

# Mitigating the Social Impacts of the Yamba Dam Project

## The Roles of Japan's Act on Special Measures for Reservoir Area Development

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### Abstract

The Yamba Dam, located in Gunma Prefecture, central Japan, is at the final stage of construction and is scheduled to be completed in 2020. The construction project has been opposed by local residents and was deadlocked for more than 30 years. One of the key devices which helped resolve the dispute and ensure that the burdens and benefits are fairly shared between the beneficiaries of the project and the locals around the dam was Japan's Act on Special Measures for Reservoir Area Development (ASMRAD). This paper first explains the features of the Yamba Dam and its history, followed by an outline of the ASMRAD. Applications of the ASMRAD and its affiliated Reservoir Area Development Fund (RADF) for the Yamba Dam are explained to highlight the effectiveness of the ASMRAD and its contribution to the project. Other measures used to mitigate the social impacts of the project are also described. Unique contributions of the dam owner and the main contractor to attract social attention and visitors proved that effective communication with the public can contribute to the regional economy and help mitigate social impacts. Finally, a provisional evaluation of the overall mitigation measures is described.

**Keywords:** Yamba Dam, ASMRAD, social impacts, public relations

## 1. INTRODUCTION

All or some of the residents living in local communities affected by a dam project are required to resettle elsewhere. While the beneficiaries of the dam project can enjoy water and power supply, irrigation water, and flood risk reduction, the integrity of such communities is lost and commercial, industrial and educational services in the remaining area may become unsustainable due to loss of population and submergence of infrastructure. Thus, the problem of equity arises. Within the affected communities, whereas those who resettle may be better off thanks to the compensation they receive, the people who remain may suffer deterioration of services to which economies of scale apply. Thus, a dam project can cause problems of inequity.

Every dam-building country must somehow deal with the problem of equity. The World Commission on Dams (WCD) [1] stresses *the importance of ensuring that affected people are better off as a result of dam development, and of considering them as shareholders, partners, and therefore project beneficiaries*. Conversion of "affected people" to beneficiaries is a key for the success of a dam project.

Brazil, China, the Philippines, Japan, Turkey and India are some of the countries that have developed and improved legal provisions to support resettlers by dam projects [2]. Japan's Act on Special Measures for Reservoir Area Development (ASMRAD) is one such law. Moreover, the ASMRAD also supports people who remain in the eclipsed communities due to the moving out of resettlers. The Yamba Dam, which is scheduled to be completed in 2020, is an exemplar of the application of the ASMRAD.

However, the ASMRAD cannot cover all the needs of all affected people and communities. Reservoir Area Development Funds (RADFs), which are explained in Section 4 of this paper, help cover the gap. Another key factor for equity is the commitment of the project owner to make locals affected by the project better off.

This paper shows how the ASMRAD and RADFs were used for the Yamba Dam project, and notable examples of the dedication of the project owner and main contractor. The Yamba Dam is notorious among dam projects for attracting some of the strongest opposition from local communities. This opposition made the dam project the longest and most expensive in Japan: more than 60 years and costing 532 billion yen. Without the ASMRAD, RADFs and concerted efforts, the project might never have been completed. On the other hand, if these factors had been available from the beginning of the project, the dam might have started operation long ago. The authors do not recommend mimicking the bumpy road taken by the Yamba Dam. However, we believe that consideration for similar frameworks to ensure equity as described in this paper can help decrease social conflict and promote better dam construction in countries where the management of resettlement is a major concern.

## 2. THE YAMBA DAM AND ITS HISTORY

The Yamba Dam is a concrete gravity dam under construction on the Agatsuma River, which is a tributary of the Tone River that flows through the upstream region of the Tokyo area (Figure 1). The purposes of the dam are flood control, water supply, and hydropower. See Figure 2 for the storage volume allocation. The dam is scheduled to be completed in 2020.



