section 2.2(2) for details).

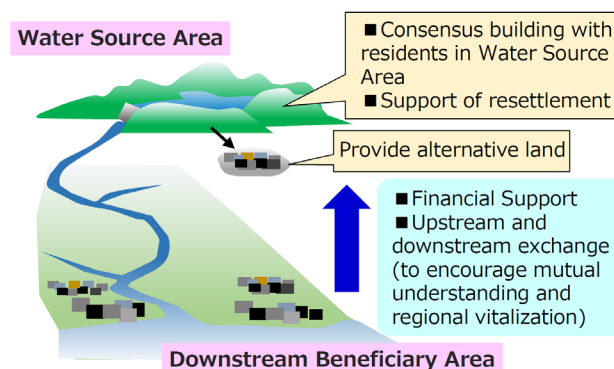
The number of NPOs conserving forests increased from approximately 600 in 2000 to approximately 3,000 in 2012. Water users in some downstream areas proactively conserve forests in the water source areas. Consequently, upstream and downstream exchanges and communication have been created. In

addition, as part of CSR activities, private companies have helped conserve forests in collaboration with customers, residents, and NPOs or helped the local community by utilizing corporate-owned forests.

CHAPTER 4 LESSONS LEARNED

(1) **Large-scale projects should be planned for the benefits of affected local communities also.** Large-scale projects, such as dam construction, could adversely impact local communities and ecosystems if appropriate measures are not taken. The entire community could be submerged and collapsed. Projects should support local communities and industries in rehabilitating their lives and activities. The project should include relocation site development as a part of the project. Support for livelihood reconstruction is required for the affected residents. Affected people must be involved in the process of consensus building and planning for reconstruction and resettlement programs.

(2) **Measures for water source areas, including financial resources, need to be institutionalized.** It is necessary to implement various effective measures for water source areas. Legal systems should be provided to implement measures and secure the financial resources necessary for implementation, such as river basin funds (Figure 4.1).



Source: Project Research Team

Figure 4.1 Concept of Support for Water Source Area

(3) **Partnerships with various stakeholders should be established to support the water source areas.** Cooperative relationships with downstream areas, private companies, and civil society organizations are crucial for mobilizing resources and developing activities. People outside the water source areas, such as those from downstream or urban areas, should be involved in efforts to revitalize the water source area. Interactions between people and those in the water source area deepen their understanding about each other and develop cooperative activities.

(4) **Assessing the environmental impact and considering conservation are prerequisites for large-scale projects.** Large-scale water management projects may affect the natural environment. To improve the project plan, there is a need to properly assess the environmental impacts, and carefully consider environmental conservation measures. It is also necessary to establish a procedure for environmental impact assessments, prepare the necessary documents at each stage, and incorporate residents' opinions into the assessment. Various environmental conservation measures should be implemented when constructing and managing facilities to avoid or reduce the adverse impacts.