

Ex-Post Project Evaluation 2010: Package II -1 (Indonesia)

October 2011

JAPAN INTERNATIONAL COOPERATION AGENCY

**Mitsubishi UFJ Research & Consulting Co., Ltd.
Octavia Japan Co., Ltd.**

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Preface

Ex-post evaluation of ODA projects has been in place since 1975 and since then the coverage of evaluation has expanded. Japan's ODA charter revised in 2003 shows Japan's commitment to ODA evaluation, clearly stating under the section "Enhancement of Evaluation" that in order to measure, analyze and objectively evaluate the outcome of ODA, third-party evaluations conducted by experts will be enhanced.

This volume shows the results of the ex-post evaluation of ODA Loan projects that were mainly completed in fiscal year 2008, and Technical Cooperation projects and Grant Aid projects, most of which project cost exceeds 1 billion JPY, that were mainly completed in fiscal year 2007. The ex-post evaluation was entrusted to external evaluators to ensure objective analysis of the projects' effects and to draw lessons and recommendations to be utilized in similar projects.

The lessons and recommendations drawn from these evaluations will be shared with JICA's stakeholders in order to improve the quality of ODA projects.

Lastly, deep appreciation is given to those who have cooperated and supported the creation of this volume of evaluations.

October, 2011

Masato Watanabe

Vice President

Japan International Cooperation Agency (JICA)

Disclaimer

This volume of evaluations, the English translation of the original Japanese version, shows the result of objective ex-post evaluations made by external evaluators. The views and recommendations herein do not necessarily reflect the official views and opinions of JICA. JICA is not responsible for the accuracy of English translation, and the Japanese version shall prevail in the event of any inconsistency with the English version.

Minor amendments may be made when the contents of this volume is posted on JICA's website.

JICA's comments may be added at the end of each report when the views held by the operations departments do not match those of the external evaluator.

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Indonesia

Ex-Post Evaluation of Japanese ODA Loan Project

“Denpasar Sewerage Development Project”

External Evaluator: Kenichi Inazawa, Octavia Japan Co., Ltd.

0. Summary

It can be seen that this project is consistent with policies and development needs. Meanwhile, there was a significant delay in the project period, which meant that part of the output could not be accomplished. Some sewer development areas which were originally planned were reduced because of a lack of project budgets. Moreover, due to the fact that many major hotels deferred the decision to join the sewer service, the actual amount of waste water treated remained at about 60% in comparison to the treatment capacity. As for the maintenance conditions, some sewer pipes and booster (relay) pump stations are now clogged with dirt, but the Indonesian side is taking steps to deal with this problem by appropriating the necessary budget, equipment and human resources. Although there are still some issues regarding this project, the Indonesian side is nevertheless making efforts to increase the amount of waste water treated by proactively encouraging hotels that are planning to start business or considering to rebuild their buildings to use the sewer service. In light of the efforts, it can be appreciated. In light of the above, this project is evaluated to be partially satisfactory.

1. Project Description



Project Location



Stabilization Pond at Waste Water Treatment Plant

1.1 Background

Denpasar City, the political, economic and tourist center of Bali Island,¹ had experienced

¹ Area of 5,633m²; one-third of Shikoku, Japan. Population is approximately 3.8-3.9 million (as of 2011),

rapid urbanization and tourism development. Although the number of tourists visiting the island was 1.24 million in 1980, it nearly doubled to 2.55 million in 1990 and the economy was expected to grow centering on trade, hotel/restaurant industries and transportation business. Nevertheless, the living environment was unsanitary, as most of the toilets in private homes were directly emptied into roadside ditches, rivers and canals, even though more than 90% of them had underground seepage treatment facilities. Because of this rapid development, sanitary facilities was less than satisfactory. Therefore, constructing a sewer system was a pressing issue, which is necessary to conserve the hygienic environment.

1.2 Project Outline

The purpose of the project is to increase the amount of wastewater treated and to improve water quality in the southern area of Bali Island (around Denpasar City and Badung Prefecture) where urbanization and tourism development had advanced rapidly, by developing sewer pipelines and pumping stations, etc; thereby contributing to improve the economic activities.

Approved Amount/Disbursed Amount	5,400 million yen/5,231 million yen
Exchange of Notes Date/Loan Agreement Signing Date	November 1994 / November 1994
Terms and Conditions	Interest Rate: 2.6% Repayment Period: 30 years (Grace Period: 10 years) Condition for Procurement: General Untied (Consulting Service: Partial Untied)
	Government of Republic of Indonesia / Directorate General of Human Settlements, Ministry of Public Works(O&M unit: Public Service Organization of Wastewater Management, BLUPAL)
Borrower/Executing Agency(ies)	October, 2008
Final Disbursement Date	PT. Waskita Karya (Indonesia) and PT. Adhi Karya (Indonesia) and Tokura Corporation (Japan)(JV), PT.

approximately 60% of which resides in the southern area, where the project site is also located.

	Pembangunan Perumahan (Indonesia) and Toa Corporation (Japan) (JV)
Main Contractor (Over 1 billion yen)	Pacific Consultants International (Japan) and Sinotech Engineering Consultants, LTD (Taiwan) (JV)
Main Consultant (Over 100 million yen)	F/S for Denpasar Area and Sanur Area, prepared by JICA (1993), F/S for Kuta Area, prepared by World Bank
Feasibility Studies, etc.	Denpasar Sewerage Development Project II (Loan Agreement: March 2008, Approved Amount: 6,004 million yen)

2. Outline of the Evaluation Study

2.1 External Evaluator

Kenichi Inazawa, Evaluation Consultant, Octavia Japan Co., Ltd.

2.2 Duration of Evaluation Study

Duration of the Study: November, 2010-October, 2011

Duration of the Field Study: January 31 – February 11, 2011 (1st study)

May 9-13, 2011 (2nd study)

2.3 Constraints during the Evaluation Study

N/A

3. Results of the Evaluation (Overall Rating: C²)

3.1 Relevance (Rating: ③³)

3.1.1 Relevance with the Development Plan of Indonesia

At the time of the appraisal, a national plan “the Sixth Five-Year Plan” (1994-1999) aimed to expand public health services in both urban and rural regions. Meanwhile, at the time of the ex-post evaluation, the National Mid-Term Development Plan (2010-2014) has also aimed to improve basic sanitary services. Furthermore, Denpasar City’s Mid-Term Development Plan (2010-2015) has also advocated the necessity of improving the sewer service and streamlining

² A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

³ ③: High, ② Fair, ① Low

waste water treatment facilities.

Since the necessity of basic sanitary services and developing the sewerage infrastructure has been continuously recognized as important, therefore consistency of policies and measures with this project both at the time of the appraisal and the ex-post evaluation can be recognized.

3.1.2. Relevance with the Development Needs of Indonesia

At the time of the appraisal in 1994, sewer facilities that were vital to the promotion of a hygienic environment in the cities had not been installed in Bali, while population growth and increase in the number of tourists were expected. As tourism development and urbanization progressed, it was deemed particularly necessary to develop sanitary and sewer facilities that would improve the hygienic environment in the cities and preserve the water quality of the ocean, a valuable resource for tourism. At the time of the ex-post evaluation, both tourism and economic development in the southern area of the island, in particular, are progressing rapidly. The residential and commercial areas are also following an upward trend. With urban expansion, the needs for developing the environmental infrastructure became greater, and the “Denpasar Sewerage Development Project II” (Phase II Project⁴), a JICA loan project following the completion of this project, has been implemented. In addition, the implementation of the Phase III Project⁵ is also being considered, since the residential and commercial areas are expected to continue expanding

Since the development of sewerage facilities has continuously been regarded as important, therefore it can be said that this project is consistent with high developmental needs even at the time of the ex-post evaluation.

3.1.3. Relevance with Japan’s ODA Policy

The Japan’s Official Development Assistance Charter (ODA Charter), endorsed by the Cabinet in 1992, deemed the “compatibility between environment and development” as one of its principles. Moreover, the Charter called for the support of infrastructural development, as a key area, which was an important postulate of economic and social development. The project was to support the environmental infrastructure of Bali Island, where rapid urbanization and

⁴ The Phase II project supports the development of a sewer facility targeting a total of 715ha, including the area in Denpasar City that has been deemed highly urgent, which contains many commercial facilities, such as hotels, that were not targeted by the Phase I project and the area strongly requested by residents (Kuta Area).

⁵ At this point, the project’s planning and implementation date are undecided. The areas scheduled to be targeted are the area surrounding Denpasar City (Denpasar and Sanur Area) and Badung Prefecture (Kuta, Legian and Seminyak Area), which were not included in the target areas of Phase I and II, but which are expected to experience both increased population growth and industrial development.

tourism were progressing despite the fact that essential sewer development had been delayed. Therefore, it is clear that this project is consistent with the relevant principles and key points of Japan's aid policy.

This project has been highly relevant with Indonesia's development plan, development needs, as well as Japan's ODA policy, therefore its relevance is high.

3.2 Efficiency (Rating: ①)

3.2.1 Project Outputs

Table 1 shows the planned and actual major outputs of the Project.

Table 1: Planned and Actual Major Outputs of the Project

Plan at the Time of Appraisal	Actual at the Time of Ex-post Evaluation
<Sewer Service Area>	
1) Denpasar: 1,038.8ha 2) Sanur: 331.8ha 3) Kuta: 355.0ha Total: <u>1,717.6ha</u>	1) Denpasar: 520.0ha 2) Sanur: 330.0ha 3) Legian and Seminyak (Kuta's alternative): 295.0ha Total: <u>1,145.0ha</u>
<Sewer Pipe Lines>	
- Secondary & Tertiary Sewer Pipes ⁶ 1) Denpasar: 126.02km 2) Sanur: 32.72km 3) Kuta: 17.60km Total: <u>176.34km</u>	- Secondary & Tertiary Sewer Pipes ¹ Denpasar: 77.01km 2) Sanur: 30.70km 3) Legian and Seminyak (Kuta's alternative): 19.8km Total: <u>127.60km</u>
- Main Sewer Pipes ⁷ 1) Denpasar: 15.14km 2) Sanur: 4.31km 3) Kuta: 11.20km Total: <u>30.65km</u>	- Main Sewer Pipes 1) Denpasar: 23.70km 2) Sanur: 9.40km 3) Legian and Seminyak (Kuta's alternative): 11.40km Total: <u>44.5km</u>
- Conveyance Sewer Pipes ⁸ 1) Denpasar: 4.39km 2) Kuta: 1.20km Total: <u>5.59km</u>	- Conveyance Sewer Pipes 1) Denpasar: 0km 2) Legian and Seminyak (Kuta's alternative): 0km Total: <u>0km</u>
- Force Main Pipes ⁹ 1) Sanur: 5.16km 2) Kuta: 5.20km Total: <u>10.36km</u>	- Force Main Pipes 1) Sanur: 3.90km

⁶ Sewer pipe lines with small diameters (150-300mm) installed on all roads facing residential buildings, such as houses, to take in household drainage.

⁷ Sewer pipe lines with fairly large diameters (350-1,500mm) serving as the main lines to take in sewer water from secondary and tertiary drainpipes.

⁸ Sewer pipe lines with large diameters (1,500-1,800mm) using the natural flowing system that connects Denpasar Area with the waste water treatment plant.

⁹ Sewer pipe lines that connect Sanur Area and Kuta Area with the waste water treatment plant; used to send sewer water pumped up at the relay pump station.

	2) Legian and Seminyak (Kuta's alternative): 4.90km Total: <u>8.80km</u>
<Pumping Stations>	
1) Booster (relay) Pump Station ¹⁰ Sanur x 1, Kuta x 1 (Total: 2 stations)	1) Booster (relay) Pump Station Denpasar x 1, Sanur x 1, Kuta x 1 (Total: 3 stations)
2) Wet-pit Pump Station ¹¹ Sanur x 2, Kuta x 2 (Total: 4 stations)	2) Wet-pit Pump Station Sanur x 6 (Total: 6 stations)
<Waste Water Treatment Plant>	
Treatment Capacity: <u>44,000 m³/day x 1</u>	Treatment Capacity: <u>51,000 m³/day x 1</u>
<Consulting Service>	
Amount of M/M: <u>406M/M</u> (Foreign: <u>121M/M</u> , Local: 285M/M. TOR includes F/S review, detailed design implementation, bidding assistance, construction supervision/management, organization reinforcement, etc.)	Amount of M/M: <u>1,078M/M</u> (Foreign: <u>236M/M</u> , Local: 842M/M. TOR at the time of the appraisal was implemented as planned.)

Source: JICA documents, Answers on questionnaire

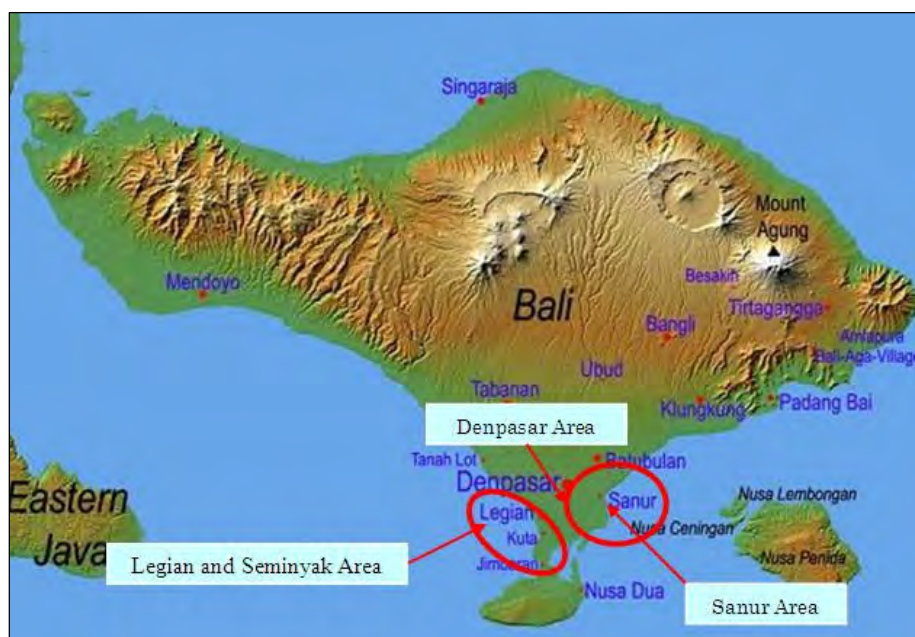


Figure 1: Project Site (1)
(Denpasar Area, Sanur Area, Legian and Seminyak [Kuta Area])

¹⁰ Pump station where sewer water from Sanur Area and Kuta Area is sent to the waste water treatment plant.

¹¹ Small-sized pump facilities that install submersible pumps in manholes. Also called “wet pit pumps”.



Figure 2: Project Site (2)
(Purple areas are target areas for this project [Phase I project area after scope reduction])

The following reasons explain why the plan differs from the actual results as shown in Table 1 above. All differences and changes are based on substantial reasons and background, and can be deemed reasonable.

1. Reduction and Scope Change in Sewer Development Area

The reason which the sewer development area in Denpasar was reduced was that it was deemed difficult that the initial project budgets could not cover all the areas originally targeted, due to currency depreciation by the Asian currency crisis of the late 1990s.¹²

Meanwhile, Kuta Area was excluded from the target development areas, because its community expressed concerns about environmental impacts, etc., that may result from adopting the sewer system.¹³ Instead, Legian and Seminyak Area, both of which were adjacent to said area, were included in the scope. Kuta Area's local community, which later learned of the advantages of the new sewer-system constructed in the two areas, had a change of heart and requested to join the sewer service. Therefore, they were included in the target areas of the

¹² Construction is currently being implemented through the aforementioned Phase II project (signed by L/A in 2008) in areas where it initially was not planned.

¹³ By interviewing the local community leaders during the site inspection, it was discovered that Kuta Area's local community had expressed understanding of the project. However, the residents had experienced so-called "trauma" from the rainwater drainage project implemented by the local authorities, which the results had been poor. It seemed that accidents occurred during the project implementation.

aforementioned Phase II project.

2. Increase/Decrease of Sewer Pipeline Lengths, and Cancellation of Extension

The increase/decreasing of the lengths of sewer pipelines and/or the cancellation of the extension were the result of a re-examination of the initial plan during the detailed design. The decrease in the extension lengths of secondary and tertiary sewer pipes, main sewer pipes and conveyance sewer pipes in Denpasar Area, was associated with the reduction of the aforementioned development target areas. Meanwhile, the reason which occurred increases/decreases/cancellations in Sanur Area was that the project's implementation unit (hereinafter called, "PPLP BALI") was unable to obtain the local community's consent at the briefing session during the detailed design, especially regarding part of the sewer construction works, request of the construction in other areas, etc. In essence, such changes occurred in the course of obtaining the local community's consent.

3. Increase in the Number of Pump Stations

The reason of increase of booster (relay) pump stations and wet-pit pump stations was also related to the fact that the initial plan was re-examined during the detailed design. The former was based on the decision, from a technical perspective, that building an extra pump station would allow sewer water to flow efficiently into the treatment plant. As for the latter, it was determined, because constructing more pump stations would decrease the length of the sewer pipes as well as reducing construction costs (in other words, cost reduction was one of the aims of this process). Although constructing wet-pit pump stations was initially planned in Kuta Area, the plan was cancelled for the aforementioned reason, which the consent could not be obtained from the local community.

4. Increase of Waste Water Treatment Capacity (Waste Water Treatment Plant)

Increasing the waste water treatment capacity was also based on a result of the detailed design. The treatment capacity of 51,000 m³ per day also includes the amount of sewer water treated in the subsequent Phase II project. As of the capacity of 51,000 m³ per day, approximately 36,000 m³ per day¹⁴ corresponds to the treatment capacity of this Phase I project.

5. Consulting Services

¹⁴ Cited from Executing Agency data.

The M/M amount was more than the original plan, mainly because the project period was extended.

3.2.2 Input

3.2.2.1 Project Period

The planned project period was 6 years and 10 months (82 months) from November 1994 to August 2001; however, it actually took 13 years and 11 months (167 months), from November 1994 to September 2008, 204% longer than planned. The main reasons are as follows:

1. Delay by Land Acquisition and Bidding Procedure

It took more time than expected in land acquisition at the waste water treatment plant construction site. The reasons are as follows: 1) A currency crisis occurred in the late 90s that disrupted the country's society and economy; as a result, the central and local governments implemented institutional reforms on a number of occasions that resulted in sluggish decision-making through this project; 2) Due to the enactment of the Decentralization Act passed in May 1999, the local government became to share the burden of the construction costs with the central government; it took time for each party to determine the amount that it had to bear; 3) It took time to negotiate with the Ministry of Forestry, the owner of the construction site (9.2ha) of the waste water treatment plant¹⁵, including a discussion on securing the alternative site. In addition, many personnel replacements took place in the Ministry of Public Works, the Executing Agency, and in related agencies, starting in the late 1990s, which caused further delays in handling paperwork and in the approval process, among other issues, etc.

2. Delay in Construction Period

The Bali bombings that occurred in 2002 and 2005 respectively¹⁶ stalled both the fulfillment of administrative functions and also the installation of equipment. It also took time to distribute local currency. Furthermore, as mentioned previously, it took time to negotiate with Kuta Area's local community regarding the scope of the project. Therefore, the construction period became longer than the original schedule.

¹⁵ Additionally, because the site was also a mangrove area, negotiations between related parties may have been conducted in a cautious manner until the land acquisition was finalized, once permission for usage had been granted by the Ministry of Forestry.

¹⁶ In 2002, a car parked by the road exploded in Kuta Area, killing 202 people. Meanwhile, in 2005, explosions occurred at three restaurants in Kuta Area and Jimbaran Beach, resulting in 23 deaths.

3.2.2.2 Project Cost

The planned project cost was 6,353 million yen (JICA loan amount was 5,400 million yen), while the actual cost was 6,332 million yen (JICA loan amount was 5,231 million yen), which was almost as much as planned (about 99% of the original plan). The Indonesian side strived earnestly to achieve thorough fund management regarding bidding, procurement and contracts. However, as the aforementioned “Output” indicates, the rupiah, Indonesia’s currency, greatly depreciated after the Asian currency crisis in the late 1990s, which resulted in soaring equipment costs. This meant that the initial project budget was no longer sufficient to implement construction in all project areas. In view of the reduction in Denpasar Area’s sewer development area (reduced roughly by half: 1,038.8ha→520.0ha), as well as the decrease in the length of sewer pipes built, the actual project cost weighed against the output cannot necessarily be deemed as efficient. Therefore, the project’s cost evaluation is moderate.

Thus, the project period was significantly exceeded the plan, while the project cost was lower than planned. However considering the decrease of the output, efficiency of the project is low.



Figure 3: Sewer Service Area
(Residential Area: Denpasar Area)



Figure 4: Sewer Service Area
(Commercial Area: Legian Area)

3.3 Effectiveness (Rating: ②)

3.3.1 Quantitative Effects

3.3.1.1 Results from Operation and Effect Indicators

In terms of the project’s effectiveness evaluation (quantitative evaluation), the results based on what has been researched regarding the population treated, the amount of waste water treated, and the rate of facility utilization are presented in Table 2, below.

Table 2: Indicator Data Regarding Effectiveness Evaluation (Quantitative Evaluation)

At the Time of the Appraisal	At the Time of the Ex-post Evaluation			
1) Population Treated (People): N/A 2) Amount of Waste Water Treated (m ³ /day): N/A (The following is the target by F/S.) - Denpasar Area: 82,800 m ³ /day - Sanur Area: 18,500 m ³ /day - Kuta Area: 19,700 m ³ /day (Total: 3 areas; 121,000 m ³ /day) (Note: The future target value of the project's amount of waste water treated was not established at the time of the appraisal. As a point to keep in mind regarding the above-mentioned F/S numeric value, both Phase II and III projects, in addition to this project, were assumed to be completed by 2010.) 3) Rate of Facility Utilization (%):N/A	Indicators	2008	2009	2010
	1) Population Treated (People)	N/A	N/A	42,155
	2) Amount of Waste Water Treated (m ³ /day): *Note 1	13,911	13,511	Approx. 23,000
	3) Rate of Facility Utilization (%) *Note 2	27.3	26.5	Approx. 64
Note 1: According to PPLP BALI, the actual amount treated between 2008 and 2009 was based only on the data of Denpasar Area and Sanur Area. Data for Legian/Seminyak Areas were not measured. Note 2: Rate of Facility Utilization = ((Amount of waste water treated/facility of capacity) x 100)				

Source: JICA documents and F/S Data (at the time of the appraisal), Answers on questionnaire (at the time of the ex-post evaluation)

As for the above-mentioned results, F/S' forecasted amount of waste water treated also anticipated the completion of both Phase II and III projects. The data for this project only (Phase I) were not prepared, thus valid comparisons cannot be drawn. Nonetheless, when comparing the aforementioned waste water treatment capacity of approximately 36,000 m³ per day with approximately 23,000 m³ per day, it can be determined to be around 60%. The key factor here is that in many cases, hotels assumed as major clients actually refrained from using the sewer service after all.¹⁷ In fact, "since the project completion was delayed, hotels that could not wait for sewer service to begin took waste water measures on their own by procuring and installing septic tanks." However, the local authorities are now strongly encouraging new hotels or those considering renovations to use the sewer service (also by establishing a regulation). Therefore, it is assumed that the amount of waste water treated, the population treated, and the rate of facility utilization may increase in the future.¹⁸

¹⁷ As a result of conducting interviews with PPLP BALI, BLUPAL and two fairly large hotels, it was revealed that some smaller hotels decided to use the sewer service, while the majority of the major hotels which have many guest rooms did not. Since the latter can be expected as major clients in Bali Island, where the tourism industry is flourishing, the fact that only a few of them joined the sewer services are directly linked to the reduction in the amount of waste water treated.

¹⁸ As a supplementary explanation, it can be said that although the initial cost for connecting sewer pipes is necessary in general when using the sewer service, the sewer usage fee on the whole is lower than the cost related to a septic tank that requires maintenance, cleaning, collecting, etc. Therefore, it can be considered highly economical, also for

3.3.1.2 Calculations of Internal Rate of Return (IRR)

Neither the Economic Internal Rate of Return (EIRR) nor the Financial Internal Rate of Return (FIRR) were recalculated, since the sewer usage fee initially assumed as a benefit is not being collected at the time of the ex-post evaluation.¹⁹

3.3.2 Qualitative Effects (Improved Living Conditions in the Sewer Development Areas)

Those using the sewer service (80 residents and 40 companies/store owners) in the project target areas (Denpasar, Sanur and Legian/Seminyak Areas) were target of a beneficiary survey. Table 3 presents the survey results. As seen in the answers to questions 1, 2 and 4, mostly positive responses were received. Moreover, as seen in the answers to questions 3 and 5, many respondents mentioned that hygienic conditions has improved while roads have been cleaner as a result of the sewer system development. Therefore, it can be presumed that some positive effect was recognized with regard to living conditions in the sewer development areas.

Table 3: Results of Beneficiary Survey

Questions	Answers
1) Are you satisfied with the current sewerage system? (n=120)	Very Satisfied: 0%
	Satisfied: 77.5%
	Normal: 18.3%
	Dissatisfied: 4.2%
2) Do you think that the sewer system introduced has contributed to improved living conditions? (Question to Residents) (n=80)	Yes: 77.5%
	No: 10.0%
	I don't know / No answer: 12.5%
3) What are the reasons for answering "Yes" to Question 2? Or, what specifically has the sewer system been able to contribute? (Multiple answers include: n= 131)	Improved hygienic conditions: 39.7%
	Road beautification: 30.5%
	Improved health conditions: 12.2%
	Easier housework: 10.7%
	Improved relations with neighbors: 1.5%
	Improved environmental awareness: 3.8%
4) Do you think that the sewer system introduced	Yes: 75.0%

the hotels. Moreover, the sewer service is better from the perspective of good hygiene. Thus, it is highly possible that the number of sewer service users will increase over the long term. According to PPLP BALI, the said fee is not charged to general households, although it is required of commercial facilities (hotels, restaurants, etc.). (General households only pay the monthly usage fee, while the said cost is covered by the government. The number of users among general households, as of February 2011, is approximately 7,500. In addition, according to PPLP BALI, the number of sewer connections by general households for this project had been estimated at approximately 9,100, although there were no precise background data. Thus, it is assumed that the proportion of connections is approximately 82%, which is moderately high, and participation in the sewer service at the general household level has been accomplished to some extent.

¹⁹ Details will be mentioned later, under "3.5.3 Financial Aspects of Operation and Maintenance".

has contributed to improved environmental conditions? (Question to companies, store owners, etc.) (n=40)	No: 5.0%
	I don't know / No answer: 20.0%
5) What are the reasons for answering "Yes" to Question 4? Or, what specifically has the system been able to contribute? (Multiple answers include: n= 40)	Improved hygienic conditions: 57.5%
	Road beautification: 35.0%
	Improved health conditions: 2.5%
	Improved environmental awareness: 2.5%
	Others: 2.5%

Source: Results of the beneficiary survey

(Determination of the Effectiveness Rating and Conclusions)

As for the quantitative data, it cannot be said at this point that the amount of waste water treated is high when comparatively analyzing the project's waste water treatment capacity, of 36,000m³ per day, with the actual waste water treated, of approximately 23,000m³ per day (actual result of 2010). Although more waste water is expected to be treated, with more hotels or major clients using the sewer service, it may still take a considerable time, since the expansion of service areas under the Phase II project²⁰ will not occur any time soon. Meanwhile, the results of the beneficiary survey, conducted in areas where the sewer service has already been introduced, show that a certain degree of project success has been achieved, since the sewer service users are generally satisfied. Therefore, this project has somewhat achieved its objectives, therefore its effectiveness is fair.