Figure 1. Location of the Yamba Dam

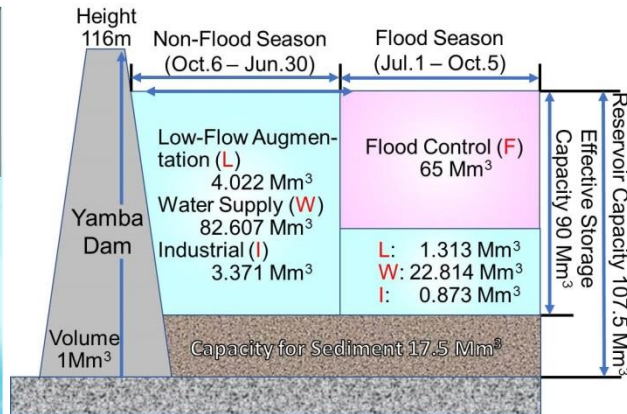


Figure 2. Storage Volume Allocation of the Yamba Dam

The catchment area of the dam is 711 km<sup>2</sup> which is the largest among the dams in the Tone River Basin. The design peak flood inflow to the reservoir is 3,000 m<sup>3</sup>/s and the design outflow discharge is 200 m<sup>3</sup>/s. The Yamba Dam plays a crucial role in the flood control system of the Tone River.

The Yamba Dam provides a municipal water supply of 22.209 m<sup>3</sup>/s, most of which is currently supplied with a provisional permit, which is enough to supply water for about five million people. The Yamba Dam is the cornerstone of the water supply system in the Kanto Region including the Tokyo Metropolitan Area.

The Yamba Dam has a long history of opposition from local communities. Project studies first started in 1952 but the project owner, the Ministry of Construction (MoC), which was reorganized into the Ministry of Land, Infrastructure, Transport and Tourism (MLIT), abandoned it because of the acidity of the Agatsuma River. The pH at Naganohara, which is located near the upper end of the Yamba Dam Reservoir, was 2.4–2.5 [3] due to acid hot springs in the upper reaches including the sources of Kusatsu Onsen. Strong acidity corrodes even concrete as well as steel structures and the MoC found it difficult to construct the dam. However, in 1965, the Shinaki Dam Neutralization Plant started operation on the upper reaches of the Yamba Dam to suppress the acidity, and as a result, the acidity at Naganohara dropped and the pH became 4.8–7.6 [3].

As the problem of acidity was resolved, the MoC declared in 1967 that it would construct the Yamba Dam but without negotiating sufficiently with local people. This triggered strong opposition from local residents. The site of the dam was ideal: the steep narrow gorge would minimize the concrete volume; the bedrock layer was solid; and the catchment area was the largest among comparable dam sites. The project owner at that time was highly confident of the imperativeness of the project, which may have led to insufficient modesty toward the local residents.

The project made very slow progress from the beginning, and this hastened the enactment of the ASMRAD in 1973. The MoC and beneficiaries of the project badly needed institutional measures to make the residents living in the affected area cooperate with the project. However, even after the Act was passed, the project did not make rapid progress. It took a long time to overcome the deep distrust of the MoC, which finally reached a basic agreement on the project with Naganohara Town, where most of the affected people lived, in 1992. It took another eight years to draw up the regional development plan based on the ASMRAD (ASMRAD plan), which was authorized in 2000. The Agreement on the Standard of Compensation for the Yamba Dam was agreed in the next year, 2001, when the Yamba Dam Negotiation Committee for Compensation Standards, which is composed of local residents, dropped general objections to the project. Although some individuals remained opposed, the project gradually gained momentum. The ASMRAD has played a pivotal role in gaining support from local residents.

### 3. AN OUTLINE OF THE ASMRAD

The WCD[1] states: *Japan's Act on Special Measures for Reservoir Area Development provides various measures for people who are affected by dam project and for the development of areas around the dam/reservoir. The Act provides for a combination of measures, a significance of the ASMRAD including compensation for property and other losses, improvement of the living conditions and industrial base of the affected area, and measures for resettling people through the Fund for Reservoir Area Development. The beneficiary municipalities, affected municipalities and central government contribute to this Fund, which finances development in the reservoir area. The Fund also promotes solidarity between the downstream beneficiaries and the displaced people.* An ICOLD bulletin[2] also provides a similar explanation.

A geographical discrepancy between affected people and beneficiaries is unavoidable for most dam projects of national importance, as the affected people are typically living near the dam and reservoir. In order to solve this problem of inequity, beneficiaries need to help mitigate the adverse impacts on the affected communities, but this typically will not happen naturally; some mechanisms needed to be set up.

The ASMRAD was formalized with this recognition, with the goal of enhancing the welfare of the locals living in the area affected by dams by improving the foundation of their lives and businesses. For each dam covered by the ASMRAD, a Reservoir Area Development Plan (ASMRAD Plan), which is a legislative plan based on the ASMRAD, is required to be authorized.

The enactment of the Law was driven by the deadlock of dam construction projects such as the Yamba Dam. Japan's Local Government Act prohibits monetary transactions between local authorities unless otherwise stated in a law, thus precluding beneficiaries from making financial contributions to communities in the reservoir area. The first case to overcome this situation was Lake Biwa. It had been planned to give water rights of 40 m<sup>3</sup>/s to Kyoto-Osaka-Kobe area by developing water resources at Lake Biwa (Figure 3). However, strong opposition from Shiga Prefecture, which covers the whole of Lake Biwa, caused an impasse. Finally, the Lake Biwa Comprehensive Development Act was enacted in 1972. This act contained a clause to allow monetary transactions from the beneficiaries to the project area through a fund. The relationship between the project area (Shiga) and beneficiaries (Kyoto, Osaka, Hyogo) is similar to dam construction projects. Boosted by this enactment, the ASMRAD was enacted in 1973.



Figure 3. Lake Biwa and Yodogawa River Basin

### 4. RESERVOIR AREA DEVELOPMENT FUND

Projects based on the ASMRAD may not meet all the requirements of the affected people because every project must be eligible for national government subsidies which are listed on the ASMRAD Order. For example, under the Order there are no subsidies for constructing hot spring facilities. Although such facilities were demanded by the local residents as well as local authorities in order to attract visitors, the ASMRAD could not provide them.

RADFs serve to fill this gap. Six RADFs are operating now in Japan. These funds are spent on projects that are not covered by the ASMRAD, to promote water resources development. The initial fund of the RADFs was provided by the national government and prefectural governments. The costs of projects sponsored by the RADFs are paid by the prefectural governments that receive benefits from the dam project ultimately. In case of the Yamba Dam, the Tone and Arakawa Reservoir Area Development Funds (TARADFs) played a role. Five other RADFs cover projects in the Kiso, Chikugo, Yoshino, Toyokawa and Yahagi River Basins.

## 5. APPLICATION OF THE ASMRAD AND TARADF TO THE YAMBA DAM

Sixty-two projects based on the ASMRAD plan with a total budget of 99.7 billion yen have been executed around the Yamba Dam. Table 1 shows the number of projects by category. Road construction projects are most popular. Although the cost of relocating a road that will be submerged, for example, is paid by the dam owner as compensation, the cost for increasing the width of the road cannot be paid by the dam owner because compensation is restricted to the same value or same function as the original infrastructure. A road construction project based on the ASMRAD covers this problem. A compensatory project and a project based on the ASMRAD are jointly executed in many cases to enable infrastructure of higher quality to be built.

**Table 1-Number of Categorized Projects in the ASMRAD Plan**

Category	No.	Category	No.	Category	No.	Category	No.	Category	No.
Land improvement	5	Degraded forest recovery	1	Flood control & sabo works	6	Road	18	Forest road	4
Sewer	2	Small water utility	1	Public housing	1	Nursery school	1	Afforestation	1
Compulsory education facilities	2	Modernization of agriculture, forestry and fishery management	5	Livestock wastewater treatment facility	1	Sports and recreation	10	Day care center for seniors	1
Firefighting facilities	1	Public hall	2					<b>Total</b>	<b>62</b>

Figure 4 is a photo of Yamba-Ohashi Bridge. As the bridge is situated just 700m upstream from the dam, it offers fine views of the dam. A bungee jump attraction, in which jumpers with a harness and life-saving rope dive from the bridge, has also been operated by a private company at the bridge since 2019. Figure 5 shows JR Naganohara-Kusatsuguchi (NK) Station Square. As there was no comparable square before, compensation money could not be paid to cover the cost and the ASMRAD was applied.



**Figure 4. Yamba-Ohashi Bridge**



Figure 5. JR NK Station Square

Table 2 lists 17.8 billion yen projects funded by TARADF. The first three projects on the list are subsidies to help make a successful start at resettlement sites. No.4 and 5 are subsidies for vocational adaptation. For example, some resettlers abandon their own farms and start a new life in an urban area, and the subsidy is intended to help them develop new skills to earn income. No.6 is for providing consulting services to those who need help designing a new life. Projects No.7 to 26 are subsidies for constructing facilities not covered by the ASMRAD.