3.4 Impact

3.4.1 Intended Impacts

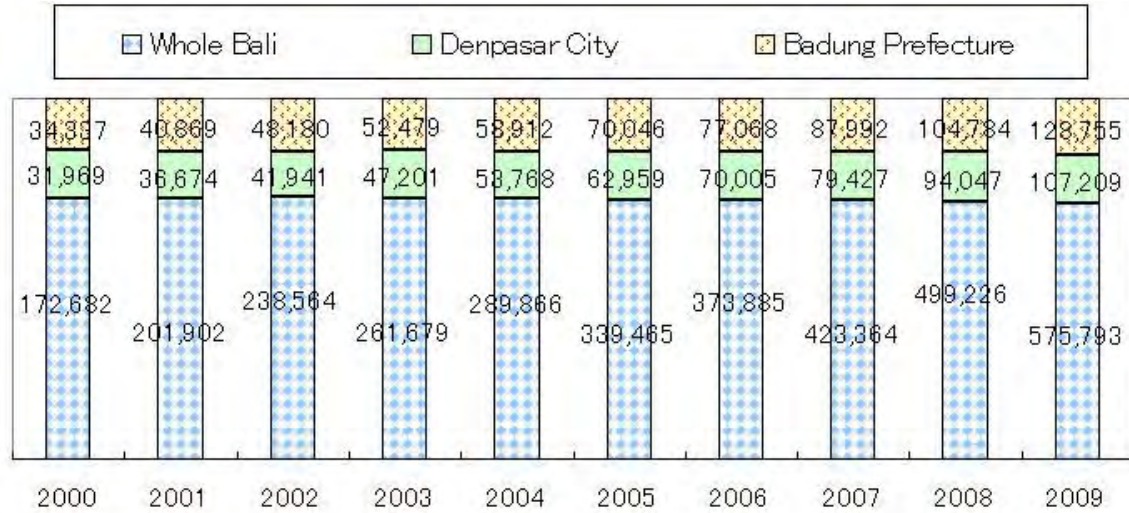
3.4.1.1 Impact on Economic Development

Figure 5 shows the trend in the gross regional domestic product (GRDP), both in Bali State as a whole, and in the area surrounding Denpasar City (Denpasar and Sanur Area) and Badung Prefecture (Legian/Seminyak Areas), where the sewer system was introduced. Economic growth has been achieved over the past decade. With sewer or environmental infrastructure development, urban development and expansion have progressed, which may have contributed to economic revitalization and increased revenue from commercial tourism. However, through this project, the sewer development area was reduced in comparison to the original plan, and the amount of waste water treated was reduced considerably by the fact that many major hotels

²⁰ According to JICA documents, it will be completed in 2014.

refrained from using the sewer service. In the light of such issues, it can be assumed that the degree of project contribution at this point is limited.

(Unit: 100 million Rp.)



Source: Bali Statistic Office

Figure 5: GRDP in Bali State, Denpasar City and Badung Prefecture

3.4.2 Other Impacts

3.4.2.1 Impacts on the Natural Environment

There were no seriously negative impacts on the environment²¹ as a result of this project. Moreover, because the residential area closest to the waste water treatment plant is approximately 500m away, there have been no complaints concerning odor or noise. Environmental Impact Assessments (EIA) was conducted in 1998 and 2003.²²

Water quality tests are regularly conducted in the inspection room of the waste water treatment plant. The test results of the treated water are reported monthly to the Environmental Monitoring Agency (BLH), one of the Bali Provincial Government's agencies. In the event that BLH determines that there is a problem with the water quality, the waste water treatment plant is required to take remedial action by advising on the problem to be corrected. Currently, there is no cause for concern, since the treated water quality is staying within the range determined by

²¹ Through the field survey, it was confirmed that no negative impact on the natural environment was found. Meanwhile, during the project implementation, environmental monitoring was conducted on a monthly basis and results were reported to the Bali Provincial Government. When sewer pipes were built, the utmost attention was paid to reducing noise and vibration in those areas where the construction took place. According to PPLP BALI, briefing sessions aimed at promoting understanding and cooperation among the local community were conducted on several occasions before construction began, and the involved parties strove to give sufficient consideration to the residents' demands, such as refraining from conducting nighttime construction works.

²² The first assessment was conducted by the Ministry of Public Works. The Bali Provincial Government conducted the second assessment after decentralization. In other words, EIA was conducted twice in accordance with the country's administrative system reform.

Bali's environmental standard for water quality (effluent standard: 50mg/l for BOD; 100mg/l for COD). (Reference: Actual results (average values) in January 2011 were 18.56mg/l for BOD and 45.35mg/l for COD. For February of the same year, BOD was 19.53mg/l, while COD was 55.21mg/l. The former was 30.60mg/l and latter was 60.65mg/l in March of the same year.²³)

Moreover, the numeric values of the BOD (biochemical oxygen demand)²⁴ of rivers in Denpasar City and average COD (chemical oxygen demand)²⁵ values of five beaches in the southern part of Bali as measuring points, were 3.77mg/l and 37.63mg/l respectively²⁶ (actual results in 2010). In terms of both these BOD and COD values, it must be admitted that verifying a cause-and-effect link to the effects of this project is not easy, particularly when considering factors such as the aforementioned amount of waste water treated, as well as the reduction of the construction area in Denpasar Area where the rivers flow. It is thought that the cause-and-effect link between change in BOD and COD values and project implementation can neither be clearly indicated nor analyzed.

A stabilization pond (lagoon) to treat sludge was constructed at the waste water treatment plant. Since the project was completed fairly recently, the sludge has not yet been taken out of this pond. According to PPLP BALI, the plan is to remove all the sludge at once after allowing it to accumulate for a few more years (i.e., currently, it is not yet due for removal, and taking it out is also a costly procedure). After being treated, the sludge will be processed into reclamation material and/or fertilizer.

3.4.2.2 Land Acquisition and Resettlement

It has been confirmed, through interviews with the Executing Agency and through the site survey, that resettlement was not implemented in the project. As mentioned earlier in the explanation of "Project Period" at Efficiency section, land acquisition did occur. Since the construction site of the waste water treatment plant (9.2ha) was originally owned by the Ministry of Forestry, the transfer procedures were followed in the process of procuring said land.

²³ Although the annual data basically should have been reviewed due to seasonality (rainy and dry seasons), the Indonesian side (BLUPAL) only measured and stored data adequately between January and March 2011. All data prior to December 2010 could not be obtained.

²⁴ It is the amount of organic matter under water expressed as the amount of oxygen necessary for microorganisms to oxidatively decompose. Two rivers flowing in the southern part of Denpasar City were targeted.

²⁵ It is non-oxidative matter under water expressed as the amount of oxygen necessary to oxidize; used for the effluent standard and for marine waters/lakes' environmental standards.

²⁶ The numeric values before project implementation (1990) were 32.2mg/l for BOD and 28.3mg/l for COD.

3.5 Sustainability (Rating: ③)

3.5.1 Structural Aspects of Operation and Maintenance

At the time of the ex-post evaluation, the organization in charge of the project's O&M is the Sewer Treatment Public Service Agency (hereinafter called "BLUPAL"²⁷). The three parties; namely, Bali Provincial Government, the mayor of Denpasar City, and the governor of Badung Prefecture, jointly serve as the organizational representatives of BLUPAL. On a practical level, BLUPAL is supervised by PPLP BALI.

In 2007, JICA conducted the Special Assistance for Project Implementation (SAPI) to support the establishment of BLUPAL, and made recommendations concerning the formation of the organizational structure, sewer fee pricing, etc. The current organizational structure of BLUPAL consists of the Technical Division and the Management/Finance Division working under the representative. The Technical Division is made up of those in charge of technical planning, of sewer collection, and of the waste water treatment plant, while the Management/Finance Division is made up of those in charge of clients, finance and general affairs. Currently, there are 43 staff members. Among them, 15 are in charge of the O&M of the sewer pipes, the booster (relay) pump stations, and the waste water treatment plant constructed as part of this project.

Meanwhile, BLUPAL at the time of the ex-post evaluation is in process of creating its organization. Although it will be discussed in further detail in the section "3.5.3 Financial Aspects of Operation and Maintenance," the collection of sewer usage fees has not yet begun, and the O&M has currently been implemented by subsidies from the Ministry of Public Works, the Bali Provincial Government, Denpasar City and Badung Prefecture. Nevertheless, in April 2011, the Bali Provincial Assembly passed a bill concerning BLUPAL's organizational development and sewer usage fee collection. It clarified the organizational structure and responsibilities of BLUPAL, which also made the collection of fees possible. According to BLUPAL, the organization's name will be changed in the near future, and to begin collecting fees from August 2011. Moreover, the respective autonomous bodies, which are currently allocating subsidies, have mentioned that they will also continue to provide support, even if BLUPAL begins to collect sewer usage fees. For example, these entities have expressed their intention to continue providing subsidies in accordance with the amount of the fees collected, in striving to secure BLUPAL's O&M costs.²⁸ As for the number of staff in connection with the

²⁷ In 2005, a law concerning the financial management of public service institutions was established in Bali, and BLUPAL was founded the following year (i.e., 2006).

²⁸ However, as will be discussed again later under "3.5.3 Financial Aspects of Operation and Maintenance," subsidies will be reduced/discontinued in a stepwise fashion, depending on the number of service users and on the amount collected. The aim is to realize an independent accounting system in the future, which relies solely on sewer

above-mentioned SAPI, it was recommended that BLUPAL's future organizational structure would have a total of 70 staff members, of whom 22 would be O&M staff. According to BLUPAL, as its organizational structure and responsibilities become clear, and as the collection of sewer usage fees begins, they are considering to enhance their organizational structure by adding more staff.

Therefore, BLUPAL is still in the organization-creating stage, and its transition should be closely observed. Nevertheless, it can be judged that there are no concerns regarding the future stability of this project's O&M.

3.5.2 Technical Aspects of Operation and Maintenance

The O&M staff at BLUPAL have participated in training courses both at home and abroad. For example, a total of 14 staff participated in a course of operational training concerning sewer facilities and treatment plants, which was conducted in Malaysia between 2007 and 2008. Eight staff have participated in a sewer-system training course conducted in Bali in 2008. Most recently, three staff have participated in a training program concerning the inspection of water quality, conducted in Surabaya. These training periods typically last for between five and 30 days. Additionally, construction management consultants from the Phase II project occasionally instruct and direct the BLUPAL staff regarding operations that relate to installation, electricity, and waste water treatment plants, to increase and maintain the technical level of the O&M. Furthermore, OJT training has also been offered to new staff on an as-needed basis.

Therefore, training courses and instructions are offered consistently at BLUPAL, where the technical level of all future O&M is presently being secured and improved. With this in mind, it can be determined that there is no concern regarding the technical aspects of the O&M.

3.5.3 Financial Aspects of Operation and Maintenance

At the time of the ex-post evaluation, BLUPAL's O&M budgets consist of subsidies from the Ministry of Public Works, the Bali Provincial Government, Denpasar City and Badung Prefecture. As shown in Table 4, the O&M budgets have been allocated since December 2008 (in actuality, since 2009), when O&M operations began. According to PPLP BALI and BLUPAL, the allocated amount is adequate for the O&M works, which means that the necessary budgets have been allocated. As mentioned before, it has been decided that sewer

usage fees.

usage fees will be collected from general households and commercial facilities, including hotels, from August 2011. In the near future, subsidies will be reduced or discontinued in a stepwise fashion, depending on the number of service users and the amount collected. Then, an independent accounting system that relies solely on sewer usage fees will be adopted.^{29,30} Although it seems that this shift must be observed for the time being, the transitional process has been confirmed, and the respective subsidizing agencies have also clearly stated that they will continue to provide subsidies until the necessary sums have been collected, which means that there is no major concern.

Table 4: O&M Budgets of the Project

(Unit: million Rp.)

Subsidy Providing Agencies	2009	2010
Ministry of Public Works	1,633	1,047
Bali Provincial Government	1,026	1,644
Denpasar City	730	749
Badung Prefecture	394	579
Total	3,783	4,019

Source: PPLP BALI and BLUPAL documents

Therefore, there is no concern regarding the financial level for the O&M of BLUPAL.

3.5.4 Current Status of Operation and Maintenance

The maintenance condition of the project's major facilities is as follows. Periodic maintenance is being conducted at the respective facilities. Spare parts have been procured and stored.³¹ The maintenance manual is currently being made, with assistance from the management consultants for the Phase II project. Once completed, it will immediately be made available to the respective divisions.

■ Secondary, Tertiary Sewer and Main Sewer Pipes

Currently, there are areas where the secondary and tertiary sewer pipes have been clogged with solid wastes and garbages from general households, mainly in Sanur and Kuta Area.

²⁹ The future collection of sewer usage fees will conform to a structure that requires service users to pay the fees every month at their nearest financial institutions.

³⁰ The sewer usage fee structure is expected to be revised every three years. The Ministry of Public Works, Bali Provincial Government, Denpasar City and Badung Prefecture are planning to discuss and make adjustments among themselves so that profits can be secured as a sewer project.

³¹ According to BLUPAL, procedures to procure these parts can be conducted more swiftly in the near future, as a result of improvements of the organizational management, and of the bill concerning sewer usage fee collection that passed at Bali Provincial Assembly.

However, funds from the Phase II project are being used to procure equipment, such as waste-absorbing vehicles shown in Figure 7, while garbage-removing tasks are being performed by the maintenance staff. Additionally, PPLP BALI and BLUPAL are proactively conducting educational activities and briefing sessions for residents in order to prevent waste dumping. Necessary measures are being taken to address the waste-clogging issue.

As for the main sewer pipes, no major problems have occurred. However, some of the manholes of the sewer pipes have been damaged, due to deterioration in material quality. These manholes are being replaced in order of precedence.³²

■ Booster (relay) Pump Stations and Wet-pit Pump Stations

Booster (relay) pump stations and wet-pit pump stations also are clogged with garbage from sewer construction areas, raising concerns about the operation of some of these stations. The former will stop operating on some occasions, while the latter face a more serious problem, making their pump facilities break down.³³ Nevertheless, similar to the secondary and tertiary sewer pipes mentioned previously, it has been decided that Phase II funds will be used for garbage removal. Some of these funds will also be allocated toward measures to prevent waste from flowing into the relevant pump stations (e.g., installing screens and protective nets, etc.) and to conduct repairs of the pump facilities.

■ Waste Water Treatment Plant

There is no particular concern regarding the maintenance condition of the waste water treatment plant. Pumps to pump up waste water, power generation facilities, and purification facilities are generally operating smoothly.

³² According to PPLP BALI, concrete manholes were initially installed, although some of them may have become damaged due to a lack of strength. Currently, steel frames are being used to reinforce them in the order of precedence.

³³ As of the end of February 2011, five out of the total twelve pump units at six wet-pit pump stations of the Project are not functioning properly. According to interview results through the field survey, it was revealed that “normal operations are interrupted, as many types of garbage come by; in some cases, even solid wastes and household eating utensils (spoons, forks, etc.).”



Figure 6: Booster (relay) Pump Station
(Sanur Area)



Figure 7: Waste-absorbing Vehicles

(Determination of the Sustainability Rating and Conclusions)

There is no concern regarding BLUPAL's organizational structure or technical and financial aspects. Meanwhile, although garbage has clogged up sewer pipes and problems have occurred with the pump stations, steady solutions can be expected, since the Indonesian side continues to allocate the necessary funds, as well as using the appropriate equipment and human resources, to tackle waste issues and take preventive measures. Therefore, no major problems have been observed in the O&M system, therefore sustainability of the project effect is high.

4. Conclusion, Lessons Learned, and Recommendations

4.1 Conclusion

It can be seen that this project is consistent with policies and development needs. Meanwhile, there was a significant delay in the project period, which meant that part of the output could not be accomplished. Some sewer development areas which were originally planned were reduced because of a lack of project budgets. Moreover, due to the fact that many major hotels deferred the decision to join the sewer service, the actual amount of waste water treated remained at about 60% in comparison to the treatment capacity. As for the maintenance conditions, some sewer pipes and booster (relay) pump stations are now clogged with dirt, but the Indonesian side is taking steps to deal with this problem by appropriating the necessary budget, equipment and human resources. Although there are still some issues regarding this project, the Indonesian side is nevertheless making efforts to increase the amount of waste water treated by proactively encouraging hotels that are planning to start business or considering to rebuild their buildings to use the sewer service. In light of the efforts, it can be appreciated.

In light of the above, this project is evaluated to be partially satisfactory.

4.2 Recommendations

(Recommendations to the Executing Agency)

To increase the amount of waste water treated, it is desirable to continue to encourage general households and hotels to use the sewer service system. Since the amount of waste water treated is especially large from hotels, which are the major clients in Bali whose tourism industry is growing, it is essential to encourage them actively to use the sewer service. Furthermore, BLUPAL should secure greater human resources and appropriate technology in accordance with increased sewer service users in the future, since more maintenance operations are requested as the increase of the amount of waste water treated.

(Recommendations to JICA)

Currently, the Indonesian side is striving to take care of issues including clogged sewer pipes and malfunctioning wet-pit pump stations. Therefore, it is desirable for JICA representative office in Jakarta to monitor progress at the necessary base, and to provide advice and support with regard to improvement measures.

4.3 Lessons Learned

It is desirable to eliminate the risks associated with project delay, as far as possible. As for this project, it took considerably more time than the original schedule to complete the land-acquisition process and to finalize the negotiations and/or procedures concerning the construction of the waste water treatment plant. Meanwhile, large hotels installed septic tanks on their own, which reduced the number of sewer service users and the amount of waste water treated.³⁴ Although a delay in the administrative process was a major factor, due to new bureaucratic appointments, both the Executing Agency and the JICA are required to secure the project's continuity and to reduce the risks of delay each time.

³⁴ In a sense, it could not be helped that the hotel industry installed septic tanks on their own. However, from a different standpoint, such action can also be understood as a loss to the local society and economy. Therefore, it is considered that such background and results are also necessary to activate for lessons learned.

Comparison of the Original and Actual Scope of the Project

Items	Original	Actual
1. Project Outputs	<p><Sewer Service Area> 1) Denpasar: 1,038.8ha 2) Sanur: 331.8ha 3) Kuta: 355.0ha Total: <u>1,717.6ha</u></p>	<p><Sewer Service Area> 1) Denpasar: 520.0ha 2) Sanur: 330.0ha 3) Legian and Seminyak (Kuta's alternative): 295.0ha Total: <u>1,145.0ha</u></p>
	<p><Sewer Pipe Lines> - Secondary & Tertiary Sewer Pipes 1) Denpasar: 126.02km 2) Sanur: 32.72km 3) Kuta: 17.60km Total: <u>176.34km</u></p> <p>- Main Sewer Pipes 1) Denpasar: 15.14km 2) Sanur: 4.31km 3) Kuta: 11.20km Total: <u>30.65km</u></p> <p>- Conveyance Sewer Pipes 1) Denpasar: 4.39km 2) Kuta: 1.20km Total: <u>5.59km</u></p> <p>- Force Main Pipes 1) Sanur: 5.16km 2) Kuta: 5.20km Total: <u>10.36km</u></p>	<p><Sewer Pipe Lines> - Secondary & Tertiary Sewer Pipes 1) Denpasar: 77.01km 2) Sanur: 30.70km 3) Legian and Seminyak (Kuta's alternative) : 19.8km Total: <u>127.60km</u></p> <p>- Main Sewer Pipes 1) Denpasar: 23.70km 2) Sanur: 9.40km 3) Legian and Seminyak (Kuta's alternative) : 11.40km Total: <u>44.5km</u></p> <p>- Conveyance Sewer Pipes 1) Denpasar: 0km 2) Legian and Seminyak (Kuta's alternative) : 0km Total: <u>0km</u></p> <p>- Force Main Pipes 1) Sanur: 3.90km 2) Legian and Seminyak (Kuta's alternative) : 4.90km Total: <u>8.80km</u></p>
	<p><Pumping Stations> 1) Booster (relay) Pump Station Sanur x1, Kuta x 1 (Total: 2 stations) 2) Wet-pit Pump Station Sanur x 2, Kuta x 2 (Total: 4 stations)</p>	<p><Pumping Stations> 1) Booster (relay) Pump Station Denpasar x 1, Sanur x 1, Kuta x 1 (Total: 3 stations) 2) Wet-pit Pump Station Sanur x 6 (Total: 6 stations)</p>
	<p><Waste Water Treatment Plant> Treatment Capacity: 44,000 m³/day</p>	<p><Waste Water Treatment Plant> Treatment Capacity: 51,000 m³/day</p>
	<p><Consulting Service> 406M/M (Foreign: 121M/M, Local: 285M/M)</p>	<p><Consulting Service> 1,078M/M (Foreign: 236 M/M, Local: 842 M/M)</p>
	2. Project Period	November 1994 to August 2001 (82 months)
3. Project Cost Amount paid in	1,693 million yen	2,348 million yen

Foreign currency		
Amount paid in Local currency	4,660 million yen	3,984 million yen
Total	6,353 million yen	6,332 million yen
Japanese ODA loan portion	5,400 million yen	5,231 million yen
Exchange Rate	1Rp.= 0.050 yen (November 1994)	1Rp.= 0.008257 yen (Average between December 2003 and September 2008)

Indonesia

Ex-Post Evaluation of Japanese ODA Loan

“Bali Beach Conservation Project”

External Evaluator: Kenichi Inazawa, Octavia Japan Co., Ltd.

0. Summary

This project is consistent with policies and development needs. Measures were taken both to prevent erosion and to restore the eroded parts of the Sanur, Nusa Dua and Kuta beaches, and works were performed to reinforce the rock face of the Tanah Lot Temple through this project. There was a significant delay in the project period, however the project cost was lower than planned. Moreover, based on the interview and beneficiary survey results, it can be determined that the livelihoods of the local fishermen have stabilized and that the tourism industry is reaping benefits. Although there are some concerns over the technical aspects of O&M and the maintenance condition due to a budget shortfall in the O&M agency, Bali River Basin Organization, there are no major problems regarding the O&M itself and the organizational structure. In light of the above, this project is evaluated to be satisfactory.

1. Project Description



Project Location



Nusa Dua Beach after the Beach Nourishment

1.1 Background

In Indonesia, which is made up with many islands, coastal erosion had begun to be identified. The popular tourist spot in the country, Bali Island¹, was no exception. Due to the overexploitation of coral reefs, fast-paced urbanization and the acceleration of economic growth

¹ Its area is 5,633m², which is one-third of Shikoku, Japan. Population is approximately 3.8-3.9 million (as of 2011), approximately 60% of which resides in the southern area, where the project sites are also located. Tourism is the key industry and the rate of GRDP is approximately 30% (followed by agriculture and manufacturing).

and tourism, coastal erosion in the southern area such as Sanur, Nusa Dua, Kuta beaches and the Tanah Lot Temple had become even more widespread as the years went by. Although tourism in Bali Island was crucial to the Indonesian economy, in both foreign currency acquisition and regional development, there was concern that the allure as a tourist spot would fall as a result of the decrease of Bali's beautiful beaches. Moreover, the decrease in land and productive resources, due to the coastal erosion, was so serious as to threaten the living environment of many residents, including the local fishermen. Therefore, it was deemed urgent to take measures to coastal conservation for the tourism industry, infrastructural development of economic and society, and residents' living stability.

1.2 Project Outline

The purpose of the project is to decrease the damage of coastal erosion around the southern coast areas of Bali Island where the erosion expanded and the sand areas decreased due to the influence of the waves, by implementing civil works such as beach nourishment and constructing groins, submerged breakwaters, offshore breakwaters, etc.; thereby contributing to improve the living conditions for local residents, to enhance economic activities, and to promote the tourism in the Island.

Approved Amount / Disbursed Amount	9,506 million yen / 8,769 million yen
Exchange of Notes Date / Loan Agreement Signing Date	November 1996 / December 1996
Terms and Conditions	[Main Body] Interest Rate: 2.5% Repayment Period: 30 years (Grace Period: 10 years) Condition for Procurement: General Untied
	[Consulting Service] Interest Rate: 2.1% Repayment Period: 30 years (Grace Period: 10 years) Condition for Procurement: General Untied
Borrower / Executing Agency(ies)	Government of Republic of Indonesia / Directorate

	General of Water Resources (DGWRD), Ministry of Public Works (O&M Organization: Bali River Basin Organization)
Final Disbursement Date	December 2008
Main Contractor (Over 1 billion yen)	Taisei-Rinkai-PP (Indonesia), PT.Pembangunan Perumahan (Indonesia) and Taisei Corporation (Japan) and Rinkai Construction Co., Ltd (Japan) (JV), PT.Waskita Karya (Indonesia) and Penta-Ocean Construction Co., Ltd (Japan) (JV)
Main Consultant (Over 100 million yen)	PT. Yodya Karya and Necon Ciptajasa and Institut Teknologi Bandung and Universitas Gadjah Mada (Indonesia) and Nippon Koei Co., Ltd (JV)
Feasibility Studies, etc.	F/S prepared by JICA - Bali Beach Urgent Conservation Plan- (1989)
Related Projects (if any)	N/A

2. Outline of the Evaluation Study

2.1 External Evaluator

Kenichi Inazawa, Evaluation Consultant, Octavia Japan Co., Ltd.

2.2 Duration of Evaluation Study

Duration of the Study: November, 2010-October, 2011

Duration of the Field Study: February 7-25, 2011 (1st study)

May 13-20, 2011 (2nd study)

2.3 Constraints during the Evaluation Study

N/A

3. Results of the Evaluation (Overall Rating: B²)

3.1 Relevance (Rating: ③³)

² A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

³ ③: High, ②: Fair, ①: Low

3.1.1 Relevance with the Development Plan of Indonesia

At the time of the appraisal, Indonesia's "Sixth Five-Year Plan" (1994-1999) advocated to strike a balance between development and environmental conservation for the natural resources. In the plan, restoring and conserving land depleted by coastal erosion was deemed important.

Meanwhile, at the time of the ex-post evaluation, the "National Mid-term Development Plan" (2010-2014), has also advocated the necessity of infrastructural development regarding environmental conservation and coastal erosion prevention. Moreover, the Ministry of Public Works developed the "Strategic Plan of the Ministry of Public Works" (2010-2014) in January 2010, which has defined the importance of coastal erosion prevention to ensure the safety of national territories and infrastructural facilities. The plan is aiming to conserve and restore the 230km coast line of 27 locations in the country, including Bali Island.

Since the necessity of coastal conservation has been continuously recognized as important, therefore consistency of policies and measures with this project both at the time of the appraisal and the ex-post evaluation can be recognized.

3.1.2 Relevance with the Development Needs of Indonesia

At the time of the appraisal, the coast in the southern part of Bali Island⁴ suffered greatly from aggressive waves that caused greater coastal erosion. Beach decreased and the erosion threatened the living environment of the local residents, including the fishermen. Moreover, measures regarding the coastal conservation were necessary, since it was deemed that the allure as a touristic spot would fall in the future, due to the decrease of beautiful beach.

Meanwhile, at the time of the ex-post evaluation, the conditions of the Sanur, Nusa Dua and Kuta beaches have restored, enhancing the allure as tourism resources. Nonetheless, damages from the coastal erosion, as a result of economic progress and tourism development, tend to continue spreading⁵ in Bali Island. The total length of the island's coast line is 438km, and damages from the coastal erosion have occurred along approximately 182km so far. Although Indonesian side has implemented coastal conservation measures along approximately 81.5km of its coast line until 2009,⁶ the 100km or so remaining continues to be untouched. Consequently, it is assumed that the damages will keep spreading even from now unless coastal conservation measures are taken.

Since the coastal conservation in Bali Island at the time of the ex-post evaluation has

⁴ On the coasts of Bali Island, tourism (including marine sports, fishing, religious ceremonies (Hindu rituals), exchanges between residents, etc) can be seen on a daily basis.

⁵ Refer to Column No. 3 which is presented later, in terms of coastal erosion factors.

⁶ Beach nourishment, construction and installation of structures such as groins, etc. It includes this project.

continuously been regarded as important, therefore it can be said that this project is consistent with developmental needs even at the time of the ex-post evaluation.

3.1.3 Relevance with Japan's ODA Policy

The Japan's Official Development Assistance Charter (ODA Charter), endorsed by the Cabinet in 1992, declared the "compatibility between environment and development" as one of its principles. Moreover, the Charter called for the support of infrastructural development, as a key point, which was an important postulate of economic and social development. This project implements and supports the development of the environmental infrastructure of Bali Island, where environmental issues have become more prominent along with the expansion of the tourism industry since the 1960s. Therefore, this project appears to be consistent with the relevant principles and key points of Japan's aid policy.

This project has been highly relevant with Indonesia's development plan and development needs, as well as to Japan's ODA policy, therefore, its relevance is high ③.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

Prior to the project implementation, coastal erosion on the beaches of the southern part of Bali Island had expanded, and a decrease both in tourism and in the quality of the residents' living environment had become apparent. Civil works, including beach nourishment⁷ and the construction of groins,⁸ artificial reefs,⁹ and offshore breakwaters were implemented by this project.¹⁰ Table 1 shows the status of the respective sites prior to the project implementation according to JICA's documents, while Table 2 shows the achievements of the output plan of this project.

⁷ To improve or restore by adding sand to the coastline where erosion had become widespread.

⁸ Structures positioned at a right angle to the coastline; several to dozens of them are set up with a certain distance between each other. They are effective at controlling nearshore currents that emerge parallel to the coast, and they prevent sand from being washed away. Either T-shaped or straight groins are chosen and set up according to the local geography, convective condition of the waves, etc.

⁹ Submerged breakwaters are structures put into place under water, while artificial reefs are expanded crowns (uppermost parts of structures) of off-shore breakwaters. Both are effective at dissipating the force of the waves (vanishing waves).

¹⁰ Structures positioned off the coast, effective at weakening the offshore waves. As they prevent coastal erosion, they also work to promote the collection of sand.

Table 1: Status of Each Project Site before Project Implementation

Project Site	Status before Project Implementation
Sanur Beach	The situation of overexploitation of coral reefs used as construction materials was serious. It was identified that the beach had receded by approximately 10-30m.
Kuta Beach	The coastline receded significantly along the 2.5km beach on the northern side of the runway at Denpasar International Airport.
Nusa Dua Beach	Since a small island, which was initially separated, became connected as a result of sand sedimentation, the sand supply from the south side ceased. In addition, due to the overexploitation of coral reefs, erosion over a distance of 1km was noticeable in some areas.
Tanah Lot Temple	The rocks' protective walls were damaged by waves in the area surrounding the temple and erosion progressed greatly. There was also a risk of collapse.

Source: JICA documents

Table 2: Planned and Actual Major Outputs of the Project

Project Site	Plan	Actual
Sanur Beach	<ul style="list-style-type: none"> - Beach Nourishment (4 sections: the nourishment sand: 93,476 m³) - Off-shore Breakwater (6 units) - Straight Groin (7 units are rebuilt) - Submerged Breakwater/Artificial Reef (3 units) 	<ul style="list-style-type: none"> - Beach Nourishment (4 sections 6,960m; the nourishment sand: 301,196 m³, Walkway 5,830m) - Off-shore Breakwater (1 unit) - Straight Groin (6 were constructed and 7 units are rebuilt) - Submerged Breakwater/Artificial Reef (Cancelled)
Kuta Beach	<ul style="list-style-type: none"> - Beach Nourishment (4 sections: the nourishment sand: 450,000 m³) - T-type Groin (3 units) - Straight Groin (1 unit) 	<ul style="list-style-type: none"> - Beach Nourishment (4 sections 7,000m: the nourishment sand: 519,605 m³, Walkway 3,400m) - Off-shore Breakwater (3 units) - Coral Reef Restoration (17,000 m² for 2 places) - T-type Groin (Cancelled) - Straight Groin (Cancelled)
Nusa Dua Beach	<ul style="list-style-type: none"> - Beach Nourishment (5 sections: the nourishment sand: 368,579 m³) - Straight Groin (4 units) - Off-shore Breakwater (2 units) 	<ul style="list-style-type: none"> - Beach Nourishment (5 sections 6,400m: the nourishment sand: 342,562 m³, Walkway 3,280m) - Straight Groin (6 were constructed and 7 units are rebuilt) - Off-shore Breakwater (Cancelled)
Tanah Lot Temple	<ul style="list-style-type: none"> - Off-shore Breakwater (1 unit) - Tetrapod (1,106 units) 	<ul style="list-style-type: none"> - Off-shore Breakwater (Cancelled) - Submerged Breakwater (1 unit) - Tetrapod (7,110 units)
Consulting Services	Amount of M/M: 480M/M (Foreign Consultant: 144 M/M, Local Consultant: 336M/M. Main TOR are reviewing detailed design, assisting order placement of the project, supervising the construction	Amount of M/M: 1,479.34M/M (Foreign Consultant: 362.96 M/M, Local Consultant: 1,116.38M/M. TORs were implemented as planned.)

	of this project, preparing a monitoring research plan of beach topography change, etc.)	
Additional Outputs	---	- Construction of Parking Lot (Kuta Beach: 3,300 m ²) - Coral Transplant (Kuta Beach: 10,000 m ² , 34 Species and 111,742 fragments), etc

Source: JICA documents, Project Completion Report (PCR), Answers on questionnaire

The followings are reasons about the difference between the “Planned and Actual Major Outputs of the Project” shown in Table 2. As both the difference and the change have reasons and backgrounds, they can be deemed reasonable.

1. Sanur, Kuta and Nusa Dua Beach

An increase in beach nourishment (amount of sand input), compared to the original plan,¹¹ can be identified, because coastal erosion had exceeded by the time the project entered its detailed design stage (1997-2000), and necessary beach nourishment had to be estimated once again.

The reason for quantity changes and cancellations regarding off-shore breakwaters, straight groins, T-type groins, submerged breakwaters and artificial reefs is because the initial design was reviewed during the detailed design. Reviews and changes were implemented, since the local residents expressed their concerns about the coastal landscape with the initial plan’s outputs, when briefing sessions were held.¹²

The reason which coral reef restoration was implemented at Kuta Beach is because coral reefs in this area had been carved out in the past, which were used as construction block materials. The concave portions were also confirmed through the results of the field measurement survey. The restoration was implemented, as it was technically determined that the wave energy reaching the coastal line would weaken and thus would prevent coastal erosion if repairs were made by adjusting the concave portions to the surrounding topography.

2. Tanah Lot Temple

The reason which the off-shore breakwater was cancelled and the number of submerged breakwaters/tetrapods increased is as a result of the review of the initial plan during the detailed design. The changes were made based on the determination that increasing the number of

¹¹ The planned value at the time of the appraisal was based on the F/S made in 1989.

¹² The Indonesian side briefed residents about the structures and the project’s actual effect, and strove to incorporate their suggestions and demands. According to the Executing Agency, a total of 45 briefing sessions (at least, based on their understanding) were held during the project implementation.

submerged breakwaters and tetrapods that dissipated waves under water, rather than choosing off-shore breakwaters that would be structurally visible above the ocean surface, would be more appropriate for the preservation of the temple's landscape after the project completion.

3. Consulting Services

The reason which the amount of M/M was larger compared to the original plan is mainly due to the extension of the project period. Although it will be discussed at "3.2.2.1 Project Period" of this section, it is because negotiations and adjustments with the local residents of Kuta Beach were taking much time at the time of briefing sessions for them, regarding the scope of the project. As a result, the amount of M/M increased.

4. Additional Outputs (Construction of Parking Lot and Coral Transplant at Kuta Beach)

The reason for which a parking lot was constructed at Kuta Beach is that local residents requested its construction at the time of briefing sessions regarding the scope of the project.¹³ Kuta residents requested that the coral reefs be transplanted, and that request was also incorporated into the new plan and implemented as part of the above-mentioned coral reef restoration.

¹³ The requests for the construction of parking lot were based on both an anticipated increase in parking revenue as a result a greater influx of tourists, and also on the anticipation of alleviated traffic congestion in the community. The local community is now maintaining the parking area.



Figure 1: Project Site

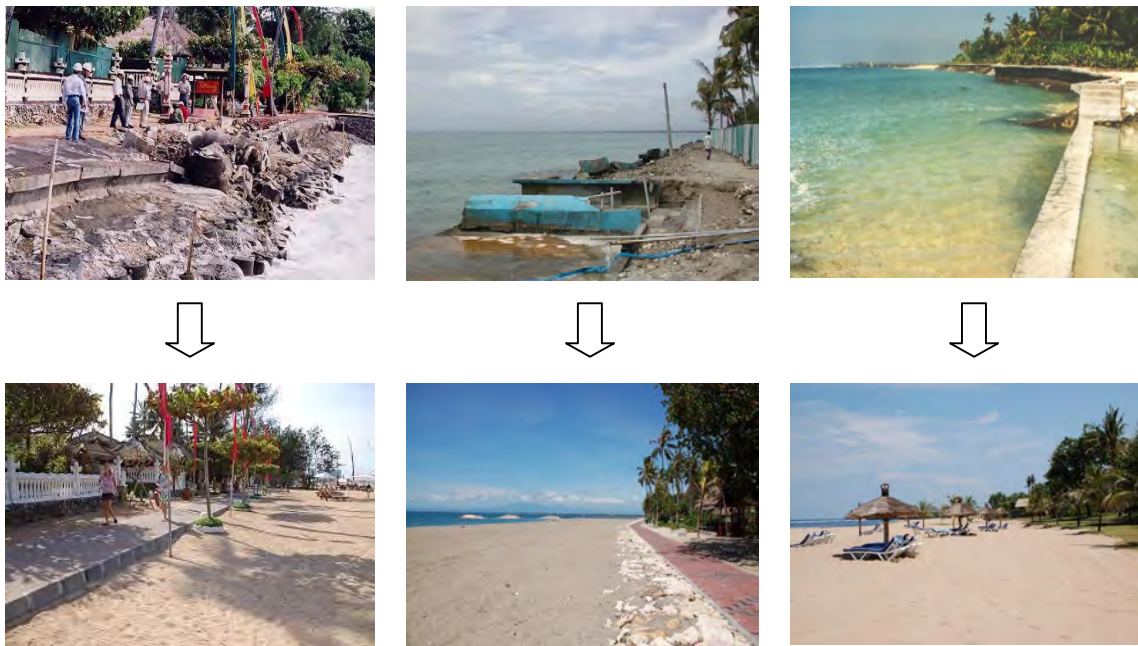


Figure 2: Change before and after the Project Implementation¹⁴
 (Left: Sanur Beach, Center: Kuta Beach, Right: Nusa Dua Beach)

¹⁴ The photos in Figures 2 and 3 were provided by Nippon Koei Co., Ltd, the consultant of the project.



Figure 3: Change before and after the Project Implementation
(Nusa Dua Beach: Aerial Photography)

3.2.2 Project Inputs

3.2.2.1 Project Period

The planned project period was 6 years (72 months) from December 1996 to November 2002; however, it actually took 12 years and 1 month (145 months), from December 1996 to December 2008, 201% longer than planned.

The main reason for the delay is that the Kuta residential community became opposed to the project after it had begun. As mentioned earlier, this resulted from the fact that the Executing Agency held many briefing sessions and had reviewed and redesigned the project plan to incorporate the residents' opinions. It took too much time for the adjustments, as well as for certain required procedures, which resulted in a delay to the start of the construction. The reasons for opposition from the local residents are as follows: 1) Perceived negative impact on tourism due to which the beach landscape would be ruined as a result of constructing structures such as groins, and 2) Concerns over the possible decline in the number of tourists due to which waves would become smaller as a result of constructing the structures, since the local area has been a popular surfing spot.¹⁵

3.2.2.2 Project Cost

The planned project cost was 12,675 million yen (JICA loan amount was 9,506 million), while the actual cost was 9,600 million yen (JICA loan amount was 8,769 million), which was lower than planned (about 76% of the plan). The reason which the actual cost was lower than

¹⁵ Additionally, according to a local community leader, people were traumatized by a coastal conservation project (construction of structures such as groins) that had been implemented on the same beach during the years under military administration. Through that project, groins were constructed only near the hotels for the military, which ruined the surrounding landscape. The local community reaped almost no benefit from it, and so it may have been inevitable that many residents were initially opposed to the project when it was proposed.

the original plan is mainly because the Executing Agency strove to cut down on the cost by sparing no pains to practice fund management regarding tendering, procurement and contract. Also, it is because of the factor concerning exchange-rate fluctuations.

Thus, although the project period was significantly exceeded the plan, the project cost was lower than planned, therefore efficiency of the project is fair ②.

3.3 Effectiveness (Rating: ③)

3.3.1 Quantitative Effects

3.3.1.1 Results from Operation and Effect Indicators

1) Damage Alleviation of Coastal Erosion (Monitoring the Nourishment Sand)

Sand was added in Sanur, Nusa Dua and Kuta beaches to promote their recovery in places where erosion damage was noticeable. At the time of the appraisal, no index was kept or data collected, with regard to the eroded areas. Therefore, as shown in Table 3, the percentage of residue from the beach nourishment is deemed as the target of analysis for the effectiveness evaluation (quantitative evaluation) to determine the project's effect. Meanwhile, at the time of the appraisal, it was expected that the "yield rate (residue percentage) after the completion of beach nourishment would be 80% for all the beaches".¹⁶

Table 3: Residual Ratio of the Amount of Nourishment Sand after the Completion of Beach Nourishment

Project Site (completion year and month of beach nourishment/ amount of sand)	Residue Percentage Considered After the Completion of Beach Nourishment (months/years in parentheses are the periods when monitoring was conducted)
Sanur Beach (October 2004/ 301,196 m ³)	Approx. 94% (December 2004) → Approx. 95% (October 2005) → Approx. 90% (December 2006)
Kuta Beach (December 2008/519,605 m ³)	Approx. 90% (November 2009) → Approx. 85- 90% (After 2010)
Nusa Dua Beach (October 2004/342,562 m ³)	Approx. 98% (November 2004) → Approx. 96% (December 2005) → Approx. 93% (January 2007)

Source: Interview Results to the Executing Agency, Documents of the Consultant of the Project

Note: The percentages (values) in this table were calculated based on the average values of each measuring points of the sites.

¹⁶ Information from JICA's evaluation documents. There is no international, Indonesian or Japanese standard pertaining to the residual volume of beach nourishment.

As for Sanur Beach since 2007, the subsequent residue percentage is unknown, because no monitoring regarding beach nourishment or amount of residue has been conducted. Nevertheless, according to the Executing Agency, the residue percentage is generally considered to be approximately 80-90% since the completion of beach nourishment. With regard to Kuta Beach, the said percentage until the time of the ex-post evaluation is generally considered to be approximately 85-90%. As for Nusa Dua Beach, no monitoring has been conducted since 2007 either, however the total residue percentage is considered to be somewhere around 90%.

Therefore, there is no data sufficiently measured regarding the residue percentage of beach nourishment from the project completion to the time of the ex-post evaluation. However, considering that the yield rate (residue percentage) was planned as 80% at the time of the appraisal and that the beach nourishment's residue percentage for all the beaches after the project completion in general was deemed as more than 80%, it can be said that the beach nourishment's effect was retained. Furthermore, it should also be noted that a stockpile of approximately 140,000m³, which was also procured by the project, is barely used. For the time being, it is used to replace sand that has flowed out, which can maintain the shoreline. Therefore, it can be determined that there exists a project effect, although it must not be forgotten that appropriate maintenance should also be implemented.

3.3.1.2 Calculations of Internal Rates of Return (IRR)

(1) Economic Internal Rate of Return (EIRR):

At the time of the appraisal, the economic internal rate of return was calculated as 21.00% in light of the spillover effects on hotel/tourism revenues. This was based on the assumption which, in the future, the O&M costs would be collected from local business managers and tourist facility operators. Then, it was assumed that the Bali Provincial Government would be responsible for collecting the amount borne. At present, however, the said costs have not been collected, and the O&M budgets have not almost been allocated from the central government (Directorate General of Water Resources; hereinafter called, "DGWRD") to the Bali River Basin Organization.¹⁷ Therefore, EIRR was not recalculated for this ex-post evaluation survey, since it was not possible to follow up on preconditions at the time of the appraisal.

(2) Financial Internal Rate of Return (FIRR):

Because the financial internal rate of return was not calculated at the time of the appraisal,

¹⁷ The details are explained in the "Financial Aspects of Operation and Maintenance" at Sustainability section.

FIRR was not calculated for this ex-post evaluation survey.

3.3.2 Qualitative Effects

An interview survey was conducted during this ex-post evaluation survey, in order to evaluate the opinions of those fishermen and tourist agents whose lives and livelihoods were being threatened prior to the project implementation. The fishermen expressed positive opinions regarding the stabilization of their living environment as a result of beach nourishment, an increase in the profitability by their fishing works. Also, the fishermen expressed that they have positively started taking part in tourism alongside fishing. Meanwhile, many tourist agents expressed positively, too. They expressed awareness of environmental beautification and conservation, in addition to enhanced profits as a result of an influx of tourists. Business owners described the ability to maintain beach security and safety by hiring security officers and being able to respond to the various needs of tourists. Specific results of the interviews conducted in the project area are summarized under Column No. 1, as follows.

【Column No.1: Results of Interviews Conducted with Fishermen and Tourist Agents】

1) Stabilized Lives (employment) and Improved Livelihoods of Fishermen

The following are main comments obtained during interviews with the fishermen¹⁸ of Sanur, Nusa Dua and Kuta areas.

[1]Outcome Level:

- Before the beach nourishment was implemented, coastal erosion had become so widespread that it was difficult to secure a place to tie up our boats. We no longer experience any problems when we go fishing.

[2]Impact Level:

- As a result of the beach nourishment, we have begun to rent out our boats to tourists as a side business in addition to fishing works.
- Fishermen were considered low-income and low-class individuals in the past, but we now have more income and are generally satisfied.

From the comments above, it can be determined that both the fishing condition and the living

¹⁸ There are four fishery unions in Sanur (total of approx. 200-250 fishermen), twelve in Nusa Dua (total of approx. 1,000 fishermen), and four in Kuta (total of approx. 200 fishermen).

environment of the fishermen have stabilized. Moreover, some fishermen have made their way into tourism and have made a profit, making it evident that they have reaped benefits from the project.

2) Stabilized Management and Improved Profits of Tourism-related Business Owners

The following comments were obtained as a result of interviewing the owners of marine sport shops such as surfing and diving shops at the respective beaches:

(1) Sanur Beach¹⁹

[1] Outcome Level:

- We were able to hire security guards as a result of more profits coming into the local community. The safety of the beaches has been enhanced because they patrol the areas.
- After the beach nourishment, we think that many business managers are beginning to feel responsible for protecting the beaches and the environment.

[2] Impact Level:

- After the beach nourishment, the shops have begun receiving more tourists and profits have increased.
- Some shops have purchased large sightseeing boats to be able to receive more tourists than before.

From these comments, it can be determined that profits from tourism are increasing as a result of this project, in addition to enhanced safety and improved awareness of the environment.

(2) Kuta Beach²⁰

[1] Outcome Level:

- The beaches have become more spacious, with the landscape noticeably different. We are truly satisfied.
- Since the beach nourishment completed, we think that an awareness of keeping the beaches looking good has developed among the tourist agents.

¹⁹ There are 37 tourist agents in Sanur Beach. This is the number of shops which operate along the seashore, and does not include those located at a great distance from it. Participating in the activities of the local community including religious events is a requirement to run stores along the seashore. Moreover, they have to be monitored and controlled by the community organization. Most owners and employees are those who have been engaged in tourism prior to the project implementation (i.e., no major change in the number of businesses and business types prior to and after the project implementation.). There are many diving and snorkeling shops along this beach.

²⁰ There are approximately 100 tourist agents in Kuta Beach. Like Sanur Beach, tourist agents belong to the local community and are monitored and controlled by them. Likewise, many tourist agents, which are actually local residents, are those who have been running their business prior to the project implementation. Kuta Beach is known at home and abroad for its surfing waves. Therefore, most tourist agencies are surfing shops.

- The local community and tourist agents of Kuta Beach were initially opposed to the project. However, they now have understandings of the beach nourishment, and there is no doubt that they are reaping benefits from it.

[2] Impact Level:

- After the beach nourishment, many surfing shops are receiving tourists and their profits are increasing.
- Although the number of tourists temporarily declined due to the bomb attacks that occurred in the Kuta downtown area in 2002 and 2005,²¹ we think that the number of visitors which has recovered and increased since then is because of the beach nourishment.

As mentioned earlier, the local community and tourist agents of Kuta Beach were initially opposed to the project. However, from comments mentioned above, it can be determined that they have recognized the positive effects of the project, and that they are reaping many benefits from it.

(3) Nusa Dua Beach²²

[1] Outcome Level:

- Before the beach nourishment, we sometimes had to evacuate our small sightseeing boats close to the roads along the beach, because the coastal erosion was so widespread. However, we are now able to keep them safely on the sand.

[2] Impact Level:

- Since the beach nourishment completed in 2004, the number of tourists, as well as profits, are increasing.
- We think that the number of vessels such as small sightseeing boats owned by tourist agents is now increasing, compared to before the beach nourishment.
- In recent years, the number of Chinese tourists has grown rapidly, and sometimes we see them standing in line in front of the marine sport shops. Perhaps the Chinese tourists are deriving the greatest benefit from the beach nourishment.

From these comments, there is no cause for concern over erosion along Nusa Dua Beach after

²¹ In 2002, a bomb planted in a car parked on the street exploded, causing the deaths of 202 people. Meanwhile, in 2005, explosions occurred in three restaurants in the Kuta downtown area and at Jimbaran beach, which resulted in the deaths of 23 people.

²² There are 20 tourist agents on Nusa Dua Beach. Like Sanur Beach, tourist agents belong to the local community and are monitored and controlled by them. There are many shops related to marine sports, such as jet skiing, banana boats, kite boats, etc.

the beach nourishment, and there are various types of tourist activities on offer. Therefore, it can be said that this project has fulfilled the needs of the tourists as well.



Figure 4: Surf Shop at Kuta Beach



Figure 5: Marine Sports at Nusa Dua Beach

(Determination of the Effectiveness Rating and Conclusions)

After the project completion, the percentage of residual sand through the beach nourishment in the aforementioned beaches has generally reached more than 80%, and it can be said that damage from past coastal erosion has decreased. Moreover, it can be determined from the interview survey results that great benefits have been reaped in terms of the lives and livelihoods of the local fishermen. Also, taking into consideration the beneficiary survey results in the next section “Impact,” it can be assumed that the project is directly or indirectly supporting economic activities in Bali Island, contributing to an improved living environment for the local residents and to the development of tourism.²³ Therefore, this project has largely achieved its objectives, therefore its effectiveness is high ③.

3.4 Impact

3.4.1 Intended Impacts

3.4.1.1 Improved Living Environment for Local Residents and Stabilized Management of Local Companies as a Result of Preventing Coastal Erosion

1) Implementation of Beneficiary Survey

Before the project implementation, the respective beaches suffered widespread erosion as a result of aggressive waves, since coral reefs were carved-out, etc. Consequently, the living environment of residents, including fishermen, was threatened. It is thought that the project has had great spillover effects for the local residents and tourist agents. In this ex-post evaluation survey, an interview survey was conducted, covering the four areas, Sanur, Nusa Dua and Kuta

²³ Since it is thought that factors except this project are sizeable and complex, any quantitative analysis regarding the economic benefit of this project was difficult.

beaches, and Tanah Lot Temple, and targeting approximately 120 local residents and merchants/shop owners (including diving/surfing shops). The following explanations are the survey results, review and analysis.

Figure 6 shows the questions and answers pertaining to degree of satisfaction. Approximately 96% of the residents and company/shop owners replied “Very satisfied” or “Satisfied.” This shows that they have perceived the project positively. Reasons for their answers are shown in Figure 7. Although many respondents stated, “Living environment has improved since coastal erosion concerns are now gone,” they also stated that “Environmental awareness has improved.” It is assumed that such comments as, “We must continue to conserve the beaches and the temple that has been beautifully improved,” point to a growing environmental awareness among the residents and company/shop owners.

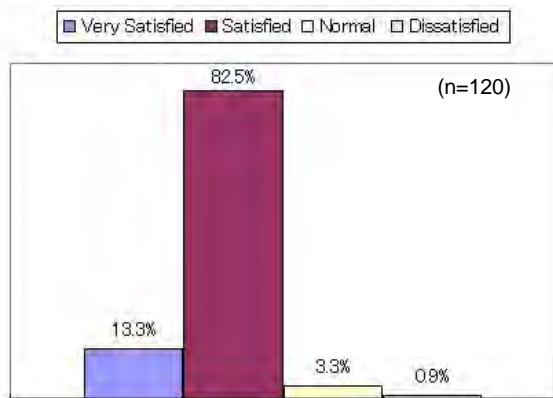


Figure 6: Are you satisfied with the coastal conservation measures (this project)?

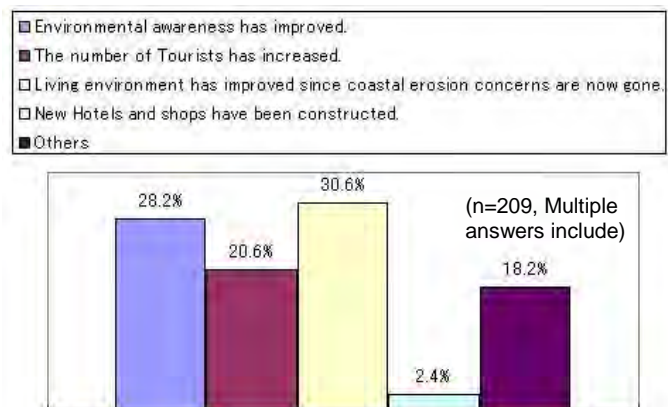


Figure 7: Reasons of “Very Satisfied” and “Satisfied” in Figure 6

Table 4 shows questions and answers regarding damage to houses, and damage to roads/transportation in the coastal areas before and after beach nourishment and construction work on structures such as groins.²⁴ As the answers indicate, damage to houses and offices/shops that had been occurring before the coastal conservation measures are now almost gone after its completion. Damage to road/transportation has also drastically decreased after the measures. Therefore, it is judged that the project has contributed greatly to the conservation of living infrastructures and the stabilization of business management.

Table 4: Damage Status before and after the Coastal Conservation Measures

²⁴ Water immersion due to tidal waves, damage to coastal infrastructure facilities due to spreading erosion, etc.