Categories	No	Project / Scheme	Categories	No	Project / Scheme	Categories	No	Project / Scheme
Subsidies for Making Good Start at Resettlement Sites	1	Interest Subsidy for Resettlement Land Acquisition	Subsidies for Remained Communities	10	Damsite Park Construction	Subsidies for Remained Communities	19	Renovation of Japan Railway's Nagano-hara-Kusatsuguchi Station Area
	2	Interest Subsidy for Extended House Acquisition		11	Construction of Kawarahata Area Promotion Facilities		20	Construction of Town Hall
	3	Interest Subsidy for Extended Business Property Acquisition		12	Construction of Kawarayu Area Promotion Facilities		21	Construction of Hot Spring Bath in Nagano-hara Town
Vocational Subsidies	4	Subsidy for Acquisition of Licenses and Qualifications	13	Construction of Parking Area at Kawarayu	22	Enhancement of Attractiveness around Reservoir		
	5	Subsidy for Vocational Trainings	14	Construction of Joint Community Bath for Kami-Kawarayu and Shimo-	23	Construction of Hot Spring Facilities in Agatsuma Gorge Hot Spring		
Consulting Services	6	Providing Concierge Service for Resettlement and New Life Design	15	Construction of Roadside Station Yamba	24	Exploration of Hot Springs in Agatsuma Town		
Subsidies for Remained Communities	7	Supports for Reestablishing Livelihoods	16	Construction of Yokokabe Area Promotion Facilities	25	Construction of Okashiwagi Area Promotion Facilities		
	8	Financial Support for Affected Local Authorities	17	Construction of Industrial Promotion Center	26	Construction of Okashiwagi Community Center		
	9	Exploration of Hot Springs in Nagano-hara Town	18	Construction of a Kindergarden	Others	27	Subsidy for Surveys and Consultant Works	

Table 2- Projects by TARADF for the Yamba Dam

Figure 6 is a map of the principal projects funded by the ASMRAD and TARADF, including the names of the relevant communities. At Kawarayu and Kawarahata, almost all the houses were to be submerged and everyone in the communities had to resettle. Kawarayu is known for its good hot springs and there were about 20 hotels with hot springs in the community. The main objection against the dam project at Kawarayu was that the residents, especially hotel owners, could not afford to dismantle their community.