Item	Before Implementing the Coastal Conservation Measures	After Implementing the Coastal Conservation Measures
Damages to houses (respondents are local residents) (n=80)	- Yes, a lot: 0% - Yes, but not much: 32.5% - No: 67.5% - No answers: 0%	- Yes, a lot: 0% - Yes, but not much: 0% - No: 96.25% - No answers: 3.75%
Damages to roads/transportation (respondents are local residents) (n=80)	- Yes, a lot: 12.5% - Yes, but not much: 34.2% - No: 53.3% - No answers: 0%	- Yes, a lot: 1.7% - Yes, but not much: 5.8% - No: 92.5% - No answers: 0%
Damages to offices/shops (respondents are local company and shop owners, and surf/dive shop owners, etc.) (n=40)	- Yes, a lot: 2.5% - Yes, but not much: 45.0% - No: 52.5% - No answers: 0%	- Yes, a lot: 0% - Yes, but not much: 0% - No: 100.0% - No answers: 0%

Source: Results of the beneficiary survey

Table 5 shows questions and answers regarding coastal cleanup and beautification relating to the project. Since many respondents replied “It was extremely neat and clean”, it is judged that there is also a drastic change regarding the coastal clean up and beautification, before and after implementing coastal conservation measures.

Table 5: Coastal Clean Up and Beautification

Item	Before Implementing the Coastal Conservation Measures	After Implementing the Coastal Conservation Measures
Clean Up/Beautification of Sanur, Kuta and Nusa Dua Beach (n=108)	- It was extremely neat and clean: 9.2% - It was cleaned up but not much: 71.4% - It was not cleaned up: 18.4% - No answers: 1.0%	- It is extremely neat and clean: 70.4% - It is cleaned up but not much: 23.5% - It is not cleaned up: 5.1% - No answers: 1.0%
Clean Up/Beautification inside Tanah Lot (n=22)	- It was extremely neat and clean: 4.5% - It was cleaned up but not much: 91.0% - It was not cleaned up: 4.5% - No answers: 0%	- It is extremely neat and clean: 77.3% - It is cleaned up but not much: 18.2% - It is not cleaned up: 4.5% - No answers: 0%

Source: Results of the beneficiary survey

Figure 8 shows questions and answers regarding “Correlation between the Project and Bali’s

Tourism Resource Value,” while Figure 9 shows questions and answers related to “Necessity of Conservation Measures in the Other Regions of Bali Island.” As for the former, many respondents recognize that the project has improved Bali’s tourism resource value. As for the latter, many pointed out that it would be necessary to promote coastal conservation measures in the other regions of Bali Island where coastal erosion has become widespread. This proves once again that the impact regarding this project has been regarded as large.

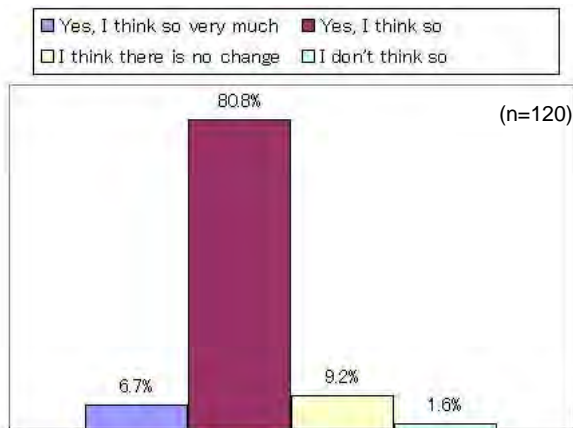


Figure 8: Do you think that Bali’s tourism resource value has improved through this project?

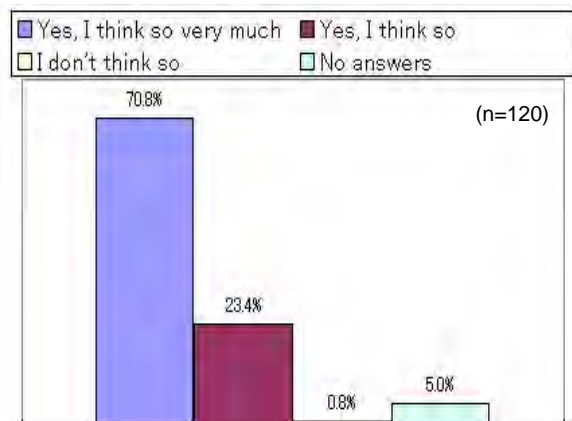


Figure 9: Do you think that coastal conservation measures continue to be necessary even in the other regions of Bali Island?

2) Contribution to Economic Revitalization and Tourism Revenue Increase

(1) Economic Revitalization of Whole Bali Island

Figure 10 shows Bali’s gross regional domestic product (GRDP) and trends in tourism revenue since 2000. Constant growth has been achieved over the past decade. It is thought that efforts to develop tourism resources, such as this project (i.e., coastal conservation measures, reinforcement works for Tanah Lot temple, etc.) have contributed to attracting many more tourists. In fact, the economic effects of tourists’ consumption activities support Bali’s economic progress, as they spill over into various areas and venture beyond the barriers of tourism-related industries alone.

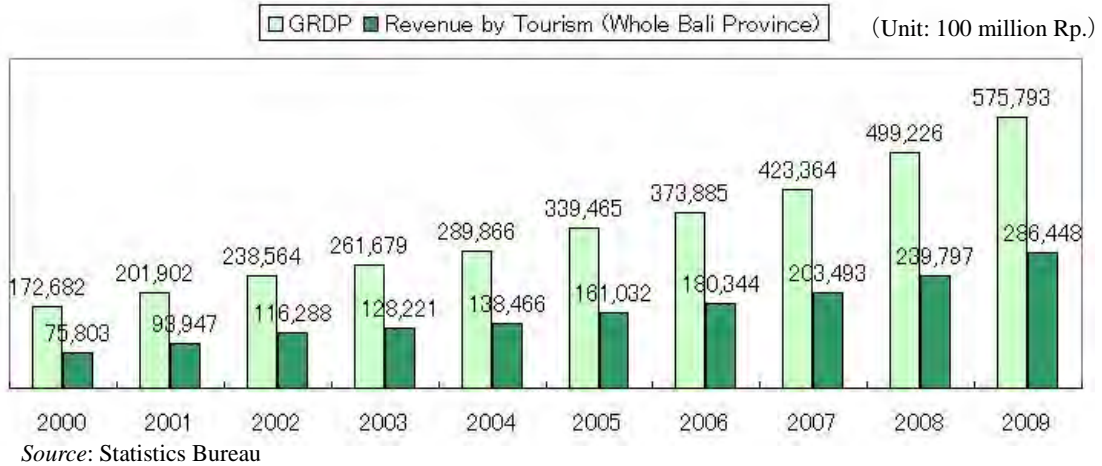
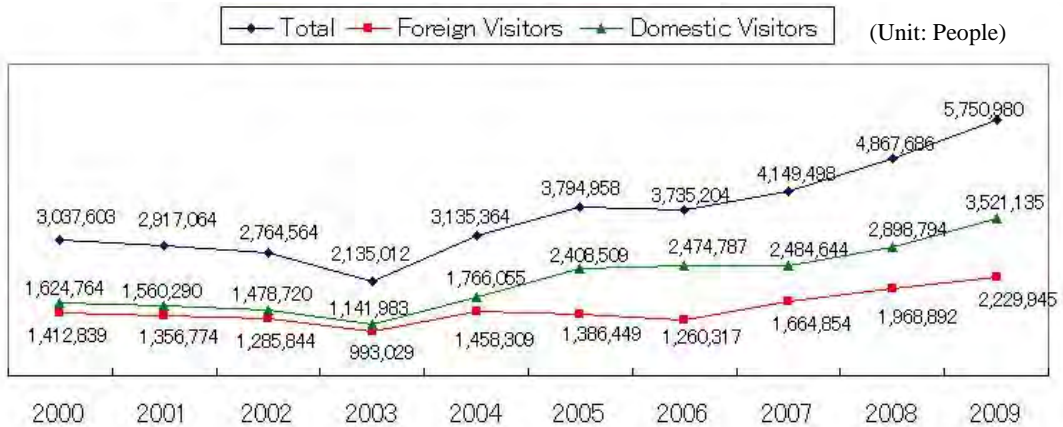


Figure 10: Transition of GRDP in Bali Province and Revenues from Tourism

(2) Increase in the Number of Visitors to Bali Island

Approximately 1.86 million tourists visited Bali in 1993 prior to the project implementation. Among them, 885,000 came from foreign countries. As shown in Figure 11, the number of visitors in general has been on the increase over the past 10 years. Although some stagnation and even decline was evident in 2003 and 2006, this was most likely due to the aforementioned bomb attacks by Islamic extremists in October 2002 and October 2005 respectively. The number of domestic visitors is also on the rise, which perhaps is due to economic growth and rising income levels in recent years. It is assumed that there are more citizens who can spend money and time on leisure pursuits,²⁵ and Bali Island, which has always been an attractive tourist spot, is becoming a more familiar place for them. Considering this background, it is easy to imagine that efforts to develop tourism resources, such as this project, have contributed to the increase the number of visitors.

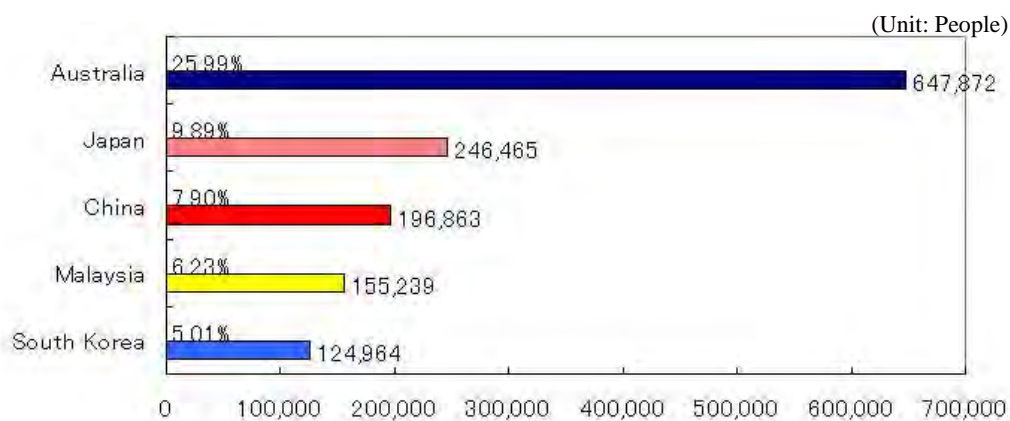
²⁵ (Reference) Indonesia's average household income is approximately 5,300 US dollars (as of 2008). The percentage of middle class/wealthy (household income of more than 5,000 US dollars) has drastically increased from 5.8% in 1990 to 39.9% in 2008. (Source: Euromonitor "World Income Distribution 2009/2010".)



Source: Statistics Bureau, Executing Agency's documents

Figure 11: Transition of the Number of Visitors to Bali Island

Figure 12 shows the number of visitors by country. Australia tops the list every year. According to the interviews with local tourist agents and hotel managers, it was confirmed that Australia is fairly close to Bali Island and there are factors which many Australian, especially young people, like surfing. Meanwhile, the number of visitors from nearby Asian countries, such as China and Malaysia, where rapid economic growth has been occurring, has also been on the increase in recent years.²⁶ Since the project areas are well-known tourist spots among non-Indonesian visitors and the project has fulfilled their visiting needs, it is assumed that it has perhaps contributed to increase the number of visitors, including those visiting for the second time or more.



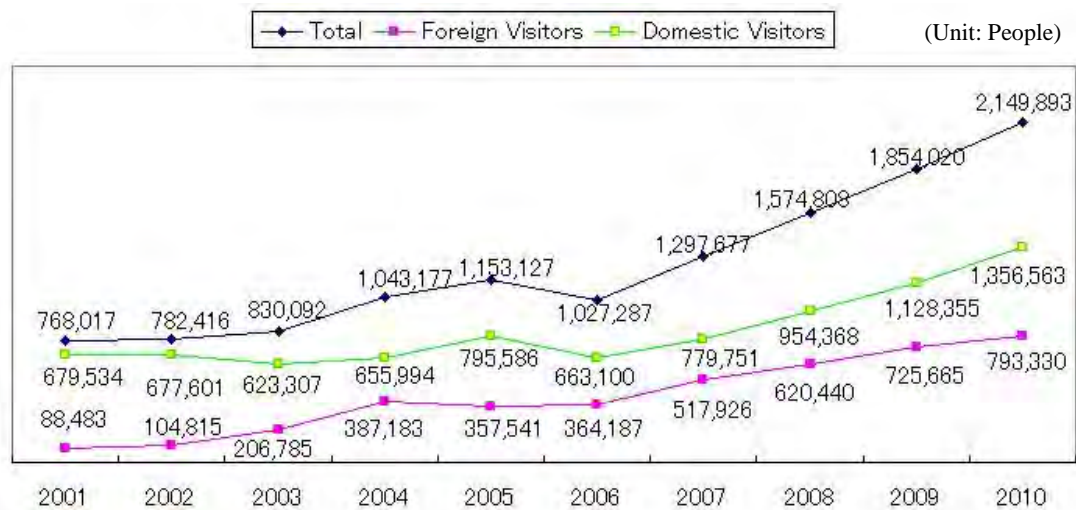
Source: Bali Tourism Bureau

Figure 12: Number of Visitors by Country in 2010 (Top 5)

²⁶ Meanwhile, the number of Japanese visitors is declining. According to a local travel agent, Japan Airlines (JAL)' decision is the major reason, which no longer operates direct flights from Narita Airport. Compared to a couple of years ago, there now are approximately 100,000-150,000 fewer visitors. Currently, only Garuda Indonesia runs direct flights every day from Narita Airport and Kansai International Airport. (There is only one direct flight per week from Chubu International Airport in Nagoya.)

(3) Transition of the Number of Visitors to Tanah Lot Temple

Reinforcement works were also implemented through this project for Tanah Lot Temple, a well-known tourist spot. Figure 13 shows the trend in the number of people visiting this temple over the past 10 years. Works were completed in February 2003 and, since then, the number of visitors is on the rise. This Hindu temple, which was constructed in the 16th Century, has been receiving worshippers, mainly the local residents, for a long time. Since the temple was constructed on a reef approximately 50m from the coast, it is well known as a rare tourist spot and it has also been attracting many tourists from abroad. It is assumed that, as a result of this project, the temple has become even more attractive, both as a religious site and as a tourist spot for many worshippers and tourists.



Source: Tourism Department of Tanah Lot Temple

Figure 13: Transition of the Number of Visitors to Tanah Lot Temple

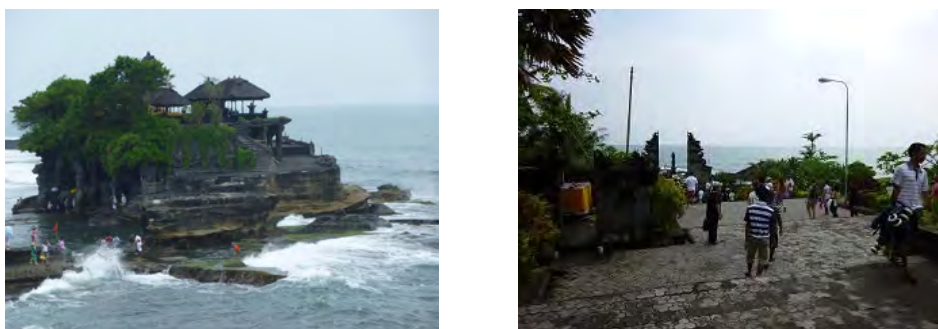


Figure 14: Tanah Lot Temple
(Left: Status after the Reinforcement Works, Right: Entrance of the Temple)

3.4.2 Other Impacts

3.4.2.1 Impacts on the Natural Environment

During the field survey, no major negative impacts were found in terms of the project's interaction with the environment centered on the beach nourishment. Meanwhile, as mentioned earlier in the beneficiary survey results, it is worth considering that the beach nourishment has improved the condition of coastal cleanup and beautification. It is because both the residents' and tourists' environmental awareness has improved as a result of keeping the beaches neat and clean, which will become a favorable example also for future environmental protection activities on the entire island of Bali Island.

At the time of the appraisal, consideration had to be given regarding the following: 1) Structures, including the beach nourishment, must harmonize with the natural environment, since the natural landscape is an important tourist resource; 2) Construction works must not be conducted during the day when tourists are at the beaches, but must be done at night in as inconspicuous a manner as possible; and, 3) At the Tanah Lot Temple, Hindus worship is done at low tide.

It was confirmed through the interviews during the field survey that: 1) Construction works were conducted while keeping in mind that the local residents pointed out to the Executing Agency that structures, such as groins and off-shore breakwaters, must blend in with the surrounding landscape as much as possible; 2) Construction works at the respective sites were conducted at night as far as possible, and construction materials were transported during the day; and, 3) Regarding construction work at the Tanah Lot Temple, consideration was given so that the operation of heavy machinery for construction was halted when the Hindus worshipped. Additionally, it was confirmed that the works were conducted in a manner that did not interfere with the arrival of Hindu worshippers at the temple.

The local municipality such as Public Cleaning Bureau and the residents' community are regularly conducting garbage collection and coastal cleanup. Hotels and restaurants on the coast are also doing the same voluntarily. Furthermore, as part of CSR (Corporate Social Responsibility), the Coca-Cola Company (hereinafter called, "Coca-Cola") has been tackling various environmental conservation activities, partnering with Quiksilver, a surfing apparel distributor.²⁷ Specifically speaking, they are providing ground-leveling equipment and garbage transporting vehicles for free to local community organizations to promote coastal cleaning

²⁷ The headquarter is located in Australia.

activities by local residents.²⁸



Figure 15: Maintenance Vehicles and Equipment Provided by Coca Cola
(Left: Garbage Transportation Vehicle, Right: Tractor of Leveling the Land)

3.4.2.2 Land Acquisition and Resettlement

Neither resettlement nor land acquisition was planned in this project. It was confirmed through interviews with the Executing Agency and field surveys.

3.4.2.3 Impacts on Public Relations

No particular advertising and PR activity related to the project has been conducted at the time of the ex-post evaluation. Nevertheless, the Executing Agency is currently getting ready to establish a research institution for water resource problems and coastal erosion in Singaradja,²⁹ located in the northern part of Bali Island³⁰. It is assumed that research regarding coastal erosion in Indonesia will progress in the near future and, at the same time, the project's PR and advertising effects will become evident in some way.

【Column No.2: Secondary Effect from Beach Nourishment of Kuta Beach】

The population of sea turtles is on the decline worldwide, due to capture and deterioration in habitat. Although Bali Island was known as an egg-laying place for sea turtles, the number of eggs laid was declining due to long years of coastal erosion. However, since December 2008, after the beach nourishment of Kuta Beach was completed, that number is on the increase. The

²⁸ According to the interview with Coca-Cola, the following were mentioned as reasons for conducting CSR: 1) Large-sized companies in Indonesia tend to conduct CSR activities; 2) Coca-Cola's own policy/stance is also to engage in CSR activities in complying with the worldwide trend; 3) Kuta Beach is a world-famous tourist spot, giving the company a great opportunity to promote its beverages while developing CSR activities. As for the regions except this project, the same activities are being conducted in Legian, Seminyak, Jimbaran, etc.

²⁹ Singaradja is the central district in the northern area of Bali and famous for its long coastline.

³⁰ The official name is "Coastal Technology Laboratory." The building itself was constructed in 2010. From now, staff assignment and operational method are scheduled to be conducted.

local community, NGOs and the aforementioned Coca-Cola are currently working together to protect sea turtles. Specific activities in which they are engaged are to collect the eggs which the turtles have laid on Kuta Beach, so that they can safely hatch at the hatching facility³¹ and be released as baby turtles into the sea. Table 6 indicates the number of the baby turtles released. It has significantly increased since the project was completed.

Therefore, it can be said that improving the beach through this project has actualized protection of sea turtles, drawing out a positive secondary effect (spillover effect) in the aspect of environmental protection. These efforts are conducted somewhere near the central area of Kuta Beach, and tourists also take part in the events to release the baby turtles.

Table 6: Number of Baby Turtles Released

Total between 2002 and 2008	2009	2010
1,947	4,450	8,725

Source: Pro Fauna (Local NGO for Environmental Protection)



Figure 16: Sea Turtle Hatching Facility



Figure 17: Scene from a Baby Turtle Releasing Event

3.5 Sustainability (Rating: ②)

3.5.1 Structural Aspects of Operation and Maintenance

At the time of the ex-post evaluation, the Bali River Basin Organization under DGWRD is in charge of the O&M. The organization is one of the DGWRD's local organizations and is a technical implementation unit responsible for water resource conservation and flood control measures.

³¹ Constructed by Coca-Cola and Quilsilver and donated to the local community. The maximum number of possible hatchings is 6,000 at once. The hatching rate is approximately 90%. According to the local community, a safe hatching place is needed or else the eggs will be taken away without permission by humans or dogs. Therefore, they are grateful that such facility has been provided.

As for the organizational structure, the Bali River Basin Organization consists of the Planning Division, Management Division, Water Resource Operation Division, Water Right Division, Operation Implementation Division, Maintenance Division, etc., all of which are under the organizational head assigned by DGWRD. Currently, there are a total of 236 staff members. Among them, 20 are from the Operational Division³² that manages Bali's overall coastal protection, including this project, while seven belong to the Maintenance Division.

The project's specific maintenance tasks are to inspect, check for damages and repair regarding the groins and off-shore breakwaters that have been constructed. There is no major concern in terms of the maintenance system. However, as mentioned above, there are seven staff in charge of the maintenance of the coastal protection projects in Bali Island, including this project, of whom only three have expertise/technical experience in maintenance tasks.³³ According to the Bali River Basin Organization, the appointment of new staff has not been realized so far, although they have asked DGWRD for more staff every year. It seems that DGWRD is lacking both the budget and human resources and cannot afford to send staff to the local branch offices.

3.5.2 Technical Aspects of Operation and Maintenance

The Bali River Basin Organization is striving to improve the skills of its people by sending one or two O&M staff every year to a training program run by the central government. However, as mentioned previously, because of the low number of staff with expertise and technical experience in maintenance tasks, there exists an issue as the precondition of obtaining the technical aspect despite the training results. OJT training for new staff is conducted on an as-needed basis.

3.5.3 Financial Aspects of Operation and Maintenance

Almost no O&M budget for the project is allocated from DGWRD to the Bali River Basin Organization. Table 7 shows "O&M Budget of the Project/Applied Amount (Bali River Basin Organization→DGWRD)," indicating the past record that only approximately 50 million rupiah (approx. 500,000 yen) was allocated in 2007. Since then, no budgets have been allocated, even though requests have been made. According to the Bali River Basin Organization, none of the structures (groins, off-shore breakwaters, etc.) has been damaged, and there is no need to

³² The department deals with coordination and promotion tasks with local community, regarding construction such as groins.

³³ Also referring the following Table 8 on column No.3, coastal erosion mainly in the other areas of Bali Island except this Project tends to expand. There is no other choice but to say that such number of staff is too few to take care of coastal conservation project and its O&M.

conduct any major repairs immediately. However, should such a budget shortfall continue, they believe that it may become difficult to conduct regular O&M or to purchase equipment. (There is no subsidy from local governments such as Denpasar City, Badung Prefecture and the Bali Provincial Government.)

Table 7: O&M Budget of the Project/Applied Amount
(Bali River Basin Organization→DGWRD)

(Unit: thousand Rp.)

Project Site	2007	2008	2009	2010
Sanur Beach	106,655	103,488	106,914	108,982
Nusa Dua Beach	109,528	99,104	107,870	102,130
Kuta Beach	N/A*	N/A*	106,575	104,767
Total Applied Amount	216,183	202,592	321,359	315,879

Source: Documents provided by Bali River Basin Organization

Note: As the beach nourishment of Kuta Beach was completed in December 2008, the budget request has started since 2009.

Meanwhile, approximately 1 billion rupiah (approx. 10 million yen) as the O&M budget is scheduled to be allocated to Bali River Basin Organization by the end of 2011. However, it cannot be expected that this budget will be used for this project. It is highly possible that it may rather be used as O&M costs related to coastal protection in the other areas of Bali Island that are deemed more urgent (e.g., repair costs for structures such as groins which Bali River Basin Organization have constructed themselves.).

As a special point, Coca-Cola is providing ground-leveling equipment and garbage transportation vehicle to the local community of Kuta Beach. Additionally, they are supplying part of the maintenance costs. The breakdown consists of gasoline costs and equipment repair charges³⁴.

3.5.4 Current Status of Operation and Maintenance

The following explanations are the current status of maintenance regarding major structural constructions and after beach nourishment. Currently, there is no major problem, however, at Bali River Basin Organization, there are issues to be solved in the near future, which the staff are not frequently conducting patrols and inspections regarding the structures, due to shortage in human resources/budget, and which the shoreline (coastline) is not being maintained because the stored sand (stock pile) has not almost been added so far. Especially, as for the latter, as

³⁴ The actual amount supplied was not disclosed.

mentioned previously, a certain amount (approx. 140,000m³) of sand for the storage and maintenance has been procured through the project. Therefore, input of sand will allow the shoreline to restore and maintain for the time being. However, according to the maintenance staff of Bali River Basin Organization, they are not able to transport sand because they do not own trailers to carry it, although they have maintenance equipment (e.g., heavy machinery to dig sand). Consequently, they have recognized that they cannot transport sand and conduct leveling by themselves.

■Sanur Beach

Even though maintenance activities are not conducted regularly, there is no major problem in terms of groins, off-shore breakwaters at this point. According to Bali River Basin Organization, the seven maintenance staff are conducting patrols and inspections about once every month. The overall condition after the beach nourishment also seems to be good. As for coastal cleanup and garbage collection, Denpasar City is delegating the Public Cleaning Bureau to take care of such tasks. Some of the hotels as well as the local community are also voluntarily conducting the clean up.

■Kuta Beach

There is no problem concerning the condition of off-shore breakwaters. The condition after the beach nourishment also seems to be good. As mentioned above, there are maintenance equipment (4 units) and trucks for transportation (3 vehicles) in Kuta Beach provided by Coca-Cola as part of their CSR activities. The local community has hired mainly residents to conduct ground leveling and clean up. Some hotels are also voluntarily doing the cleaning. Moreover, the Public Cleaning Bureau of Badung Prefecture is engaged in garbage collection operations in some areas (where there are no hotels and restaurants along the coast.).

■Nusa Dua Beach

Like Sanur Beach, there seems to be no major problem here in terms of the condition of groins although the maintenance tasks conducted by Bali River Basin Organization are limited. Moreover, the overall condition after the beach nourishment seems to be good. The cleanup of the beach is basically and voluntarily done by local hotels and restaurants. Similar to Kuta Beach, the Public Cleaning Bureau of Badung Prefecture is engaged in garbage collection operations in some areas (where there are no hotels and restaurants along the coast.).

■Tanah Lot Temple

Routine inspections and clean up are not being conducted since the project was about

constructing submerged breakwaters and adding tetrapods (i.e., it is physically difficult to conduct maintenance of submerged breakwaters and tetrapods after they are placed under water). Currently, no particular problem has occurred.

(Determination of the Sustainability Rating and Conclusions)

Although there seems to be no major problem concerning the aspect of organizational structure of Bali River Basin Organization related to the O&M, there is some concern regarding the technical aspect due to lack of maintenance staff and the maintenance condition due to lack of budget shortfall. There is no major damage of structures due to lack of maintenance and deterioration of the shoreline, however these are issues to be solved from the standpoint that are lack of human resources/budget and insufficient of maintenance equipment utilization, for which the project effect must be kept even in the future. Therefore, sustainability of the project effect is fair ②.

【Column No.3 : Performances of Bali's Coastal Protection Measures and Factors regarding the Occurrence of Coastal Erosion】

1) Performance of Coastal Conservation Measures

The review of the situation of coastal erosion and construction performances in the regions targeted by this project and other regions is as follows. Table 8 shows that the construction performances in Denpasar City where Sanur Beach is located and Badung Prefecture where Nusa Dua and Kuta beaches are located are high (85.3% and 93.8% respectively) in most part due to coastal conservation measures undertaken in the regions targeted by this project (in bold print in Table 8). Meanwhile, it is evident that erosion is becoming widespread in the other regions, especially in Buleleng Prefecture in the northern part and Karangasem Prefecture in the eastern part. The current situation of coastal erosion in the eastern area of Bali Island is shown in Figures 18 and 19. In some parts, the coast has receded leading to the disappearance of sand. It can be assumed that the same kind of situation as before the project implementation is now occurring (e.g.: difficulty in fishery, damages on coastal infrastructure facilities, etc.). Therefore, it is certain that coastal conservation measures must continue being implemented on the island.

Table 8: Situation of Coastal Erosion Damages and Construction Performances in Regions Targeted by the Project and Other Regions

(Unit: km)

Prefecture Along Beach	Total Coastline Length	Extension of Coastal Erosion (distance)			Result of Civil Works Until 2009 (c)	Proportion ((c)/(b)) × 100	Necessary Extra Future Constructions (d)=(b)-(c)
		Until 1987	Until 2008 (a)	Until 2009 (b)			
Buleleng Pref.	121.18	9.5	29.06	54.83	22.265	40.6%	32.565
Jembrana Pref.	67.35	4.45	7.51	19.7	6.05	30.7%	13.65
Tabanan Pref.	28.66	5.5	7.5	12.76	4.30	33.7%	8.46
Badung Pref.	80.05	11.5	14.1	27.16	25.468 <i>*Note 1</i>	93.8%	1.692
Denpasar City	16.00	7.0	10.0	10.0	8.532 <i>*Note 2</i>	85.3%	1.468
Gianyar Pref.	12.56	3.0	3.3	3.65	0.5	13.7%	3.15
Klungkung Pref.	40.20	3.0	12.6	18.8	5.6	29.8%	13.2
Karangasem Pref.	71.70	6.0	9.0	34.8	8.785	25.2%	26.015
Total	437.70	49.95	93.07	181.70	81.50	44.9%	100.20

Source: External evaluator formed, based on the Executing Agency's documents

Note 1: Among them, the construction performance distance (total) at the project's sites (Nusa Dua and Kuta beaches) is approximately 13.4km.

Note 2: Likewise, the construction performance distance (total) at the project's site (Sanur Beach) is approximately 7.0km.



Figure 18: Beach Where Coastal Conservation Measures Have Not Been Implemented (Candidasa Beach in the Eastern Part of Bali Island)



Figure 19: Beach Where Coastal Conservation Measures Have Not Been Implemented (Buitan Coast in the Eastern Part of Bali Island)

2) Factors of Coastal Erosion Occurrence

Meanwhile, factors leading to the occurrence of coastal erosion in Bali Island are examined

here. Factors as confirmed mainly through the field survey and interviews are as follows: 1) There is decrease in the volume of sand flowing from the upper reach of the river into the river mouth, due to construction of the irrigation/sand-control dam. In addition, sand is being extracted in the river³⁵; 2) There is the fact that coral reefs have been carved out over the years³⁶; and, 3) Structures such as hotels and residences have been allowed to build on the coast³⁷. It is conceivable against these backdrop that there are major factors such as rapid economic growth, overheating of tourism and increase in population³⁸. These factors must once again be considered, and examining comprehensive measures is necessary if coastal conservation measures shall be implemented in the future.



Figure 20: Sand-control Dam in Bali's Largest River (Unda River)



Figure 21: Scene of Illegal Sand Extraction in the Unda River

4. Conclusion, Lessons Learned, and Recommendations

4.1 Conclusion

This project is consistent with policies and development needs. Measures were taken both to prevent erosion and to restore the eroded parts of the Sanur, Nusa Dua and Kuta beaches, and works were performed to reinforce the rock face of the Tanah Lot Temple through this project.

³⁵ If the volume of sand flowing in from the river declines and the volume collected by building contractors, etc. increases, there will be no supply of sand in the beach and erosion resulting from waves will become widespread. (Namely, natural recovery of beach sand cannot be expected since the volume of sand settling and collecting becomes lower than the volume of sand being washed out while sedimentation begins disappearing from the beach and making the shoreline recede.) According to the law, the Bali Provincial Government prohibits extraction of sand in the river. Nevertheless, illegal collection continues even today.

³⁶ Derived from Bali's architectural culture. Coral reefs that have been carved out were fabricated on outer walls or gates of some houses. Or, they were mixed with cement for foundation works. Today, however, it is prohibited by law to carve off pieces of coral reefs from the sea.

³⁷ The decrease in sand occurred since constructing hotels and residences along the coast was allowed (silently accepted) for many years.

³⁸ The population of Bali Island in 1995 before the project commencement was approximately 2.6-2.7 million but grew to approximately 3.8-3.9 million at the time of the ex-post evaluation. The rate of increase is high, which records as around 45-50%. As a result of rapid tourism development and economic growth, many people have come to live there from other islands. Along with population increase, farmland reclamation and housing land development have also progressed. Demand for sand as construction material increase which may have been the cause of decrease in the river and beach sand.

There was a significant delay in the project period, however the project cost was lower than planned. Moreover, based on the interview and beneficiary survey results, it can be determined that the livelihoods of the local fishermen have stabilized and that the tourism industry is reaping benefits. Although there are some concerns over the technical aspects of O&M and the maintenance condition due to a budget shortfall in the O&M agency, Bali River Basin Organization, there are no major problems regarding the O&M itself and the organizational structure. In light of the above, this project is evaluated to be satisfactory.

4.2 Recommendations

(Recommendations to the Central Government (DGWRD))

■At present, it cannot be said that the organizational structure and the number of staff at Bali River Basin Organization can sufficiently take care of maintenance tasks regarding coastal conservation measures. Therefore, it is advisable that DGWRD allocate enough budget and staff for the maintenance. In addition to the maintenance of this project, this must be considered as an issue of the entire Bali Island where coastal erosion will continue to expand in the future. Specifically speaking, it is desirable to promote training and allocating staff with expertise on beach nourishment operations to raise the maintenance level of Bali River Basin Organization. Moreover, should it be difficult for DGWRD alone to secure financial resources for the maintenance budget, it may be worth considering to collect contributions from local governments and hotels for maintenance fund resources.

■It is advisable to enhance PR activities regarding the project effects and impacts. To appeal the necessity of environmental conservation, this project may be a positive factor. Moreover, it is contributing greatly to the development of tourism industry. Advertising both Japan and Indonesia's efforts will result in the understanding of the ODA project. Furthermore, proactively working on PR may be meaningful in the understanding of the countries and their economic/social relations.

(Recommendations to Bali River Basin Organization)

■Although periodic monitoring of the beach nourishment sand input has not been conducted after the project completion, it is advisable that Bali River Basin Organization voluntarily conduct it and use it as database for their maintenance tasks. This is because measuring the residual volume of beach nourishment sand on a regular basis will allow understanding of precise and necessary maintenance tasks, as well as of necessary input of sand from the stock

pile. At the same time, it is also necessary to fully recognize that appropriate maintenance tasks and project effects are inextricably associated with each other.

■Currently, Coca-Cola Inc., as part of their CSR, as well as the local community are performing maintenance tasks in Kuta Beach such as ground leveling and clean up of the coast by using equipment. It is advisable that Bali River Basin Organization also participate in such operations as much as possible. Since it cannot be completely ruled out that Coca-Cola may stop providing support to the local community in the future, it is advisable to clarify the responsibilities and assignments of the maintenance tasks while also discussing and making coordination with the local municipality, Badung Prefecture, to secure the project's future sustainability.

(Recommendations to JICA)

■With regards to the maintenance system and current budget status of Bali River Basin Organization, it is advisable that JICA office in Indonesia confirm on a timely basis the implementing status of the maintenance system and provide advices to the organization at necessary basis. Although there are no major concerns regarding the status, it is assumed that these tasks will bring benefits in light of ensuring sustainability in the future.

4.3 Lessons Learned

(Lesson Learned to Bali River Basin Organization)

■Through this project, it seems that development and control of indexes and data regarding effects of the coastal conservation project and damages caused by coastal erosion should have been enforced. Continuously monitoring the beach nourishment data especially after the project completion is effective. Therefore, it can be assumed that Bali River Basin Organization should have voluntarily developed and controlled the aforementioned indexes and data.

(Lesson Learned to JICA)

■In case of implementing sand nourishment such as this project, since maintaining the injected sand is based on appropriate maintenance, it is assumed that securing the sand stock such as stockpile and its continuous injection are crucial. Therefore, at the time of implementing a similar project in the future, especially at the stage of project formation, it is worth conducting a meeting and agreement about the action plan between JICA and Indonesian side.

Comparison of the Original and Actual Scope of the Project

Items	Original	Actual
1. Project Outputs	(Sanur Beach) - Beach Nourishment (4 sections: the nourishment sand: 93,476 m ³) - Off-shore Breakwater (6 units) - Straight Groin (7 units are rebuilt) - Submerged Breakwater/Artificial Reef (3units)	(Sanur Beach) - Beach Nourishment (4 sections: 6,960m: the nourishment sand: 301,196 m ³ , Walkway 5,830m) - Off-shore Breakwater (1 unit) - Straight Groin (6 were constructed and 7 units are rebuilt) - Submerged Breakwater/Artificial Reef (Cancelled)
	(Kuta Beach) - Beach Nourishment (4 sections: the nourishment sand: 450,000 m ³) - T-type Groin (3 units) - Straight Groin (1 unit)	(Kuta Beach) - Beach Nourishment (4 sections: 7,000m: the nourishment sand: 519,605 m ³ , Walkway 3,400m) - Off-shore Breakwater (3 units) - Coral Reef Restoration (17,000 m ² for 2 places) - T-type Groin (Cancelled) - Straight Groin (Cancelled)
	(Nusa Dua Beach) - Beach Nourishment (5 sections: the nourishment sand: 368,579 m ³) - Straight Groin (4 units) - Off-shore Breakwater (2 units)	(Nusa Dua Beach) - Beach Nourishment (5 sections: 6,400m: the nourishment sand: 342,562 m ³ , Walkway 3,280m) - Straight Groin (6 were constructed and 7 units are rebuilt.) - Off-shore Breakwater (Cancelled)
	(Tanah Lot Temple) - Off-shore Breakwater (1 unit) - Tetrapod (1,106 units)	(Tanah Lot Temple) - Off-shore Breakwater (Cancelled) - Submerged Breakwater (1 unit) - Tetrapod (7,110 units)
	(Consulting Services) - 480M/M (Foreign Consultant:144 M/M, Local Consultant: 336M/M)	(Consulting Services) - 1,479.34M/M(Foreign Consultant: 362.96 M/M, Local Consultant: 1,116.38M/M)
	---	(Additional Outputs) - Construction of Parking Lot (Kuta Beach: 3,300 m ²) - Coral Transplant (Kuta Beach: 10,000 m ² , 34 Species and 111,742 fragments) , etc
2. Project Period	December 1996 – November 2002 (72 months)	December 1996 – December 2008 (145 months)
3. Project Cost		
Amount paid in Foreign currency	6,822 million yen	6,238 million yen
Amount paid in Local currency	5,853 million yen	3,362 million yen

Total	12,675 million yen	9,600 million yen
Japanese ODA loan portion	9,506 million yen	8,769 million yen
Exchange Rate	1USD=105.7 Yen (2,302Rp.) (December, 1996)	1JPY=82.2Rp. (Average between July 1998 and December 2008)

Ex-Post Evaluation of Japanese ODA Loan
“Medan Flood Control Project”

External Evaluator: Masumi Shimamura
Mitsubishi UFJ Research and Consulting Co., Ltd.

0. Summary

Mitigation of flood damage in the project area has been achieved through the project’s river bank reinforcement works and construction of floodway. The results of local interview and beneficiary surveys have shown local residents’ satisfaction to the benefit of the project. The project has also contributed to the improvement and enhancement of the people’s livelihood, and the economic development. In light of this, the project is deemed as to have yielded a significant number of positive effectiveness and impacts. The project objective to contribute to the reduction of flood damage, stabilization and enhancement of people’s livelihood, and promotion of local economy is consistent with Indonesia’s development plan and development needs, both at the time of appraisal (1997) and the ex-post evaluation (2011), as well as Japan’s ODA policy at the time of appraisal, therefore its relevance is high. Project efficiency is fair because while the yen loan portion of the project cost was within the plan, the project period was exceeded. As regards operation and maintenance, some problems have been observed in terms of financial aspects, therefore sustainability of the project effect is fair.

In light of the above, this project is evaluated to be satisfactory.

1. Project Description



Project Location



Percut River after improvement

1.1 Background

Due to the small river flow capacity, flood had occurred frequently in both Deli and Percut River which flow through Medan City, the provincial capital of North Sumatra Province. At the time of appraisal, Medan was Indonesia’s third city with a population of about two million, and was the base

of socioeconomic activities in Western Indonesia. The flood damage had been increasing due to the population growth and urbanization of the city and its surrounding area (from 1990 to 1995, the average population growth rate of the project area was 2.2%, which far exceeded the national average rate of 1.7% in the same period). In fact, according to the executing agency, the flood which occurred in Deli River in November, 1990 recorded the inundated area of 45 km², with about 8,000 affected households and two deaths, and the total cost of damage went up to IDR 54 billion (about 3,800 million yen).

For such background, it was urgently needed to mitigate flood damage in Medan City by undertaking improvement works of the river and construction of floodway in order to stabilize people's livelihood, and enhance the economic development of the project area.

1.2 Project Outline

The objective of this project is to protect Medan City from flooding by constructing a bypass floodway in Medan and conducting river bank reinforcement of the Percut River and the upper Deli River, thereby contributing to the stabilization and enhancement of the people's livelihood, and the economic development of the said area.

Loan Approved Amount/ Disbursed Amount	9,697 million yen / 9,323 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	January, 1998 / January, 1998
Terms and Conditions	<p>Interest Rate: 2.5% Repayment Period: 30years (Grace Period: 10years) Conditions for Procurement: General Untied</p> <p>Consultant Interest Rate: 2.1% Repayment Period: 30years (Grace Period: 10years) Conditions for Procurement: General Untied</p>
Borrower / Executing Agency	The Republic of Indonesia / Directorate General of Water Resources Development, Ministry of Public Works
Final Disbursement Date	February, 2009
Main Contractor (Over 1 billion yen)	PT. Hariara (Indonesia) / PT. Wijaya Karya (Indonesia) / PT. Brantas Abipraya (Indonesia) / PT. Pembangunan Perumahan (Indonesia) / PT. Adhi Karya (Indonesia) / PT. Waskita Jaya Purnama (Indonesia)
Main Consultant (Over 100 million yen)	PT. Melias Kesuma (Indonesia) • CTI Engineering Co., Ltd. (Japan) • Sinotech Engineering Consultant (Taiwan) (JV)

Feasibility Studies, etc.	<ul style="list-style-type: none"> - Feasibility Study and Master Plan: Belawan-Padang Consolidated River Basin Development Study (JICA, 1992) - Engineering Service: Medan City Flood Control Plan Study (1996, JICA) - Master Plan: Medan Urban Development Program (ADB, 1978) - Special Assistance for Project Implementation (JBIC, 2007)
Related Projects (if any)	<ul style="list-style-type: none"> - Medan Urban Development (ADB, 1982) - Second Medan Urban Development (ADB, 1995)

2. Outline of the Evaluation Study

2.1 External Evaluator

Masumi Shimamura, Mitsubishi UFJ Research and Consulting Co., Ltd.

2.2 Duration of Evaluation Study

Duration of the Study: November, 2010 – October, 2011

Duration of the Field Study: January 30 – February 25, 2011, May 11 – 21, 2011

2.3 Constraints during the Evaluation Study

None.

3. Results of the Evaluation (Overall Rating: B¹)

3.1 Relevance (Rating: ③²)

3.1.1 Relevance with the Development Plan of Indonesia

At the time of appraisal, the Government of Indonesia identified, in its Sixth Five-Year National Development Plan (REPELITA VI: 1994-1999), to undertake flood control projects in urban areas with accumulated population and assets, and in agricultural areas where irrigation has been developed – to be specific, flood control measures were planned in: (1) cities and industrial areas: 37,000 ha, (2) rural areas: 200,000 ha, and (3) development areas: 40,000 ha etc. The objective of the project to mitigate flood damage in Medan City and its surrounding areas was consistent with Indonesia's medium-term development plan.

At the time of ex-post evaluation, the project objective remains consistent with Indonesia's plans – the Government of Indonesia also recognizes the necessity of infrastructure development to control flood and to prevent seashore corrosion, and the importance of flood mitigation measures in residential areas in its Medium-Term National Development Plans (RPJMN 2010-2014) and in the Water Resource Management Strategy of the Medium-Term Development Plan of the Ministry of Public Works (RENSTRA 2010-2014).

¹ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

² ③: High, ② Fair, ① Low

3.1.2 Relevance with the Development Needs of Indonesia

At the time of appraisal, flood had occurred frequently in both the Deli and the Percut River, flowing through Medan City, because of the limited river flow capacity and the progress of urbanization, therefore, the project was urgently necessary to cope with the situation. Although river improvement and drainage projects had been undertaken with utilization of national budget of Indonesia and by the support of other donors, they were not sufficiently implemented – especially the improvement works of the Percut River remained almost untouched. For such background, necessity and priority was high to mitigate flood damage by undertaking improvement works of the Deli and the Percut River.

Until the project implementation, the downstream Deli River could respond up to the scale of 10-year return period ($240\text{m}^3/\text{s}$) and mitigation of flood damage was insufficient. The project has achieved to secure safety up to the maximum flow of $300\text{m}^3/\text{s}$ (25-year return period) for the Deli and the Percut River, however, necessity of disaster prevention continued to persist, since serious flood that exceeded 25-year return period occurred in 2011. The necessity for river improvement works, the early realization of sedimentation removal, and early re-examination of the drainage system in Medan urban area is pointed out. In the Medan City Development Plan (RTRW 2010-2020), which is under revision, the river improvement and removal of sediments for the Deli and the Percut River are placed higher priority among the seven rivers which flow through the city.

There are many illegal residents³ along the riverside (holm) of the Deli River (partly), and the Mati and the Babura River that flow into the Deli River. Such situations have prevented to implement river improvement works and, thus, have caused flood damage to expand. Because undertaking measures against illegal residents have been difficult, river improvement works had been untouched in these areas so far. For such background, measures to resettle illegal residents (provision of low-cost apartments etc.) are to be considered in the revised RTRW.

3.1.3 Relevance with Japan's ODA Policy

The objective of the project was consistent with the Government of Japan's assistance policies at the time of appraisal. The Ministry of Foreign Affairs of Japan's Country Assistance Strategy for Indonesia stipulated in the 1997 Status of ODA Implementation recognized "responding to natural disasters, such as forest fires, drought, earthquake, and a flood" as Indonesia's serious challenges. It also indicated in Japan's priority areas for assistance – "environment protection" and "securement of fairness" – the strategy to reduce aggravation of living environment from population concentration in large cities and to secure Basic Human Needs (improvement of living environment etc). Since the onset of the project, there has been no change in the assistance policies of the Government of Japan or JICA, which might affect the direction of the project. Thus, the consistency of the project with the

³ Illegal residents live along rivers and settle there because they cannot afford to rent houses or purchase land, and they can easily access to water which is necessary for their living. Riverside properties are national lands and the illegal residents will not be compensated for resettlement. Although little compensation may be provided for their houses, it is not enough to start their living in other places, and they have no choice but to continue to live there.

Japanese assistance policies is still maintained.

This project has been highly relevant with the country's development plan, development needs, as well as Japan's ODA policy, therefore its relevance is high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

Comparison of planned and actual project outputs is summarised in the table below.

Table 1: Comparison of Planned and Actual Project Outputs

Planned	Actual	Comparison
Civil Works		
1) Construction of Percut River improvement works: approx. 28km 2) Construction of Medan floodway: approx. 4km 3) Diversion and improvement works of Upper Deli River including 2 weirs	1) Construction of Percut River improvement works: approx. 29km 2) Construction of Medan floodway: approx. 4km 3) Diversion and improvement works of Upper Deli River including 2 weirs	1) Additional scope <ul style="list-style-type: none"> Design change taken place due to land acquisition issues Additional works conducted for solid waste management, drainage improvement, and sedimentation treatment in Percut river mouth 2) Design change taken place in order to mitigate land acquisition issues 3) As planned
Consulting Service		
1) Construction supervision of the Percut River improvement works, Medan floodway and diversion, and improvement works of Upper Deli River	1) Construction supervision of the Percut River improvement works, Medan floodway and diversion, and improvement works of Upper Deli River 2) Detailed design study for additional civil works (solid waste management, drainage improvement, and sedimentation	1) and 2) Additional scope <ul style="list-style-type: none"> Additional detailed design works taken place due to the additional scope for civil works 3) Additional scope Lausimeme Dam is a multiple purpose dam including the purpose of flood control on the upper Percut River, whose necessity has been pointed out in the Master Plan (JICA, 1992). The detailed design for the construction of the dam was implemented in this project in order to 1) further improve flood control ability to respond to 40-year return period flood, 2) ensure

	control) 3) Detailed design study for the main structures of Lausimeme Dam	water supply to Medan City and its surrounding areas, and 3) cope with the sharp rise for electricity demand on the area.
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As for the civil works, there were additional scope to the Percut River improvement works and Medan floodway construction. The design changes took place due to the change of river alignment in order to mitigate effects on residents for land acquisition, and the additional construction took place to further improve flood control effects, which are both considered as appropriate. There was no change from the planned output for the Deli River commutation and improvement works.

Inputs for consulting service have increased substantially for both foreign consultants and local consultants, which are summarized in the table below. This is due to the additional detailed design accompanied by the additional scope and changes in line shapes of the Percut River improvement and Medan floodway construction, as well as implementation of additional detailed design for Lausimeme Dam. The development of Lausimeme Dam is expected to enhance the flood control effect for Medan City and its surrounding areas by raising the river capacity from 300m³/s to 320m³/s as controllable flood scale through physical construction, and it will resolve the water and electricity shortages corresponding to population increase as a plan. The plan will be stipulated in the Medan City Development Plan (RTRW) which is now under revision.

Table2: Comparison of Planned and Actual Consulting Service (M/M)

	Planned	Actual	Comparison
Foreign	102	428	Increase by 326
Local	293	1,093	Increase by 800
Total	395	1,521	Increase by 1,126

Source: Information from JICA, results from questionnaire surveys to Sumatra II River Basin Office and interview survey results during field survey

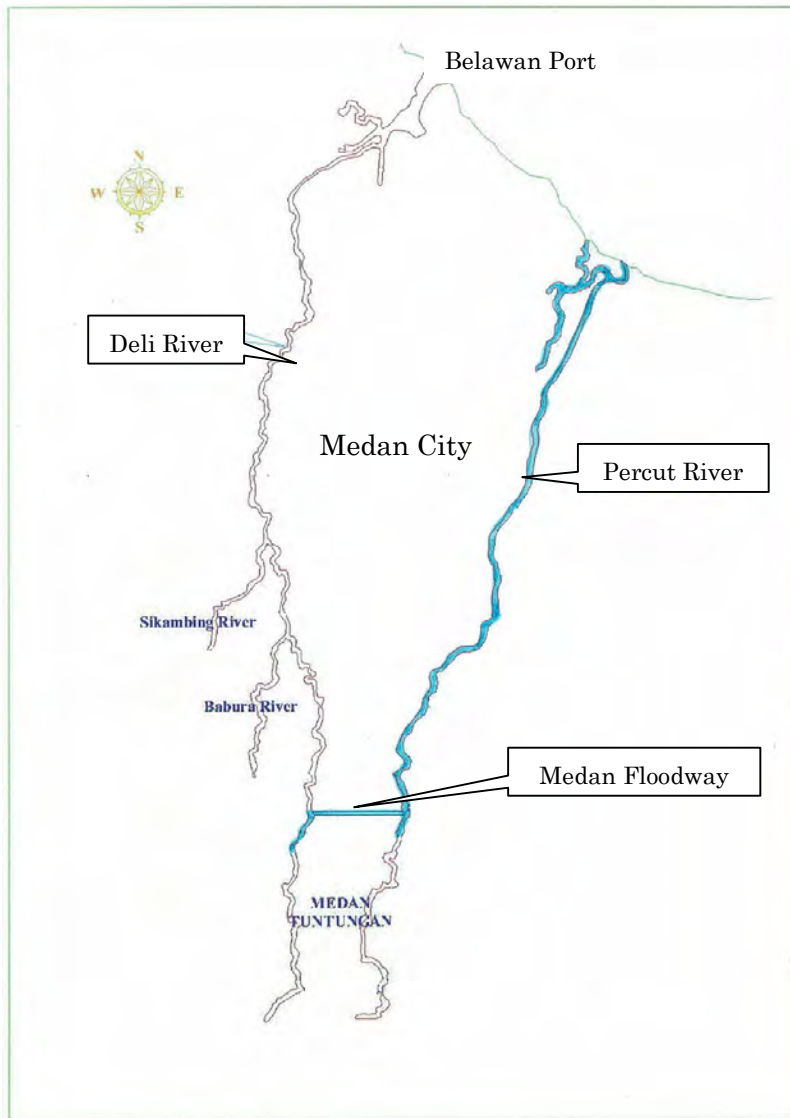


Figure1: Project Site



Medan Floodway



Rubber Dam

3.2.2 Project Inputs

3.2.2.1 Project Cost

The total project cost was initially estimated at 13,425 million yen, of which Japanese ODA loan would cover 9,697 million yen. In actuality, Japanese ODA loan provided a total of 9,323 million yen, resulting in a lower amount than the initial estimate (96.1% of the planned amount). The entire costs for civil works and consulting service, including costs for additional scope were eligible for yen loan disbursement.

There is no reliable evidence to confirm the actual project cost spent; because the amounts invested from the government and the Directorate General of Water Resources Development (DGWRD) budgets were not properly recorded in project accounting under imperfect project accounting system of DGWRD. (Only the cost for land acquisition of IDR 115,888 million was identified as the government expenditure of this project.)

Despite the delay in the schedule and the increase in the outputs, the amount of Japanese ODA loan decreased mainly because of the Asian currency crisis, which occurred during the project implementation period, causing the local currency, Indonesian Rupiah, to depreciate against the Japanese yen.

Therefore, the yen loan portion of the project cost was lower than planned.

3.2.2.2 Project Period

The overall project period was planned as 71 months as opposed to 132 months including the extended loan period (two times) in reality, representing an expansion to 185.9% of the initial plan (see table below for breakdowns). Due to the delay in the schedule, the project involved extensions of the loan disbursement period twice, the loan disbursement deadline was extended to February, 2008 as a result of the first extension, and to February, 2009 as a result of the second.

The table below shows a comparison by items and entire implementing periods. As the periods in each item are overlapping, simple sum of each difference will not equal to the entire difference.

Table 3: Comparison of Planned and Actual Project Period

Planned	Actual	Comparison
Civil Works: Jun. 2000 – Sept. 2003 (40 months)	Civil Works: Oct. 2000 – Dec. 2008* (99 months)	Civil Works: Delayed by 59 months
Land Acquisition: May 1997** – Mar. 2000 (35 months)	Land Acquisition: May 1997** – Dec. 2007 (128 months)	Land Acquisition: Delayed by 93 months
Consulting Service: Dec. 1998 – Aug. 2002 (45 months)	Consulting Service: May 1999 – Jan. 2009 (117 months)	Consulting Service: Delayed by 72 months
Total: Nov. 1997*** – Sept. 2003 (71 months)	Total: Jan. 1998*** – Dec. 2008* (132 months)	Total: Delayed by 61 months

* Project completion is considered at the time when the civil works were completed in December, 2008.