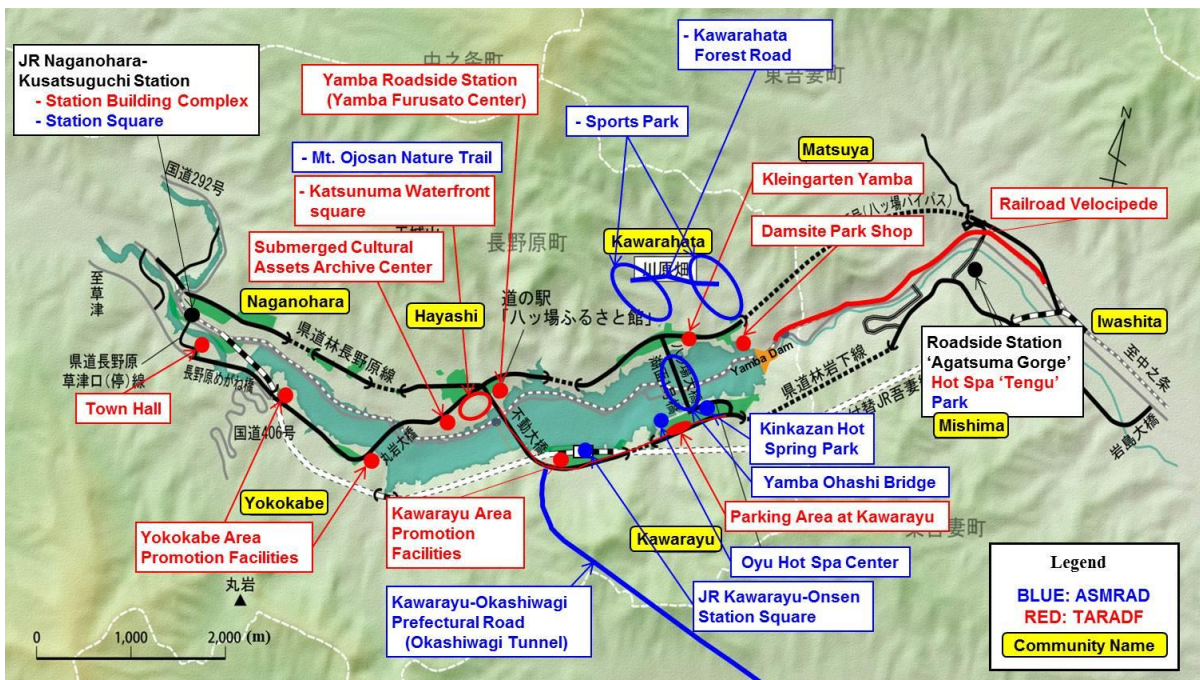


Figure 6. Extracted Projects funded by the ASMRAD and TARADF

The affected communities including Kawarayu wanted to keep their communities the same as before in a nearby location. Their wishes were accepted by the dam owner and so a relocation site was constructed on higher ground near to the original community by cutting mountains and making flat land.

However, this policy of creating relocation sites nearby required complicated procedures to ensure a smooth sequence of relocation, because most of the relocation sites were owned by those who were affected by the dam projects. It took a long time to construct these relocation sites and many residents could not wait for the sites to be completed and decided to move out of the community.

Most of the facilities funded by TARADF aim to restore the livelihood of the communities. Figure 7 shows the Yamba Roadside Station, which became a busy tourist attraction. Tourists typically park at the station and enjoy walking along the Yamba-Ohashi Bridge nearby to view the Fudo-no-taki Falls, and then walk back to the station to enjoy shopping and meals. Figure 8 shows Kleingarten Yamba, which was built as part of the Kawarahata Promotion Facilities listed in Table 2 (item No.11). Kleingarten is a German word; fruits and vegetables are planted by people who pay rent for using the garden. Figure 9 shows the parking area at Kawarayu; there was not much space for parking before the relocation, and they decided to have a large parking area at the relocation site.



Figure 7. Yamba Roadside Station



Figure 8. Kleingarten Yamba



Figure 9. Parking Area at Kawarayu

## 6. EFFORTS BY THE DAM OWNER AND THE CONTRACTORS

Although the ASMRAD and TARADF are important mechanisms to mitigate the social impacts of the Yamba Dam, the commitment of the dam owner to improving the local society was the main reason for the success. The Yamba Dam Construction Office (YDCO) of the MLIT has been working with the local communities and Naganohara Town along with the Gunma Prefectural Government, which is mainly in charge of the ASMRAD and TARADF projects. Recent initiatives led by YDCO include Yamba Tours and collaboration with a university.

The Yamba Dam project was officially abolished in 2009 following a change in the ruling party. The Democratic Party of Japan (DPJ) won the Lower House election with a political agenda that included abolishing the project. At that time, there was strong public opposition to the Yamba Dam. However, the DPJ reversed the decision to abolish the project in 2011 and the negative opinion gradually softened. However, the local communities around the dam badly needed a positive public image in order to attract tourists and to prosper.

Yamba Tours, which started in April 2017, are guided free bus tours around the area to be submerged, including the local heritage sites and nature that remain. The main attraction is watching dam construction work and listening to explanations by guides called “Yamba Concierge”. In order to make the tour course attractive, a viewing spot on a raised mound called “Yamba Mihodai (means *watch as you like*)” was constructed near the dam. “Yamba Mihodai” attracted 200 thousand people in 2018[4], five times more than in 2015[4].

In Figure 10 the woman wearing a blue helmet and long jacket with the words “YAMBA DAM” is a Concierge. The activities of the Yamba Concierges were boosted by the collaboration between YDCO and Atomi University, Tokyo. All the Yamba Concierges were staff of YDCO and locally hired persons before the collaboration. Thirty-five students and staff of the University, led by Prof. Yasushi Shinohara, stayed in the Yamba area during the summer holidays in 2017 and the students worked as temporary Yamba Concierges (Figure 11). To do this, they had to learn about the dam and create their own style of introducing it. Although many students are likely to be beneficiaries of the Yamba Dam because Atomi University is located at the center of the beneficiary area, most of the students did not know much about the dam before they joined the activity, and so the explanations by the Atomi Concierges sounded like third-party opinions. The activities of the Yamba Concierges were widely covered in the media and helped change public opinion. Moreover, the students do more than just serve as concierges; they have proposed a variety of measures to attract tourists, increase the

number of tourists ten-fold, and produce economic benefits worth 4 billion yen annually[5]. Their proposals stimulated the locals and raised their motivation.