** Land acquisition started prior to the signing of the Loan Agreement (L/A).

*** L/A conclusion date.

The delay in the implementation schedule was caused mainly by the land acquisition issues which were not predictable in the first place. Concrete reasons are described below. (See “3.4.2.2 Land Acquisition and Resettlement” for more detail.)

- Land certifications had been issued from multiple institutions and it took time to specify the land owner.
- Land owners could not be clearly identified for some land.
- Some residents filed a lawsuit to the Local Court pointing out that the procedure for land inventory survey and compensation was unclear, which took substantial time for the inquiry and necessary procedures.

Although the yen loan portion of the project cost was within the plan, the project period was significantly exceeded, therefore efficiency of the project is fair.

3.3 Effectiveness⁴ (Rating: ③)

3.3.1 Quantitative Effects

3.3.1.1 Results from Operation and Effect Indicators

No operation and effectiveness indices were set at the time of appraisal. Table below summarizes the results of flooded area, number of inundated houses, number of affected people, and estimated maximum flow, of major flood in Medan City occurred in the past 20 years, based on data available at the time of ex-post evaluation.

Table 4: Flood Data in Medan City in the Past 20 years

Major flood dates with available data	Flooded area (ha)	Number of inundated houses	Number of affected people	Estimated Maximum Flow (m ³ /s)	Remarks
Sept .16, 1987		1,256	7,592		
Aug. 3, 1988		702	4,474		
Sept. 15, 1988		566	5,792		
Nov. 26, 1990	4,500	8,309	70,000	240	10-year period
- Flood data from 1993 to 1998 is unknown					
- Discharge capacity of Percut River in May, 1996: Average 150 m ³ /s, Deli River (upstream): Average 280m ³ /s					
Feb. 16, 1999	750				
Civil works for the project started in Oct. 2000					
Nov. 7, 2001	4,142	2,530	10,250	290	25-year period
Nov. 23, 2001		75			
Dec. 29, 2001	100		400 house holds		
Jan. 13, 2002					
Sept. 22, 2003		1,031	5,000		
Sept. 20, 2004		560			
Nov. 15, 2004		More than 700			

⁴ In assessing “effectiveness” to give rating, “impact” is also considered.

Oct. 3, 2006		hundreds			
- Flood data from 2002 to 2010 is unknown					
- Project completion was Dec. 2008, and the Medan floodway started its operation from Apr. 2009					
Jan. 6, 2011	1,015	3,150*	12,600	320	40-year period

Source: Sumatra II River Basin Office (data unknown for blank space)

* Out of 3,150 inundated houses from the flood of 6 January 2001, 1,290 houses were inundated by the flood from the Belawan River. Therefore, as far as the flood from the Deli and the Percut River, the target rivers for the improvement works of the project, was concerned, the number of inundated houses was 1,860.

Table 5 compares the actual data of flood which occurred on 6 January, 2011 after the completion of the project with the flood control plan of the project. According to this, as a result of river improvement works of the project, the Deli River (the upper section of the project coverage) and the Percut River have gained its river flow capacity corresponding to 25 year-return period ($300\text{m}^3/\text{s}$), which the project has targeted. (According to the appraisal documents, the river flow capacity of the Percut River in May, 1996 was only $150\text{m}^3/\text{s}$ on average, and that of the Deli River was $280\text{m}^3/\text{s}$ on average.)

The flood occurred on 6 January, 2011 was considered 40-year return period flood, judging from the maximum flow of the Deli River, $320\text{m}^3/\text{s}$, which exceeded the project assumption of 25-year return period flood. As far as the flood from the Deli River and the Percut River was concerned, the target rivers for the improvement works of the project, the number of inundated houses were 1,860 (refer to the foot note of Table 4), which was less than the number of inundated houses (2,530) from the 25-year return period flood occurred on 7 November in 2001. In other words, the number of inundated houses from the 6 January 2011 flood, a 40-year return period flood, was less than that of the flood in 7 November, 2001, a 25-year return period flood. When comparing the number of affected people from these floods, 10,250 people were affected by the flood in November 2001 and 12,600 people in January 2011, thus the latter was bigger. However, 12,600 included those affected by the flood from the Belawan River, which the project did not target. Although the concrete number of the affected people could not be grasped, when calculated in proportion to the number of flooded houses, it becomes 7,440 people, which was less than those from the flood in November 2011. It is uncertain whether the number of inundated houses and the affected people included illegal residents.

Table 5: Comparison of the Flood Control Plan for the Project and the Actual Flood Data on Jan. 6, 2011

	Estimated Maximum Flow
Flood data on Jan. 6, 2011	$320\text{m}^3/\text{s}$ (Corresponding to 40-year return period flooding)
Flood control plan for the project (protecting from 25-year return period flooding)	$300\text{m}^3/\text{s}$

Source: Sumatra II River Basin Office

3.3.1.2 Results of Calculations of Internal Rates of Return (IRR)

Economic Internal Rate of Return

Based on the cost and benefit data obtained from the Sumatra II River Basin Office, the

economic internal rate of return (EIRR) was recalculated. The Sumatra II River Basin Office is the local office of the executing agency, DGWRD.

Table 6: Assumption and Results of EIRR Recalculation

	At time of Appraisal	At time of Evaluation
EIRR	13.08%	13.04%
Benefit	Expected amount of direct flood damages mitigated (each asset and product) and expected increase of revenue (increase in land value, etc.)	Expected amount of direct flood damages mitigated (each asset and product) and expected increase of revenue (increase in land value, etc.)*
Cost	Construction cost, consulting service cost, land acquisition cost, general administration cost, contingency and O&M cost (excluding tax and price escalation)	Construction cost, consulting service cost, land acquisition cost and O&M cost (excluding general administration cost, tax and price escalation)**
Project Life	50 years after project completion	

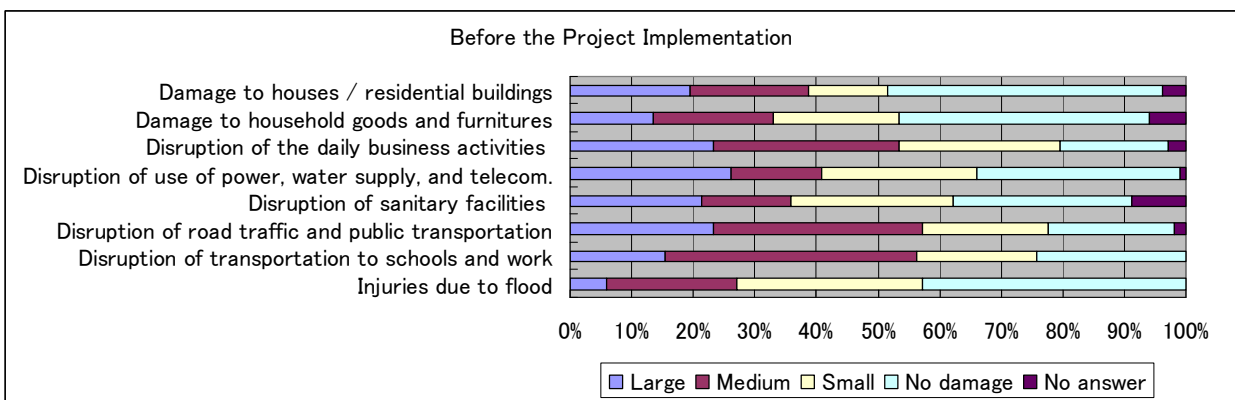
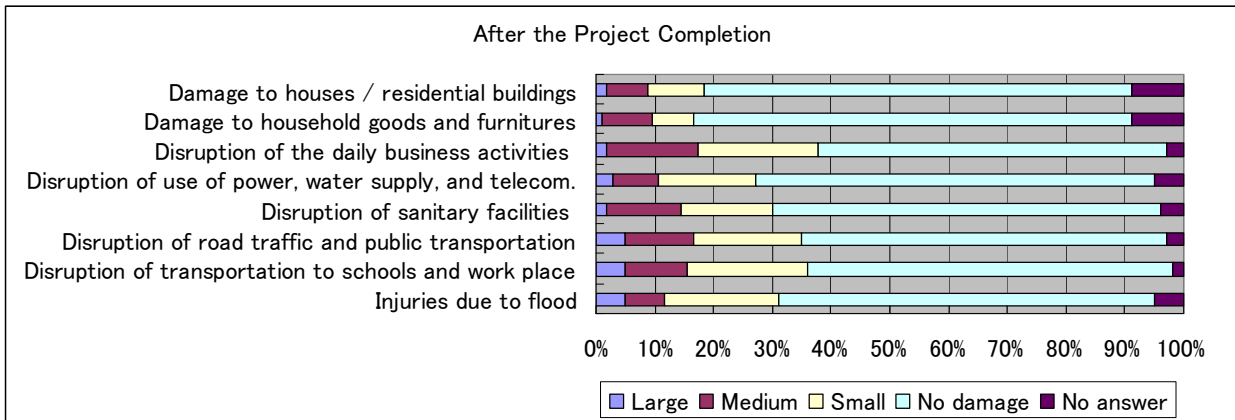
* Utilized the same assumption with that at the time of appraisal for percentage of rise.
 ** Because reliable total project cost and the amount of annual expenditures were not available, recalculation was made based on the data provided by Sumatra II River Basin Office, excluding general administration cost, tax and interest.

Recalculated figure was almost the same as the one at time of the appraisal⁵. However, because the unavailable costs – general administration cost, tax and interest – were excluded from the calculation, the EIRR value is considered to be higher than the actual. Therefore, figure is shown here as a reference. If these costs, which act on reducing the EIRR, were included to the total project cost for recalculation, the EIRR value would presumably become less than that of the value at the time of the appraisal. The main reason is the increase of the amount of compensation caused by the rise in land price. According to the Sumatra II River Basin Office, the land acquisition cost had soared to more than two times compared to the original estimation, during the project period from 1998 to 2008. While it was difficult to predict the rise in land value at the planning stage, it should be noted that this became the major factor to substantially delay the land acquisition and project implementation process.

3.3.2 Qualitative Effects
 3.3.2.1 Mitigation of Flood Damage

The results of the beneficiary survey to residents and farmers in the project area on flood damage before and after the completion of the project are summarized in the figure below. As a whole, respondents answered that the flood damage has decreased after the completion of the project, including, decrease of damage to houses and residential buildings, household goods and furniture etc.

⁵ The appraisal document stipulated, “EIRR=15.0%”, however, when recalculated the EIRR using the same assumption indicated in the document, it resulted to 13.08%. Therefore, EIRR at the time of the appraisal was regarded as 13.08%, and recalculation was made based on the same assumption.



Source: Results from the beneficiary survey

Large: Difficult to recover
 Medium: Able to recover with substantial time and money
 Small: Able to recover with self-efforts and small money

Figure2: Comparison of Flood Damage Before and After the Project (N=103)

According to the interview survey to the beneficiaries (residents), Desa Bandar Setia village, which is located in the project area, was not affected from the flood which hit Medan City and its surrounding area on 6 January, 2011. The water level of the Percut River was reaching to the top of the embankment, and residents pointed out that if the project had not been implemented, the village would have been affected. Every resident in the village showed satisfaction with the benefits from the project and sense of security.

The Sumatra II River Basin Office has conducted a beneficiary survey in August 2010 with their own budget by commissioning to local consultants. The survey result indicated that 248 respondents (residents) out of 312 (around 80%) have answered that the flood damage were mitigated or eliminated after the project completion.

Assessing from the results of the beneficiary survey conducted in this ex-post evaluation, the interview survey to residents during the field visits, and the beneficiary survey by the Sumatra II River Basin Office itself, it can be said that the project has contributed to the mitigation of flood damages.

This project has largely achieved its objectives, therefore its effectiveness is high.

3.4 Impact

3.4.1 Intended Impacts

3.4.1.1 Improvement of Living Environment in Medan City and its Surrounding Area

Regarding changes of living environment after the project completion, results of the beneficiary survey to local residents and farmers in the project area is summarized in the table below.

Table 7: Respondents' Living Environment After Project Completion (N=103)

Item	Highly improved		Improved		No change		Deteriorated		Highly deteriorated		N.A. (No answer)	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Effects on overall living standard of households	10	9.7	75	72.8	15	14.6	3	2.9	0	0	0	0
Effects on health and sanitary condition	7	6.8	73	70.9	18	17.5	4	3.9	1	1.0	0	0
Effects on access to neighbouring towns outside the flood area	8	7.8	84	81.6	6	5.8	2	1.9	2	1.9	1	1.0
Effects on job opportunities	9	8.7	70	68.0	22	21.4	0	0	1	1.0	1	1.0
Effects on income condition	6	5.8	61	59.2	32	31.1	3	2.9	0	0	1	1.0
Effects on economic values of assets (house, residential land, farm land, etc)	5	4.9	62	60.2	30	29.1	2	1.9	0	0	4	3.9

Source: Results from the beneficiary survey

* The above figures are rounded numbers; the sum may not necessarily become 100%.

According to the beneficiary survey results, more than 80% of residents and farmers answered that their overall living standard of households were improved or highly improved, thus, it can be confirmed that their living standards after the project completion have improved. Around 80% of the respondents answered that the avoidance and mitigation of flood damage have improved or highly improved health and sanitary condition. In particular, around 90% of residents and farmers answered that effects on access to neighbouring towns outside the flood area was improved or highly improved, indicating that the project has contributed to the improvement of traffic accessibility.

According to the interview survey to the beneficiaries (Desa Bandar Setia villagers mentioned

above) during the field survey, their response was as follows: “Because the access roads and bridges were developed by the project, travel time was reduced and transporting materials became easier, and thus, the convenience of travel has enhanced.⁶”, “Socialization among different villagers has been facilitated.”, “After the project, new residential areas were developed and the use of land has changed”. In this way, residents in the village have shown their satisfaction to the project’s positive impacts on their living environment, especially to the increased transport mobility from the development of access roads and bridges.

In addition, the answers to the questionnaires to the Sumatra II River Basin Office have shown that the project has enhanced land use in the project area. Concretely, following benefits were pointed out: “The construction of the rubber dam in the irrigation areas of Bandar Sidoras, which is located in the project area, has contributed to the increase of agricultural crops (especially paddy rice) and to the improvement of farmers’ living.”, “Access roads and bridges have improved transportation mobility, and new houses and stores were created in empty lands.”, “Residents have started to grow plants along the river bank.⁷” The answers to the questionnaires to the executing agency were confirmed to be consistent with the responses from residents.

3.4.1.2 Acceleration of Economic Development of Medan City and its Surrounding Area

The table below summarizes the beneficiary survey results to residents, farmers and those related to private companies in the project area regarding the effects on regional economy after the completion of the project.

Table 8: Effects on Economy of the Project Area (N=141)

Item	Improved		No change		Worsened		Others		N.A. (No answer)	
	Number	%	Number	%	Number	%	Number	%	Number	%
Effects on economic activities generally in the project area	94	66.7	30	21.3	13	9.2	0	0	1	2.8
Effects on the land use of the project area	87	61.7	29	20.6	19	13.5	1	0.7	5	3.5

Source: Results from the beneficiary survey

The beneficiary survey results show that around 67% of residents, farmers and those related to private companies consider economic activities in the project area have been improved and about 62% regard land use of the project area have been improved. Therefore, it can be considered that the project has contributed to the economic development in the project area.

Local residents in Desa Bandar Setia village pointed out during the interview survey that after

⁶ However, it was pointed out that due to the absence of maintenance after the project, roads and bridges have been deteriorating.

⁷ Sumatra II River Basin Office pointed out that there will not be any problem unless the vegetation along the river bank seriously affects the flood control function.

the implementation of the project, many stores were newly opened for business, which have activated the regional economy. In addition, the answer to questionnaires from the Sumatra II River Basin Office have shown that the development of access roads and bridges has activated the regional economy of Medan City, surrounding agricultural areas as well as plantation areas, and the development of the rubber dam has increased harvest of agricultural goods. Thus, it can be regarded that the project has led to the expansion of irrigation areas through the avoidance and mitigation of flood damage.

There is no clear correlation between the trend in the regional macro data and the project, therefore, it is difficult to measure its effect based on the changes in regional indicator values. However, Medan City, which is the capital of North Sumatra Province, has been playing a significant role as the bases for economic and social activities with 6 to 7% annual GRDP growth and around 1% population growth recently. Thus, it can be regarded that the project has been contributing to the regional economic development.

Table 9: Population, Population Growth Rate and GRDP Growth Rate of North Sumatra Province and Medan City

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Population of North Sumatra Province (1,000)	11,463.4	11,525.4	11,587.4	11,642.0	11,851.6	11,863.7	11,890.4	12,123.4	12,326.7	12,643.5	12,833.2	13,042.3	13,248.4
Population growth of North Sumatra Province (%)	1.98	0.54	0.54	0.47	1.80	0.10	0.23	1.96	1.68	2.57	1.50	1.58	1.58
GRDP growth rate of North Sumatra Province (%)	5.70	-10.90	2.43	4.98	3.98	4.56	4.81	5.74	5.48	6.20	6.90	6.39	5.07
Population of Medan City (1,000)	1,899.0	1,901.1	1,902.5	1,904.3	1,926.5	1,963.9	1,993.6	2,006.1	2,036.2	2,067.3	2,083.2	2,102.1	2,121.1
Population growth of Medan City (%)		0.11	0.08	0.09	1.17	1.94	1.51	0.63	1.50	1.53	0.77	0.91	0.90
GRDP growth rate of Medan City (%)	7.73	-18.11	3.52	5.40	4.60	5.00	5.76	7.29	6.98	7.76	7.78	6.89	6.56

Source: BPS-Statistics of Sumatra Utara Province and Medan City

3.4.2 Other Impacts

3.4.2.1 Impacts on the Natural Environment

The Environmental Impact Assessment (AMDAL) was conducted in the JICA Master Plan in March 1992, and following the changes in the AMDAL procedure (Decree 51, 1993), supplementary study of the AMDAL was conducted. At the same time, the Environmental Management Plan (RKL) and the Environmental Monitoring Plan (RPL) were prepared, with the final approval from the Ministry of Public Works in January 1996.

The effects on natural environment have not been observed during the construction and after the

project completion, as a result of interview survey from residents. According to the Sumatra II River Basin Office, guidance was made to the contractors to give necessary environmental consideration during the implementation of the project, and the contractors have taken necessary measures. Thus, no particular issues have been observed. Concretely, the Sumatra II River Basin Office had implemented environmental monitoring as the need arises – checking the situation of sediments near the river mouth, ground water near the floodway, and wastes in the river. Guidance was provided to the contractors for proper environmental measures. Measures such as watering the dust, provision of alternative well and water facilities to residents have been implemented.

The survey result shows that 54 residents and farmers, almost half of the total respondents (103), recognized the impacts on natural environment during the construction. However, most of them pointed out the issue of muddy waters, and no severe complaints were observed.

In order to enhance project effectiveness, improvement of solid waste management (countermeasures against throwing waste into the river, improvement of garbage collection system, promotion of recycling, and so on) was added to the project scope, and garbage bins and garbage collection trucks have been provided. From the technical aspects, Special Assistance for Project Implementation (SAPI) was conducted. As regards to the initiative of organic-matter composting, for example, the Sumatra II River Basin Office engaged in the activities in cooperation with Japanese experts possessing the skills. However, it is not certain that such initiatives to improve solid waste management have been firmly rooted even after the project completion. During the project site visit, several people who were throwing wastes into the river have been witnessed, just next to the sign board that prohibits the abandonment of garbage. Illegally dumped garbage were piling up beside the bridge. Such illegal wastes hinder the rive flow and affect the sustainability of the project, so it is critical to take preventive measures against illegal disposal – by conducting educational campaign, setting up fences, for example.



Signboard banning waste disposal to a river Beneficiaries (residents and farmers in project surrounding area)

3.4.2.2 Land Acquisition and Resettlement

The table below shows comparison between plan and actual results for land acquisition and

resettlement. The actual acquired land was less than 60% of the planned area, and number of actual resettled household increased from the plan for about 300. The number of resettled households has increased even though the area for land acquisition was less than planned, because of the population growth with the urbanization.

Table 10: Comparison of Areas of Land Acquisition and Resettlement

	Planned	Actual
Land Acquisition	197.07 ha	114.99 ha
Resettlement	899 house holds	1,208 house holds

Source: Sumatra II River Basin Office

According to the interview survey with the Sumatra II River Basin Office, no particular problem on the direction and the process has been observed for land acquisition and compensation – appropriate process has taken place including public hearing and consultation with residents, based on the Indonesian regulation. A land acquisition committee, called “Committee 9”, in which the executing agency became the responsible agency, was established to proceed with the land acquisition process. The member of the Committee was composed of those related to local governments and police departments. On the other hand, some issues were observed for land acquisition during the project implementation.

- Land certifications were issued from multiple institutions redundantly, and it took time to specify the land owner.
- The owner of some land was unclear and there were confusion as to the ownership of land.
- Some residents filed a suit to the Local Court, pointing out that the procedures for the land inventory survey and compensation were unclear, and at the end, 9 houses abided at the project site.

The main reason that the issues were brought to trial was because residents did not agree on the compensation amount, and thus they filed suit to the Medan Local Court in January and February of 2004 to call for modification of compensation. While residents won the lawsuits in the Medan Local Court and the Provincial High Court, the Medan City won the case in the Supreme Court (in August 2005), and the decisions from the Local Court and the High Court was rejected. Following the judgement, the Medan Civil Court was given the role to manage arbitration with residents who denied receiving the compensation from the City, and the Court would resort to forced expropriation through appropriate procedures in case the arbitration fell apart (in November 2006), which actually took place. To cope with the issue, the governor of North Sumatra Province gathered relevant executive officials in the Province (Chief of Police, Chief of Prosecutors, the Chief Justice, and the Military Commander) to tackle with the problem. They have gone through continued discussions before deciding to proceed with forced expropriation and the removal of houses.

According to the Sumatra II River Basin Office, resettlement action plan was not prepared

because each resident was to resettle to the nearby places on their own with the compensation they received, instead of having been developed alternative lands for them to live. Those residents have been informed in advance and have agreed upon through public hearing regarding the resettlement. Because most residents who resettled moved to the nearby places with no change in their livelihood, no specific measure for livelihood program was provided. No particular problem has been seen for resettlement of public facilities, such as schools, mosques and churches. In some cases, resettlement was avoided by lifting-up the basement of the building in the same place in order to mitigate the effects as much as possible.

The beneficiary survey results on land acquisition and resettlement indicated, 29 of 103 residents and farmers resettled and 25 of them (86.2%) answered as they were satisfied with their new land.

The survey also showed 49 people, almost half of the 103 residents and farmers, received compensation from the project. Of which, 20 (40.8%) said they were satisfied with the compensation amount, and 28 (57.2%) said the amounts were too little considering the market value. (1 was unanswered)

No resident pointed out any particular issues on land acquisition during the interview survey at the time of site visit.

Thus, the project is deemed as to have yielded a significant number of positive impacts while curbing negative impact on the natural environment, resettlement and land acquisition.

3.5 Sustainability (Rating: ②)

3.5.1 Structural Aspects of Operation and Maintenance

The operation and maintenance of the project is also undertaken by the Sumatra II River Basin Office. Under the organization, operation and maintenance section is deployed along with the planning section and the construction section. The total number of operation and maintenance staffs at the time of ex-post evaluation was 26. There is no particular problem observed in the structural aspects – planning, implementation, and operation and maintenance are placed under the same organization, and mechanism that enables decision making through coordination among each section is established, according to the Sumatra II River Basin Office.

There is no full-time operation and maintenance staff just for this project. Among 26 operation and maintenance staffs, 4 technical staffs are in charge of the maintenance work of this project concurrently with that of the other projects (in the areas of river, coast, irrigation, and so on). The table below shows the breakdown of the 4 staffs – the number of the staffs cannot be considered as sufficient.

Table 11: Breakdown of the O&M Technical Staffs at the Time of Ex-post Evaluation

Responsibility	Number of Technical Staffs in charge of O&M	Number of Years of Experiences
Operation of Dam	1	2-3 years
Maintenance of the River	3	Around 10 years for all staffs

Source: Sumatra II River Basin Office

According to the Sumatra River Basin Office, the operation and maintenance of the project commenced from 2011. The actual operation and maintenance work in the field would be outsourced to experienced and time-proven local contractors and the 4 technical staffs mentioned above will be in charge of supervising the contractors.

It was planned at time of the appraisal that a part of the bridges which had been developed by the project would be relegated to local governments, railway authorities and so on, and to be managed on their own budget. However, the plan was not realized at the time of the ex-post evaluation, and its perspective remained unclear. In the meantime, the responsible organizations for the maintenance would remain unclear, and no specific maintenance work was done at time of the ex-post evaluation.

<The bridges which were supposed to be relegated to other organizations after their completion of the project>

- Irrigation bridge, road bridge, drainage facility: to local governments (Medan city, Deli-Serdang Province)
- Railway bridge: to PJKA (Perusahaan Umum Kereta Api)
- Water supply bridge: to Medan Public Water Authority

3.5.2 Technical Aspects of Operation and Maintenance

During the implementation of the project, the consultants provided necessary training (in Japan) and site investigations to the operation and maintenance staffs of the Sumatra II River Basin Office.

After the completion of the project, mainly due to the budget constraint, no particular training was given to the operation and maintenance staffs, and no plan is expected.

Manuals for the operation and maintenance have been developed (details are listed below), and the operation and maintenance staffs undertake the work by referring to them. The operation and maintenance staffs have acquired necessary skills and knowledge through OJT, and therefore, no particular problem was observed in the technical aspect of the operation and maintenance staffs at the time of ex-post evaluation.

< The main items of maintenance manual for equipments and facilities put in place for the project >

- Removal of soil, stones and plants in the river channel and flood way

- Removal of sediment in the river channel
- Repair of river bank and access road
- Repair and reconstruction of river bank protection
- Repair of a doorsill and concrete stairs
- Repair of weir
- Repair of drainage waterway

3.5.3 Financial Aspects of Operation and Maintenance

The operation and maintenance costs associated with the project are first estimated by the Sumatra II River Basin Office, then estimation will be reviewed by the DGWRD in Jakarta. Once approved, the budget is drawn out from the headquarters' ordinary budget and allocated to the Sumatra II River Basin Office.

While the project completed in December, 2008, the budget for operation and maintenance was secured and its operation started only after this year (2011). Therefore, the Sumatra II River Basin Office did not undertake particular maintenance work, including removal of sedimentation, for about 2 years after completion of the project.

The operation and maintenance budget for the project was secured for the first time in 2011 in the amount of IDR 100 million, and to be financed for outsourcing to local contractors. However, with that amount, the maintenance work will be limited to weeding along river channel, removal of sediments and so forth.

Therefore, the budget for operation and maintenance costs is not sufficiently secured.

The officer in charge for operation and maintenance in the Sumatra II River Basin Office pointed out that they need at least twice as much budget as they have been allocated in 2011 in order to implement appropriate operation and maintenance work.

Shortage of operation and maintenance budget in the area of flood control is pointed out as a common issue in whole Indonesia, not just for this project. This can be confirmed by the fact that the river maintenance target stipulated in the RPJMN 2010-2014 was 1,500 km from 2005 – 2009, whereas the actual achievement remained only 225km.

3.5.4 Current Status of Operation and Maintenance

As mentioned above, the Sumatra II River Basin Office did not undertake operation and maintenance work for about two years, since the project completion until 2011, therefore, measures, such as removal of sedimentation, are not taken until now. The result of the visual check during the site survey confirmed that volume of sediments was increasing, as it goes to the upper stream. There were places where sediments in both banks have narrowed the river width, affecting quite a respectable river flow capacity.

After the project completion, as a measure to remove sedimentation, the Sumatra II River Basin Office has installed automatic water gate using its own fund in the Medan floodway at the junction of the Percut River (completed in December, 2010). However, accumulated driftwood was observed near

the water gate during the site visit.

As operation and maintenance work will be conducted from 2011, and sedimentation removal will take place, project sustainability is expected to improve.

Responding to January 6, 2011 flood damage, the Sumatra II River Basin Office has installed CCTV (Closed-circuit Television) using its own fund. The purpose is to ensure operation of the water gate by observing the status of the river and maintenance facilities at all times including night time.

Some problems have been observed in terms of financial aspects of operation and maintenance, therefore sustainability of the project effect is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

Mitigation of flood damage in the project area has been achieved through the project's river bank reinforcement works and construction of floodway. The results of local interview and beneficiary surveys have shown local residents' satisfaction to the benefit of the project. The project has also contributed to the improvement and enhancement of the people's livelihood, and the economic development. In light of this, the project is deemed as to have yielded a significant number of positive effectiveness and impacts. The project objective to contribute to the reduction of flood damage, stabilization and enhancement of people's livelihood, and promotion of local economy is consistent with Indonesia's development plan and development needs, both at the time of appraisal (1997) and the ex-post evaluation (2011), as well as Japan's ODA policy at the time of appraisal, therefore its relevance is high. Project efficiency is fair because while the yen loan portion of the project cost was within the plan, the project period was exceeded. As regards operation and maintenance, some problems have been observed in terms of financial aspects, therefore sustainability of the project effect is fair.

In light of the above, this project is evaluated to be satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

Importance of maintenance (especially removal of sediments)

Since the project completion in December, 2008, the Sumatra II River Basin Office has not taken measures, including removal of sediments (in large scale), until operation and maintenance budget was secured for the first time in 2011. It was confirmed during the site visit in the field that sediments in both banks have narrowed the river width, affecting quite a respectable river flow capacity. The executing agency should develop mechanism for appropriate planning, budgeting and implementation for maintenance, including removal of sediments, in order to enhance sustainability of the project after its completion.

Importance of undertaking measures to prevent illegal waste disposal

“Improvement of solid waste management” was added to the project scope in order to enhance project effects, however, as far as visual check was conducted during the site visit in the field, garbage was illegally disposed and accumulated on the riverside around the bridge. Several people were witnessed throwing garbage into the river beside a signboard which forbids abandonment of waste to the river. Since piled up garbage hinders of the capacity of the original river flow at the time of flood, and affects project sustainability, further educational campaign (such as running campaign in the TV program to prevent illegal disposal of waste) and installation of fence etc. are necessary.

Importance of improving urban drainage

In order to enhance project effects of river improvement works for urban flood control of this type (flood control from river overflow), the improvement of drainage surrounding the project area is indispensable. In this case, City of Medan is responsible for urban drainage, thus authority is different. Therefore, it is important for the executing agency to closely coordinate with the organization in charge of urban drainage from the project formulation stage, and to undertake project preparation, implementation and maintenance from overall perspectives against flood control.

4.2.2 Recommendations to JICA

Importance of developing and managing indicators and data on project effects and flood damage

Unlike other infrastructure projects such as transport projects, flood control projects have an inherent difficulty to clearly grasp their effectiveness before and after the project. For this reason, it is important that project effect is indicated quantitatively, and development and management of flood damage data before project implementation is critical. From the time of project preparation stage, JICA should pay attention to and follow-up with the executing agency and other relevant organizations so that they can develop measurable, appropriate operation and effect indicators, and consistently collect and manage indicators and data throughout the project and after its completion. The following can be considered as examples of possible operation and effect indicators.

- Annual maximum flow (m^3/s)
- Flood damage in the project area (flooded area, number of inundated houses, number of affected people, cost of flood damage)
- Rainfall data at each time of flood (cumulative precipitation)

4.3 Lessons Learned

There are many illegal residents along the riverside (holm) of the Deli River (partly), and the Mati and the Babura River that flow into the Deli River, preventing to implement river improvement works and, thus, causing flood damage to expand. Since many of such illegal residents reside just before the riverside, they seem to be leading their life, coexisting with flood. In order to achieve effects of flood control projects appropriately, implementing necessary measures to cope with such illegal residents becomes important. Since there is a limit to cope with such issues in individual

projects, it is important to consider and take actions as a part of city development plan with comprehensive perspectives with medium-long term approach.

End

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Project Outputs	1) Construction of Percut River Improvement Works: approx. 28km 2) Construction of Medan Floodway: approx. 4km 3) Diversion and Improvement Works of Upper Deli River including 2 weirs Consulting Service (Construction supervision etc.) 395M/M	1) Design change taken place to mitigate effects on land acquisition, and additional works conducted to enhance the effectiveness of flood control 2) Design change taken place for floodway 3) As planned Consulting Service (Construction supervision and detailed design for additional construction works etc.) 1,520.99M/M
2. Project Period	Nov. 1997 – Sept. 2003 (71 months)	Jan. 1998 – Dec. 2008 (132 months)
3. Project Cost	Amount paid in Foreign currency 4,834 million yen Amount paid in Local currency 8,591 million yen (165,212 million IDR) Total 13,425 million yen Japanese ODA loan portion 9,697 million yen Exchange rate 1 IDR=0.052 yen (As of Apr. 1997)	Amount of total project cost was not available at Ex-post Evaluation. 9,323 million yen 1IDR = 0.012 yen (Average between 1999 and 2008)

End

Indonesia

Ex-Post Evaluation of Japanese ODA Loan
“Upper Citarum Basin Urgent Flood Control Project (I) (II)”

External Evaluator: Masumi Shimamura
Mitsubishi UFJ Research and Consulting Co., Ltd.

0. Summary

Mitigation of flood damage in the project area has been achieved through the project’s river bank reinforcement works. The project has also contributed to the improvement and enhancement of the people’s livelihood and the economic development. In view of this, the project is deemed as to have yielded a significant number of positive effectiveness and impacts. The river basin conservation activities undertaken through close coordination between the executing agency and local residents are noteworthy as they set a good practice case. The project objective to contribute to the reduction of flood damage, stabilization and enhancement of people’s livelihood, and promotion of local economy is consistent with Indonesia’s development plan and development needs, both at the time of appraisal (1993/1997) and the ex-post evaluation (2011), as well as Japan’s ODA policy at the time of appraisal, therefore its relevance is high. Project efficiency is fair because while the yen loan portion of the project cost was within the plan, the project period was exceeded. As regards operation and maintenance, some problems have been observed in terms of technical aspects, however, solid prospects exist to secure high sustainability of the project effect.

In light of the above, this project is evaluated to be highly satisfactory.

1. Project Description



Project Location



Citarum River after improvement

1.1 Background

In upper Citarum River basin, which is located in West Java Province, population was increasing rapidly with the expansion of urban area of the provincial capital, Bandung City. While development of the basin and accumulation of assets progressed in the area, the flood had occurred frequently in the

rainy season, and aggravation of flood damage was pointed out – especially the flood in March, 1986 affected total area of 7,249ha, inundating 27,310 houses. In order to mitigate flood damage of the area, the river improvement projects had been undertaken by the support of Asian Development Bank, and with utilization of national budget of Indonesia, however, only a part of improvements have realized in the Citarum River and its tributaries, and flood damage was still continuing.

For such background, it was urgently needed to mitigate flood damage in Bandung City and the surrounding area by undertaking full-scale improvement works of the upper Citarum Basin in order to stabilize people’s livelihood, and enhance the economic development of the project area.

1.2 Project Outline

The objective of this project is to protect Bandung from flooding by river bank reinforcement works on the Citarum, Cisangkuy, Citarik, Cikeruh and Cisaranten Rivers, thereby contributing to the stabilization and enhancement of the people’s livelihood, and the economic development of the said area.

	Stage I	Stage II
Loan Approved Amount/ Disbursed Amount	3,165 million yen / 2,639 million yen	4,722 million yen / 4,567 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	October, 1993 / November, 1993	January, 1998 / January, 1998
Terms and Conditions	Interest Rate: 2.6% Repayment Period: 30years (Grace Period: 10years) Conditions for Procurement: Multiple Consultant Interest Rate: 2.6% Repayment Period: 30years (Grace Period: 10years) Conditions for Procurement: Multiple	Interest Rate: 2.5% Repayment Period: 30years (Grace Period: 10years) Conditions for Procurement: General Untied Consultant Interest Rate: 2.1% Repayment Period: 30years (Grace Period: 10years) Conditions for Procurement: General Untied
Borrower / Executing Agency	The Republic of Indonesia / Directorate General of Water Resources Development, Ministry of Public Works	
Final Disbursement Date	December, 1999	February, 2008
Main Contractor (Over 1 billion yen)	PT. Pembangunan Perumahan (Indonesia)	—
Main Consultant (Over 100 million yen)	Pacific Consultants	Pacific Consultants

million yen)	International (Japan) • PT. Geo Ace (Indonesia) • PT. Rayakonsult (Indonesia) • PT. Barunadri Engineering Consultant (Indonesia) • PT. Bhakti Werdhatema Konsultan (Indonesia) (JV) / PT. Melias Kesuma (Indonesia) • CTI Engineering Co., Ltd. (Japan) • Sinotech Engineering Consultant (Taiwan) (JV)	International (Japan) • PT. Geo Ace (Indonesia) • PT. Rayakonsult (Indonesia) • PT. Barunadri Engineering Consultant (Indonesia) • PT. Binatama Wirawredha Konsultan (Indonesia) (JV)
Feasibility Studies, etc.	<ul style="list-style-type: none"> - Feasibility Study: Upper Citarum Flood Control Study (JICA, 1988) - Detail Design: Irrigation and Flood Control Restoration Project (OECF, 1992) 	
Related Projects (if any)	<ul style="list-style-type: none"> - Upland Plantation and Land Development Project at Citarik Sub-watershed (JBIC, 2006) - Bandung Urban Development Program (ADB, Phase 1: June, 1979, Phase 2: January, 1986) (As a part of the Phase 2 project, river improvement of the Citarum River tributaries that flow through Bandung City was conducted) 	

2. Outline of the Evaluation Study

2.1 External Evaluator

Masumi Shimamura, Mitsubishi UFJ Research and Consulting Co., Ltd.

2.2 Duration of Evaluation Study

Duration of the Study: November, 2010 – October, 2011

Duration of the Field Study: January 30 – February 25, 2011, May 11 – 21, 2011

2.3 Constraints during the Evaluation Study

None.

3. Results of the Evaluation (Overall Rating: A¹)

3.1 Relevance (Rating: ③²)

3.1.1 Relevance with the Development Plan of Indonesia

At the time of appraisal of the Stage I of the project, the Government of Indonesia identified, in

¹ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

² ③: High, ② Fair, ① Low

its Fifth Five-Year National Development Plan (REPELITA V: 1989-1993), high priority for river improvement projects in the important areas, such as residential, industrial, and agricultural areas, from a standpoint of facilitating economic activities and promoting social welfare. In REPELITA V, total area of 450,000 ha was planned to implement flood control projects, and the actual achievement for three years until 1991 was about 310,000 ha (70%). In addition, at the time of appraisal of the Stage II of the project, the Government of Indonesia planned, in its Sixth Five-Year National Development Plan (REPELITA VI: 1994-1999), to undertake flood control projects in urban areas with accumulated population and assets, and in agricultural areas where irrigation has been developed – to be specific, flood control measures were planned in: (1) cities and industrial areas: 37,000 ha, (2) rural areas: 200,000 ha, and (3) development areas: 40,000 ha etc. The Citarum River, along with Solo River and Brantas River, was regarded as one of the important river basins among seven basins in Java Island. The objective of the project to mitigate flood damage in Bandung City and its surrounding areas was consistent with Indonesia's development plan.

At the time of ex-post evaluation, the project objective remains consistent with Indonesia's plans – the Government of Indonesia also recognizes the necessity of infrastructure development to control flood and to prevent seashore corrosion, and the importance of flood mitigation measures in residential areas in its Medium-Term National Development Plans (RPJMN 2010-2014) and in the Water Resource Management Strategy of the Medium-Term Development Plan of the Ministry of Public Works (RENSTRA 2010-2014).

3.1.2 Relevance with the Development Needs of Indonesia

At the time of appraisal, population of upper Citarum River basin was increasing rapidly with the expansion of urban area of the provincial capital, Bandung City. In the said area, the flood had occurred frequently in the rainy season, and aggravation of flood damage was pointed out – especially the flood in March, 1986 affected total area of 7,249ha, inundating 27,310 houses. For this reason, high necessity and priority was recognized to mitigate frequent flood damage by implementing improvement works of the upper Citarum River.

At the time of ex-post evaluation, the Citarum River is specified as one of the 24 strategic areas (KSP:Kawasan Strategis Provinsi) in the Development Plan of West Java Province (Spatial Plan 2009-2029), and is recognized as the priority development area (for river improvement and recovery) in the Province. KSP specifies the areas which have serious effects on national defence and security, environment, economy, society, culture, or utilization of natural resources and technology. The importance and urgency remains high to implement flood control and water resource development of the Citarum River, and to facilitate economic development of Bandung City urban area.

3.1.3 Relevance with Japan's ODA Policy

The objective of the project was consistent with the Government of Japan's assistance policies at the time of appraisal. The Ministry of Foreign Affairs of Japan's Country Assistance Strategy for Indonesia stipulated in the 1997 Status of ODA Implementation recognized “responding to natural

disasters, such as forest fires, drought, earthquake, and flood” as Indonesia’s serious challenges. It also indicated in Japan’s priority areas for assistance – “environment protection” and “securement of fairness” – the strategy to reduce aggravation of living environment from population concentration in large cities and to secure Basic Human Needs (improvement of living environment etc). Since the onset of the project, there has been no change in the assistance policies of the Government of Japan or JICA, which might affect the direction of the project. Thus, the consistency of the project with the Japanese assistance policies is still maintained.

This project has been highly relevant with the country’s development plan, development needs, as well as Japan’s ODA policy, therefore its relevance is high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

Comparison of planned and actual project outputs is summarised in the table below.

Table 1: Comparison of Planned and Actual Project Outputs (Stage I and II)

Planned	Actual	Comparison
Civil Works (Stage I)		
1) Improvement works of Citarum River: approx. 23.5km 2) Construction of supplementary facilities (including access road and bridges)	1) Improvement works of Citarum River and its tributaries: approx. 23.5km+6.8km 2) Construction of supplementary facilities (including access road, bridges and telemetering for flood warning system)	1) Additional scope <ul style="list-style-type: none"> • Additional river improvement works and removal of sediments taken place in the Citarum River tributaries (the Cipamokolan River and the Cikapundung River) to enhance project effects 2) Additional scope <ul style="list-style-type: none"> • Construction and improvement of access road, and installation of telemetering for flood warning system added
Civil Works (Stage II)		
1) Improvement works of Citarum River and its tributaries (Cisangkuy, Citarik, Cikeruh and Cisaranten):	1) Improvement works of Citarum River and its tributaries (Cisangkuy, Citarik, Cikeruh and Cisaranten): approx. 63.6km 2) Construction of	1) Additional scope <ul style="list-style-type: none"> • Additional river improvement works taken place as emergency measures against problems of land subsidence (15cm/year) between Nanjung and Dayeuhkolot areas along Citarum River

approx. 51km 2) Construction of supplementary facilities (including access road, bridges and weir)	supplementary facilities (including access road, bridges and weir)	2) As planned
Consulting Service (Stage I)		
1) Construction supervision of the Citarum River improvement works 2) F/S review and detailed design for upstream Citarum River, Citarik River and Cikeruh River	1) Construction supervision of the improvement works of Citarum River and its tributaries 2) F/S review and detailed design for upstream Citarum River, Citarik River and Cikeruh River	1) Additional scope <ul style="list-style-type: none"> Additional construction supervision works conducted due to the additional scope for civil works for the tributaries (the Cipamokolan River and the Cikapundung River) 2) As planned
Consulting Service (Stage II)		
1) Detailed design of the river improvement works of the Cisaranten river 2) Construction supervision of the improvement works of Citarum River and its tributaries (Cisangkuy, Citarik, Cikeruh and Cisaranten)	1) Detailed design of the river improvement works of the Cisaranten river 2) Construction supervision of the improvement works of Citarum River and its tributaries (Cisangkuy, Citarik, Cikeruh and Cisaranten) 3) Review of flood control plan and detailed design preparation	1) As planned 2) Additional scope <ul style="list-style-type: none"> Additional construction supervision works conducted due to the additional scope (river improvement between Nanjung and Dayeuhkolot areas) for civil works 3) Additional scope <ul style="list-style-type: none"> Responding to serious flood occurred in February and April 2005, review and update of flood control plan and detailed design preparation conducted – the flood inundated 4,500ha with 0.5-2.0m height, forcing 14,000 people to evacuate

As for Stage I project, there were additional scopes: 1) improvement works of river, 2) construction of supplementary facilities, and consulting services. As for 1), improvement works of tributaries were implemented to enhance the project effectiveness. 2) Telemetering for flood warning

system, which was originally planned to install under Stage II project, was added under Stage I, considering its urgency. Construction supervision, accompanied by the additional scope of river improvement works and construction of supplementary facilities, was added to the consulting services.

As for Stage II project, there were additional scopes: 1) improvement works of river, and 2) consulting services. Regarding 1), additional river improvement works were implemented along the Citarum River as emergency measures against problems of land subsidence in Dayeuhkolot area. (After the completion of the Stage I, Dayeuhkolot area began to suffer from flood damage since 2001, and a survey has concluded that land subsidence was occurring – thus, urgent countermeasures were necessary.) Scope on consulting services was added to respond to the flood incidence that occurred in February and April, 2005, respectively. Flood plan of 1992 had to be revised, taking into consideration of the 2005 flood. Review and update of flood control plan and needs investigation were added to the scope.

As for the consulting services, the inputs of both foreign and local consultants significantly increased as shown in the table below.

The reason for the increment for Stage I was basically due to the construction supervision of the additional improvement works of the tributaries (the Cipamokolan River and the Cikapundung River) as mentioned above, as well as prolonged construction supervision, necessitated in association with the delay in the implementation schedules mainly caused by delayed land acquisition. The reason for the increase for Stage II was due to the added scope to review the flood control plan and to conduct needs survey, the added construction supervision works created by the additional scope for river improvement between Nanjung and Dayeuhkolot areas, and delayed in the implementation schedules mainly caused by the delay in land acquisition.

Table 2: Stage I – Comparison of Planned and Actual Consulting Service (M/M)

Stage I	Planned	Actual	Comparison
Foreign	108	161	Increase by 53
Local	254	516	Increase by 262
Total	362	677	Increase by 315

Source: Information from JICA, results from questionnaire surveys to Citarum River Basin Office and interview survey results during field survey

Table 3: Stage II – Comparison of Planned and Actual Consulting Service (M/M)

Stage II	Planned	Actual	Comparison
Foreign	89	213	Increase by 124
Local	235	938	Increase by 703
Total	324	1,151	Increase by 827

Source: Information from JICA, results from questionnaire surveys to Citarum River Basin Office and interview survey results during field survey

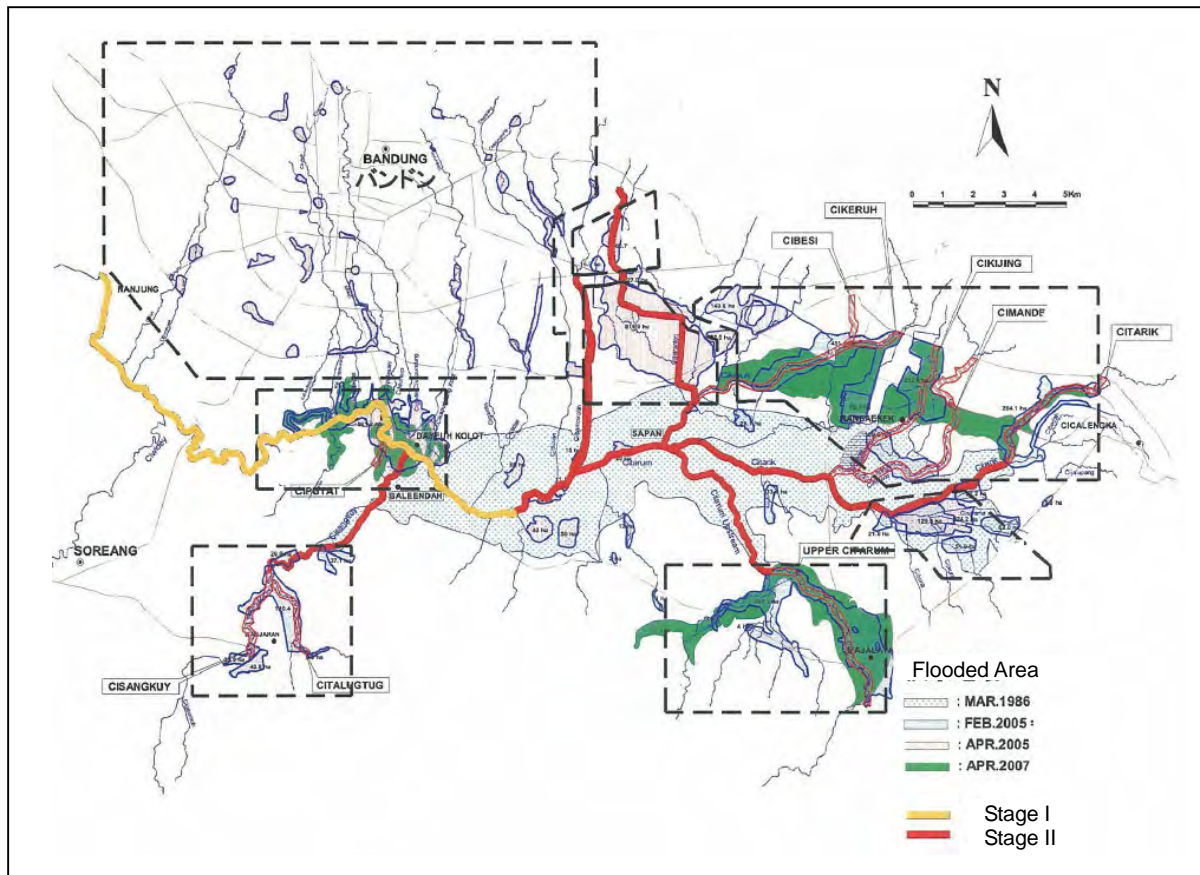


Figure 1: Project Site



Manumotive Flood Gate



River Basin near Dayeuhkolot area

3.2.2 Project Inputs

3.2.2.1 Project Cost

The total project cost, covering Stage I and Stage II, was initially estimated at 11,112 million yen, of which Japanese ODA loan would cover 7,887 million yen, consisting of 3,165 million yen for Stage I and 4,722 million yen for Stage II. In actuality, Japanese ODA loan provided a total of 7,206

million yen – 2,639 million yen for Stage I and 4,567 million yen for Stage II – resulting in a lower amount than the initial estimate (91.4% of the planned amount). The entire costs for civil works and consulting service, including costs for additional scope were eligible for yen loan disbursement.

There is no reliable evidence to confirm the actual project cost spent; because the amounts invested from the government and the Directorate General of Water Resources Development (DGWRD) budgets were not properly recorded in project accounting under imperfect project accounting system of DGWRD ³.

Despite the delay in the schedule and the increase in the outputs, the amount of Japanese ODA loan decreased mainly because (i) the competitive biddings generated price competition, which held down the total project cost, and (ii) the Asian currency crisis, which occurred during the project implementation period, caused the local currency, Indonesian Rupiah, to depreciate against the Japanese yen (about 80% depreciation against the rate at appraisal).

Therefore, the yen loan portion of the project cost (Stage I and Stage II) was lower than planned.

3.2.2.2 Project Period

The overall project period, covering Stage I and Stage II, was planned as 117 months as opposed to 193 months including the extended loan period in reality, representing an expansion to 164.9% of the initial plan (see table below for breakdowns). Due to the delay in the schedule, the project involved extension of the loan disbursement period for Stage II, in February, 2005 – the loan disbursement deadline was extended to February 2008.

The table below shows a comparison by item for Stage I and II, respectively, and entire project implementing periods. As the periods in each item are overlapping, simple sum of each difference will not equal to the entire difference.

Table 4: Comparison of Planned and Actual Project Period

	Planned	Actual	Comparison
Stage I	Civil Works: Jan. 1996 – Dec. 1997 (24 months)	Civil Works: Jul. 1994 – Nov. 1999* (65 months)	Civil Works: Delayed by 41 months
	Land Acquisition: Apr. 1993 – Sept. 1994 (18 months)	Land Acquisition: Apr. 1993** – Jun. 1999 (75 months)	Land Acquisition: Delayed by 57 months
	Consulting Service: Jan. 1995 – Dec. 1997 (36 months)	Consulting Service: Jun. 1994 – Mar. 1997 (34 months)	Consulting Service: Shortened by 2 months

³ Data on total project cost for Stage I was available. The actual project cost was 3,470 million yen, compared with its planned cost of 3,892 million yen (89.2% of the plan).

	Total: Oct. 1993*** – Dec. 1997 (51 months)	Total: Nov. 1993*** – Nov. 1999* (73 months)	Total: Delayed by 22 months
Stage II	Civil Works: Apr. 1999 – Mar. 2003 (43 months) Land Acquisition: Aug. 1997 ** – Mar. 2001 (44 months) Consulting Service: Apr. 1999 – Apr. 2003 (49 months)	Civil Works: Sept. 1999 – Dec. 2007* (100 months) Land Acquisition: Apr. 1998 – Dec. 2007 (117 months) Consulting Service: Oct. 1998 – Dec. 2007 (111 months)	Civil Works: Delayed by 57 months Land Acquisition: Delayed by 73 months Consulting Service: Delayed by 62 months
	Total: Nov. 1997 *** – Apr. 2003 (66 months)	Total: Jan. 1998*** – Dec. 2007* (120 months)	Total: Delayed by 54 months

* Project completion is considered at the time when the civil works were completed.

** Land acquisition started prior to the signing of the Loan Agreement (L/A).

*** L/A conclusion date.

The delay in the implementation schedule was caused mainly by the substantial delay in the negotiation process with local residents in reaching agreement on the amount of compensation for resettlement and securing necessary budget. Land acquisition costs soared to more than 4 times from the estimation in 6 years from 1998 to 2004. It took time to reach agreements with residents because the gap between the market price which land owners desired for compensation, and the government's price used as the base value for calculating compensation were significantly large. In addition, necessary budget could not be secured in timely manner for the increased compensation cost caused by the rise in land price, which also led to the project delay.

Although the yen loan portion of the project cost was within the plan, the project period was significantly exceeded, therefore efficiency of the project is fair.

3.3 Effectiveness⁴ (Rating: ③)

3.3.1 Quantitative Effects

3.3.1.1 Results from Operation and Effect Indicators

No operation and effectiveness indices were set at the time of appraisal. Analysis was made on maximum flow and number of inundated houses for the flood occurred in Bandung area, based on data available at the time of ex-post evaluation.

⁴ In assessing "effectiveness" to give rating, "impact" is also considered.

Table 5: Data on River Flow, Number of Inundated Houses and Average Rainfall in Bandung Area in Flood Year

Major flood year	Maximum Flow in Nanjung (m ³ /s)	Number of inundated houses	Average rainfall throughout entire river basin (mm)				
			1 day rain	2 days	3 days	4 days	5 days
1986	482	1,174	32.5	53.5	80.3	99.5	119.1
2002	508		29.1	52.5	65.2	73.2	88.1
2005	572	419	38.5	55.3	85.7	93.9	117.7
2006	311	261					
2007 Stage II - Civil Works Completion (Dec.)	481	460					
2010	622	1,220	49.1	72.7	100.6	116.3	131.3


* Stage I was completed in November, 1999. The blank space indicates that data were unavailable.