Figure 11. Yamba Tours in Winter



Figure 10. Atomi Concierges and Tourists

Although similar guided tours like the Yamba Tours had been organized before, the number of visitors quadrupled after the Yamba Tours started[6]. The tours ended when initial impoundment started in October 2019. However, similar guided *charged* tours operated by the Naganohara Tourist Association started in October. Therefore, the initiative by YDCO succeeded to an income-earning activity led by locals.

Another impressive activity to enhance public understanding of the dam was led by Shimizu Corporation, the main contractor for the dam body. Shimizu and the “Camera Girls”, the biggest group of female camera enthusiasts in Japan with more than 7,000 members (as of September 2019), collaborated to record the situation of the dam through photographs in 2017. The Camera Girls took 3,000 photographs[7], which were then published with the photographers’ messages through TV and newspaper advertisements sponsored by Shimizu. Figure 12 shows the advertisement which appeared in the Yomiuri Shimbun, which is the most popular newspaper in Japan with 8 million subscribers. The TV program with the advertisement was also very popular and received an average rating of 18.1%. Therefore, about 20 million people are estimated to have seen the advertisement on TV.

Surprised to find all the construction works are controlled by engineers.

Dam construction can boost local economy through tourism.

“Camera Girls” snapped the dam construction site and revealed hidden attractiveness.

“Camera Girls”, the largest female camera enthusiasts group in Japan, gathered at the Yamba Dam. The group visited work areas where outsiders are normally not allowed to enter into and to take photographs.

**Dam Pasha**  
“Pasha” is a Japanese onomatopoeia for a click sound of a camera

Collaboration of Shimizu Corporation and “Camera Girls”

Snapped the Yamba Dam Construction Site!

I found that our daily use of tap water, a kind of automatic routine, is owing to civil engineering works.

We have been felt that the Dam is an entity something remote.

Infrastructure Tourism - Yamba Dam.

Civil Engineering is beside you really.

Figure 12. Advertisement by Shimizu Corporation in the Yomiuri Shimbun

Shimizu also displayed footage of the Camera Girls at Yamba in the cars of the Tokyo Metro subway. TV screens are installed above each door of most cars, and some 7.4 million passengers are estimated to have seen the footage while riding on the subway.

## 7. CONCLUSIONS

The Yamba Dam will be undergoing initial impoundment in December 2019 when the APG International Symposium is held in Iran. The long history of struggles will end soon. The authors have identified the following lessons from the experiences of this project:

1. Initial distrust from local communities can severely prolong the project and increase the cost.
2. The ASMRAD enabled measures to be taken that cannot be covered by compensation and helped mitigate the social impacts on affected communities.
3. The target of the ASMRAD is not limited to resettlers but includes those who remain in the communities that are eclipsed by the moving out of resettlers.
4. Initiatives by YDCO, the owner of the Yamba Dam project, such as Yamba Tours and Yamba Concierges, worked to increase tourists to the dam and the locals have taken over the initiative, which thus seems to have led to sustainable activities.
5. RADFs cover the needs of local communities which cannot be covered by the ASMRAD due to legal constraints.
6. The main contractor of the dam developed a new method of attracting public attention by collaborating with a group of female camera enthusiasts.
7. The collaboration with Atomi University and the Camera Girls show how third parties can apparently overcome public skepticism and improve the image of the project through their own messages.
8. Although it may be premature to evaluate how much the ASMRAD, RADFs and efforts of the dam owner and main contractor contributed to decreasing the social impacts of the dam project and to realizing equity among stakeholders, the number of tourists visiting Yamba, which is an index of the attractiveness of the region, is rapidly increasing as shown in the case of “Yamba Mihodai” which attracted 200 thousand people in 2018, five times more than in 2015.

ASMRAD and RADFs help enhancing equity between dam construction area and beneficiaries and contribute to realize a win-win situation. It will be our pleasure if our experience may be a hint for any dam construction projects in the world.

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