Source: Citarum River Basin Office

Table 6 shows the comparison of the flood control plan of the project and the actual data of the flood which occurred on 21 February, 2005, after the completion of the Stage I project (during Stage II implementation period)⁵. According to this, as a result of river improvement works of the project, the Citarum River has gained its river flow capacity corresponding to 5 year-return period (510m³/s). (The project aimed to decrease flooded areas from 10,082 ha (before the project) to 2,948 ha (after the project) in case of flood incidence of 5 year-return period.)

Table 6: Comparison of the Project's Flood Control Plan and the Actual Flood Data on 21 February, 2005

5-year return period flooding (plan)	Flooded area before the project	Flooded area after the project
		10,082ha



	Maximum flow	Highest water level	Flooded area
Actual flood data on Feb. 21, 2005	572m ³ /s (actual data, corresponding to 10-yr period)	660.95m ³ /s (actual data in Dayeuhkolot area)	1,191ha (actual data)
Plan for 5-year return period flooding after the project	510m ³ /s	659.50m ³ /s	2,948ha

It became clear that the flood on 21 February, 2005 was 10-year return period flood, not 5-year period flood as planned for the project, when taking into account of its maximum flow of the Citarum River (572m³/s). The highest water level during the flood in Dayeuhkolot area was 660.95m³/s, exceeding the maximum safe water level of 5-year probability flood (659.50m³/s). The flooded water level in the area was recorded as 1.45m. The flooded area of the 21 February, 2005 flood (corresponding to 10-year return period flood) was 1,191 ha, which was less than that of the planned area for 5-year return period flood (2,948ha). That means the project has achieved its target and has

⁵ The Stage II project completed on December 2007, however, the flood data in 2005 was used by necessity – dealing with natural disaster brings about an issue of data availability.

secured flood control effectiveness. (The flood occurred in 2010 gave severe damage because of the heavy amount of rainfall – the flood seems to have exceeded the scale of 5-year return period.)

3.3.1.2 Results of Calculations of Internal Rates of Return (IRR)

Economic Internal Rate of Return

Based on the cost and benefit data obtained from the Citarum River Basin Office, the economic internal rate of return (EIRR) was recalculated. The Citarum River Basin Office is the local office of the executing agency, DGWRD.

Table 7: Assumption and Results of EIRR Recalculation

	At time of Appraisal	At time of Evaluation
EIRR	16.7% (Figure at the time of Stage I appraisal) 15.1% (Figure at the time of Phase II appraisal: for the entire Project including Stage I)	16.99% (Fro the entire Project – Stage I and II)
Benefit	Expected amount of direct flood damages mitigated (each asset and product) and expected increase of revenue (increase in land value, etc.)	Expected amount of direct flood damages mitigated (each asset and product) and expected increase of revenue (increase in land value, etc.)*
Cost	Construction cost, consulting service cost, land acquisition cost, general administration cost, contingency and O&M cost (excluding tax and price escalation)	Construction cost, consulting service cost, land acquisition cost and O&M cost (excluding general administration cost, tax and price escalation)**
Project Life	50 years after project completion	

* Utilized the same assumption with that at the time of appraisal for percentage of rise.

** Because reliable total project cost and the amount of annual expenditures were not available, recalculation was made based on the data provided by Citarum River Basin Office, excluding general administration cost, tax and interest.

The recalculated figure became a little higher than the one at time of the appraisal. This was primarily because general administration cost, tax and interest, which were unavailable costs, were excluded from the calculation, leading to higher EIRR value. If these costs, which act on reducing the EIRR, were included in the recalculation, the EIRR value would presumably become less than 16.99%. The main reason is the increase of the amount of compensation caused by the rise in land price. According to the Citarum River Basin Office, the land acquisition cost had soared to more than 4 times compared to the original estimation in 6 years from 1998 to 2004.

3.3.2 Qualitative Effects

3.3.2.1 Mitigation of Flood Damage

The result of the interview survey to local residents⁶ and the local NGO⁷ in the project area

⁶ The interview survey was conducted to 5 farmers (who belong to the GEMAS, a local agricultural community) in Solokan Jeruk village in the project area (along the Citarum and the Citarik River), 3 residents who are

shows that they are satisfied with the mitigation of damage from flood through the project, and they have expressed sense of security. The five rural villages in the project area (Solokan Jeruk, Langan Sari, Cibodas, Padamukti, Sangiang) have suffered water inundation of 0.5 to 1 meter for every concentrated heavy rains lasting two hours or more, before the implementation of the project (Stage II). (It took two or three days to recover in case when the damage was relatively small, and it took several weeks in case the damage was severe.) However, after 2008, when the Stage II project was completed, concentrated heavy rain did not caused any flood damage, according to the interviewees. The water level of the Citarum River in Solokan Jeruk village was reaching to the top of the embankment when heavy rain occurred in August 2010, and residents pointed out that if the project had not been implemented, the village would have been affected.

On the other hand, at the Cieunteung village (located in the project area for expected Stage III project), the elementary school was closed down because it suffered damage from flooding (2 to 3m inundation) for five months, and the inflow of sediments due to the heavy rain in August 2010. The school had to move to another area because of the damage – the school building which encountered damage is still not used.

This project has largely achieved its objectives, therefore its effectiveness is high.

3.4 Impact

3.4.1 Intended Impacts

3.4.1.1 Improvement of Living Environment of the Upper Citarum River Basin

The result of the interview survey to local residents in the project area and the above-mentioned NGO (PKK DAS Citarum) on the living environment after the project completion is summarized as follows. They have all expressed their satisfaction with the improvement of living environment, especially with the enhanced travel convenience due to the construction of access roads and bridges.

- Effects on health and sanitation have improved due to the alleviation of flood damage
- Residents can lead a life without worrying about flood, and safety of living environment has improved
- Travel convenience has enhanced due to the construction of access roads and bridges
 - Travel time has reduced.
 - Transporting materials has become easier.
 - Socialization among different villagers has been facilitated
- New residential areas were developed after the implementation of the project

engaged in forestation activities in Dayeuhkolot area, and 2 residents in the Cieunteung village where it was not included in the project target area (the village is expected to be included in the Stage III project area).

⁷ Interview survey was conducted to the local NGO (PKK DAS Citarum) which plays an active role in the environmental conservation activities in the Citarum River. The NGO was established in 2008, consisting of local residents group to undertake environmental conservation activities for the Citarum, the Cisangkuy, and the Citarik Rivers. There were 142 members at time of the ex-post evaluation. In collaboration with the Citrum River Basin Office, the NGO conducts activities including monitoring of the river conditions, education activities to the residents and forestation for river conservation.

The results of the interview survey to the executing agency are summarized as follows. It is confirmed that their responses are consistent with the interview results to residents and local NGOs.

- Land price has increased due to the improvement of land use in the project area
 - Access roads and bridges have improved transportation mobility, and new houses and stores were created in empty lands
 - Residents have started to grow plants along the river bank



Access road constructed under the project



Open land created by change of river alignment

3.4.1.2 Acceleration of Economic Development of Upper Citarum River Basin

There is no clear correlation between the trend in the regional macro data and the project, therefore, it is difficult to measure its effect based on the changes in regional indicator values. However, Bandung City has been playing a significant role as the bases for economic and social activities with about 8% annual GRDP growth and more than 1% population growth recently. Thus, it can be regarded that the project has been contributing to the regional economic development.

Table 8: Population, Population Growth Rate and GRDP Growth Rate of West Java Province and Bandung City

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Population of West Java Province (1,000)	35,500.6	36,075.3	37,291.9	38,132.4	39,140.8	39,960.9	40,737.6	41,483.7	42,194.9	42,694.0
Population growth of West Java Province (%)		1.59	3.26	2.20	2.58	2.05	1.91	1.80	1.69	1.17
GRDP growth rate of West Java Province (%)	4.15	3.89	4.14	5.12	5.94	5.60	6.02	6.48	5.84	4.29
Population of Bandung City (1,000)	2,141.8	2,146.4	2,211.6	2,248.8	2,290.5	2,315.9	2,340.6	2,364.3	2,390.1	2,414.7
Population growth of Bandung City (%)		0.21	2.95	1.65	1.82	1.10	1.06	1.00	1.08	1.02
GRDP growth rate of Bandung City (%)	5.41	7.34	6.82	7.34	7.49	7.53	7.83	8.24	8.17	8.34

Source: BPS-Statistics of West Java Province and Bandung City

3.4.2 Other Impacts

3.4.2.1 Impacts on the Natural Environment

The Environmental Impact Assessment (AMDAL) was conducted from 1992 to 1993 as a part of the detailed design of the Engineering Service Yen Loan project: “Irrigation and Flood Control Restoration Project (IP-347)”, and the approval was given from the Ministry of Public Works in June 1993. An environmental study was additionally conducted in 1999 as the AMDAL for Stage II project, and the Environmental Management Plan (RKL) and Environmental Monitoring Plan (RPL) were revised accordingly (especially the existing plan for monitoring and management of rivers was revised). In addition, the AMDAL for the upper streams was conducted in 2008 based on the regulations of the government. This was the study for the Stage III project, which is expected to be implemented in future.

The effects on natural environment have not been observed during the construction and after the project completion, as a result of interview survey from residents and the local NGO. The results of the environmental monitoring (below) show no particular effects on natural environment.

- Water Quality: No particular effect has been reported and no complaint from residents has been heard
- Treatment of dredged sediments: Part of dredged sediments has been used for earth fill in the surrounding community. The suspected sediments with heavy metal content are used as soil in bamboo grove, after abandoned in isolated area (based on the directions of the governor of West Java Province). Monitoring has been conducted in order to contain the pollution and no particular problem has been reported
- Land subsidence: Land subsidence due to excavation of water channel has not been reported
- Impacts on flora and fauna: No particular effect has been reported. The project area is located in the urban area, not in ecological preservation area
- Impacts on landscape and geology: No particular effect has been reported. (Surveys have been conducted 3 times: in November 2006, May and November 2007, respectively)

No particular problem has been observed during the construction, because the Citarum River Basin Office has given environmental guidance to the contractors, and the contractors have taken necessary mitigation measures. As concrete measures, watering was conducted to mitigate dust and sediments were removed during the construction (at the time of Stage II, sediments were removed from the rivers which had been improved under Stage I project).

The Citarum River Basin Office autonomously carries out empowerment programs (3R activities, forestation, environmental education etc.) to local residents, and supports environmental activities undertaken by the local NGO as part of their CSR efforts – continuous efforts are made in order to enhance project effectiveness. These initiatives have greatly contributed to awareness-raising of residents on river conservation. As an example, all the residents who have been interviewed have shown high consciousness toward environmental issues, and have been participating in activities such

as forestation and environmental education to local elementary school children to conserve the Citarum River basin.

These basin conservation and environmental activities by the Citarum River Basin Office have contributed to establish and maintain good relations with local residents and NGO. These initiatives have also contributed to enhance sustainability of the project, and are noteworthy as they set a good practice case.

It should be noted that the local NGO has pointed out the necessity to take comprehensive approach with the cross-ministerial collaboration in order to achieve sustainable river conservation in the area ⁸.

3.4.2.2 Land Acquisition and Resettlement

The comparison of areas of land acquisition between plan and actual is summarized in the table below. The actual areas acquired were about two times as planned for Stage I, and about 1.6 times as planned for Stage II ⁹. It is regarded that the increase is caused by the additional scope for the improvement works of the Citarum River and its tributaries.

Table 9: Comparison of Areas of Land Acquisition

	Planned	Actual
Stage I	44 ha	91.7 ha
Stage II	89 ha	141.6 ha

Source: Citarum River Basin Office

According to the interview survey with the Citarum River Basin Office, no particular problem on the direction and the process has been observed for land acquisition and compensation – appropriate process has taken place including public hearing and consultation with residents, based on the Indonesian regulation. A land acquisition committee, called “Committee 9”, in which the executing agency became the responsible agency, was established to proceed with the land acquisition process. Its member of the Committee was composed of those related to local governments and police departments.

According to the Citarum River Basin Office, it took time to negotiate with residents on the amount of compensation and to secure necessary budget, however, it did not become a substantial problem. (No particular opposition from residents was shown for the project implementation and resettlement. It took time to reach agreements with residents because the gap between the market price and the government’s price used as the base value for calculating compensation were significantly large.)

⁸ While these various initiatives are undertaken by the Citarum River Basin Office, some factories in the Majalah Area where textile factories are concentrated, discharge untreated chemical substance to the river, causing skin diseases to the residents and creating environmental problems.

⁹ The executing agency does not have the record of the number of resettled households, thus it cannot be confirmed for both Stage I and II.

According to the Citarum River Basin Office, resettlement action plan was not prepared because each resident was to resettle to the nearby places on their own with the compensation they received, instead of having been developed alternative lands for them to live. Those residents have been informed in advance and have agreed upon through public hearing regarding the resettlement. Because most residents who resettled moved to the nearby places with no change in their livelihood, no specific measure for livelihood program was provided. No particular problem has seen for resettlement of public facilities, such as schools, mosques and churches.

No particular issue was pointed out by resident and local NGO on land acquisition during the interview survey at the project site.

Thus, the project is deemed as to have yielded a significant number of positive impacts while curbing negative impact on the natural environment, resettlement and land acquisition.

3.5 Sustainability (Rating: ③)

3.5.1 Structural Aspects of Operation and Maintenance

The operation and maintenance of the project is also undertaken by the Citarum River Basin Office. Under the organization, operation and maintenance section is deployed along with the planning section and the construction section. At the time of ex-post evaluation, total number of operation and maintenance staffs was 35. There is no particular problem observed in the structural aspects – planning, implementation, and operation and maintenance are placed under the same organization, and mechanism that enables decision making through coordination among each section is established, according to the Citarum River Basin Office.

Among 35 operation and maintenance staffs, 5 are sedentary managers, and 30 are technical staffs in charge of actual operation and maintenance in the field. The technical staffs have average of 10-year experience in this area, and the number of staffs is constant for the past several years¹⁰. At present, the number of operation and maintenance staff is not necessarily sufficient in consideration of the vast area of the river basin, as a result of interview survey from the Citarum River Basin Office staffs. However, major rehabilitation project utilizing national budget has been approved, and there is a firm perspective that necessary staffs would be deployed for the project.

While the Citarum River Basin Office is in charge of the whole watershed management of the Citarum River (river bank, water gates, automated water gage, irrigation water channel management), Jatiluhur Public Corporation (Perum Otorita Jatiluhur: POJ)¹¹, which possesses Jatiluhur multiple purpose dam and hydroelectric power plant, Jatiluhur irrigation facilities etc., is in charge of water supply management of the river (water supply to Jakarta, and design and implementation of water

¹⁰ The Citarum River Basin Office directly conducts the operation and maintenance of the project. (As for large-scale dredging works, it outsources to contractors every year.)

¹¹ It is established in 1970 with the objective of water resource management in the Citarum River basin and is directly under the control of the Minister of Public Works. It manages 21 dams along the river and the operation and maintenance works of the related facilities including irrigation canal in an integrated manner, and its financial source comes from water charges and so on.

demand and supply plan in response to intended purposes such as irrigation and power generation) and operation and maintenance of their own facilities. Both organizations undertake the management of the Citarum river basin in close cooperation – they hold coordination meetings every three months. No particular problem is observed on their cooperation and coordination.

3.5.2 Technical Aspects of Operation and Maintenance

During the project implementation, training to the operation and maintenance staffs of the Citarum River Basin Office did not place by the consultants. Guidelines and manuals have not been prepared for operation and maintenance works. Standard operation procedure for operation and maintenance works has not been followed thoroughly, which remain an issue.

According to the Citarum River Basin Office, after the project completion, there is a plan to train 30 operation and maintenance staffs as its own initiative within the year of 2011. Classroom lectures, inviting visiting lecturers, and OJT will be conducted. The contents would be operation and maintenance works for dams, weirs, irrigation facilities and so forth. While the training will be held on ad hoc basis according to needs, training on a regular basis is considered to be necessary, from the result of the interview survey where necessity to strengthen technical capacity of operation and maintenance staffs have been pointed out.

3.5.3 Financial Aspects of Operation and Maintenance

The operation and maintenance costs associated with the project are first estimated by the Citarum River Basin Office, then estimation will be reviewed by the DGWRD in Jakarta. Once approved, the budget is drawn out from the headquarters’ ordinary budget and allocated to the Citarum River Basin Office.

The total requested operation and maintenance costs (excluding personnel expenses) for the entire Citarum River Basin Office in 2010 was IDR 8,550 million whereas the actual allocation was IDR 6,190 million (72.4% of requested amount). The Citarum River Basin Office gives priority to allocate its budget to the operation and maintenance work concerning flood control, which is regarded as the primary importance – maintenance of pump station, weir, and water gate, as well as removal of sediments and wastes in the surrounding areas. In case of an emergency maintenance after flood, emergency budget is secured in the annual budget, to be allocated according to need.

Table 10: Annual O&M Budget Allocation to Entire Citarum River Basin Office

Year	Requested Amount (IDR)	Allocation (IDR)
2008	7,590,935,000	7,235,648,175
2009	6,637,163,000	5,827,635,950
2010	8,549,585,500	6,191,663,200

Source: Citarum River Basin Office

In light of the strategic importance of the Citarum River in Indonesia (water supply to capital, Jakarta) and urgency of undertaking operation and maintenance measures, three-year major

rehabilitation project (2011 to 2013), which covers the entire Citarum River (upper, middle and downstream), has been approved, and thus, large-scale national budget over two or more fiscal years was secured¹². Extensive dredging as a measure to remove sedimentation will be conducted in the rehabilitation project. Hence, the capacity of the original river flow of the Citarum River is expected to recover or effects beyond this may come out through the rehabilitation.

Table 11: Budget for Large-scale Rehabilitation Project for Citarum River (already secured)

Year	Budget (IDR)
2011	144,000,000,000
2012	400,000,000,000
2013	900,000,000,000

Source: DGWRD, Ministry of Public Works

The actual dredging work in the field will be outsourced to contractors, and the Citarum River Basin Office will develop necessary institutional mechanism for this.

In view of the fact that large increase of budget was approved officially for the major rehabilitation project and selection process of contractors is proceeding, it can be regarded that “solid prospects exist to secure budget for appropriate operation and maintenance”.

3.5.4 Current Status of Operation and Maintenance

According to the Citarum River Basin Office, river channel dredging has been implemented periodically (monthly dredging conducted around the flood control related facilities, and annual dredging conducted in large-scale by outsourcing). However, due to the budget constraint, it was limited to the areas of high urgency. (According to the Citarum River Basin Office, since the Citarum River and its tributaries are located in a basin, with a topographical feature easy to accumulate sedimentation, sediments seem to have already compiled for an average of 2m in the river channel where Stage I and Stage II projects have been completed.) However, as mentioned above, large-scale rehabilitation project has been approved, and there is a solid prospect of solving the critical issues of sedimentations.

Local NGO members and residents in the project area who have been interviewed all pointed out the urgency of resolving the sedimentation issues – its significance was confirmed by the visual check during the site survey. In addition, the underutilization of empty land which was created by changing the river alignment from S-shape to straight line was confirmed during the site investigation. Conservation and utilization of the former river channels are also needed for environmental protection purpose.

¹² According to the DGWRD, Ministry of Public Works, the concept/plan for the major rehabilitation project have been under consideration from the past in view of the strategic importance of the Citarum River in Indonesia. It was pointed out that the preparation for the expected Stage III project may have pushed up the approval process in the government. According to the DGWRD, 2 other rivers have been approved their budget to implement major rehabilitation projects; 1) the Ciliwung-Cisadane River, which flows through the center of Jakarta, and 2) the Bengawan Solo River, which is the longest river in Java Island and flows from the Middle Java to the East Java.

According to the Citarum River Basin Office, lack of guidelines and manuals for the operation and maintenance works, and deficiency of facilities which are necessary for appropriate maintenance work are the issues to be tackled with. Concretely, lack of water pump stations, lack of automatic water gages for early warning system (4 of them have been installed, however, it should be increase to at least 15), water leakage in the rubber dam and so on are pointed out.

The Citarum River Basin Office presently faces issues to overcome for sufficient operation and maintenance, however, these issues are expected to resolve in the course of implementing the major rehabilitation.

Some problems have been observed in terms of technical aspects of operation and maintenance, however, solid prospects exist to secure high sustainability of the project effect.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

Mitigation of flood damage in the project area has been achieved through the project's river bank reinforcement works. The project has also contributed to the improvement and enhancement of the people's livelihood and the economic development. In view of this, the project is deemed as to have yielded a significant number of positive effectiveness and impacts. The river basin conservation activities undertaken through close coordination between the executing agency and local residents are noteworthy as they set a good practice case. The project objective to contribute to the reduction of flood damage, stabilization and enhancement of people's livelihood, and promotion of local economy is consistent with Indonesia's development plan and development needs, both at the time of appraisal (1993/1997) and the ex-post evaluation (2011), as well as Japan's ODA policy at the time of appraisal, therefore its relevance is high. Project efficiency is fair because while the yen loan portion of the project cost was within the plan, the project period was exceeded. As regards operation and maintenance, some problems have been observed in terms of technical aspects; however, solid prospects exist to secure high sustainability of the project effect.

In light of the above, this project is evaluated to be highly satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

Importance of maintenance

Since the Citarum River and its tributaries are located in a basin with a topographical feature easy to accumulate sedimentation, it is important that the executing agency periodically takes measures to remove sediments in order to secure sustainability after the project completion. Due to the budget constraint, the Citarum River Basin Office could take measures to remove sedimentation to limited sections with high urgency after the project completion. However, three-year major rehabilitation project (2011 to 2013), which covers the entire Citarum River, has been approved, and thus, large-scale national budget over two or more fiscal years was secured. In addition to the fact that

the Citarum River has a strategic importance in Indonesia, continued efforts by the executing agency to secure operation and maintenance budget from the Ministry of Public Works, and the preparation process for the expected Stage III project seem to have contributed to the realization of the rehabilitation project. Therefore, continued efforts by the executing agency is important so as to properly plan, secure budget and develop implementation structures to undertake maintenance activities, including removal of sedimentation, in order to enhance sustainability after project completion. In addition, as mentioned below, with respect to river conservation activities, which the executing agency has been tackling in close coordination with resident organizations and local NGO, as well as forest conservation activities which would reduce sediment itself, it is crucial to formulate structures that would enable to reflect local voices property to the administration.

4.2.2 Recommendations to JICA

Importance of developing and managing indicators and data on project effects and flood damage

Unlike other infrastructure projects such as transport projects, flood control projects have an inherent difficulty to clearly grasp their effectiveness before and after the project. For this reason, it is important that project effect is indicated quantitatively, and development and management of flood damage data before project implementation is critical. From the time of project preparation stage, JICA should pay attention to and follow-up with the executing agency and other relevant organizations so that they can develop measurable, appropriate operation and effect indicators, and consistently collect and manage indicators and data throughout the project and after its completion. The following can be considered as examples of possible operation and effect indicators.

- Annual maximum flow (m^3/s)
- Flood damage in the project area (flooded area, number of inundated houses, number of affected people, cost of flood damage)
- Rainfall data at the time of flood (cumulative precipitation)

4.3 Lessons Learned

In order to enhance project sustainability, it is important to undertake river conservation activities from a standpoint of comprehensive development of the Citarum River Basin. In Indonesia, the New Water Resources Law was enacted in March, 2004. The Law specifies the entire water resources sector comprehensively, and the actual enforcement of the Law is defined through its administrative instructions. In order for the executing agency and local government to plan and draw up suitable water resource related policy and to promote comprehensive water resources management, cooperation among related sector ministries is important, and institution building and enhancement based on such legal framework and related regulations is crucial. For example, while maintaining continuous cooperation and coordination with the Ministry of Environment, it is important to advance institutional mechanism for relevant ministries and agencies to cooperate and cooperate in their responsibility, and promote river conservation effectively – Ministry of Industry in charge of taking measures for industrial wastewater treatment in the area where textile factories concentrate, Ministry

of Forestry in charge of forestation, Ministry of Agriculture in charge of agriculture and irrigation, Ministry of Health in charge of public health and sanitation etc.

For similar projects of this type – flood control and river improvement projects – participatory approach for project formulation and implementation is important. In the Citarum River basin, river conservation activities have been conducted actively by local residents – several community organizations and NGOs exist with the aim of undertaking such activities. The Citarum River Basin Office, which is in charge of operation and maintenance of the project, has established and maintains good relations with local residents and NGOs, and carries out various programs with them as part of their CSR efforts. These participants have been greatly contributing to the enhancement of the project effects and sustainability through providing constructive recommendations and inputs to the administration by gathering various local needs in a systematic manner. Therefore, it is important to develop a mechanism in which such community organizations and NGOs participate in project formulation for similar projects of this type, such as flood control and river improvement, and their voice to be reflected towards more effective project implementation. (For example, recommendation from local residents on the issues of effective land uses – utilization of newly created land as a result of alignment change of the river, promotion of grass-roots initiatives for water quality conservation, environmental protection, and disaster prevention etc.)

Moreover, in similar yen loan projects, incorporating “participatory type” activities in the project component would be one option, so that community organizations and NGOs can participate in the project monitoring and river conservation activities in collaboration with the executing agency/operation and maintenance agency during the project implementation and after the completion.

End

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Project Outputs	<p>Stage I:</p> <p>1) Improvement works of Citarum River: approx. 23.5km</p> <p>2) Construction of supplementary facilities (including access road and bridges)</p> <p>Stage II:</p> <p>1) Improvement works of Citarum River and its tributaries (Cisangkuy, Citarik, Cikeruh and Cisaranten): approx. 51km</p> <p>2) Construction of supplementary facilities (including access road, bridges and weir)</p> <p>Consulting Service</p> <p>Stage I: Construction supervision, F/S review and detailed design 362M/M</p> <p>Stage II: Construction supervision and detailed design 324M/M</p>	<p>Stage I:</p> <p>1) Improvement works of Citarum River and its tributaries: approx. 23.5km + 6.8km</p> <p>2) Construction of supplementary facilities (including access road, bridges and telemetering for flood warning system)</p> <p>Stage II:</p> <p>1) Improvement works of Citarum River and its tributaries (Cisangkuy, Citarik, Cikeruh and Cisaranten): approx. 63.6km</p> <p>2) Construction of supplementary facilities (including access road, bridges and weir)</p> <p>Consulting Service</p> <p>Stage I: Construction supervision, F/S review and detailed design 676.7 M/M</p> <p>Stage II: Construction supervision, detailed design and review of flood control plan 1,150.85 M/M</p>
2. Project Period	<p>Stage I: Oct. 1993 – Dec. 1997 (51 months)</p> <p>Stage II: Nov. 1997 – Apr. 2003 (66 months)</p> <p>Total: 117 months</p>	<p>Stage I: Nov. 1993 – Oct. 1999 (72 months)</p> <p>Stage II: Jan. 1998 – Dec. 2007 (120 months)</p> <p>Total: 192 months</p>
3. Project Cost	<p>Amount paid in Foreign currency 5,407 million yen</p> <p>Amount paid in Local currency 5,705 million yen</p>	<p>Amount of total project cost was not available at Ex-post Evaluation.</p>

Total Japanese ODA loan portion	(106,343 million IDR) 11,112 million yen 7,887 million yen	7,206 million yen
Exchange rate	Stage I: 1 IDR = 0.059 yen (As of Apr. 1993) Stage II: 1 IDR = 0.052 yen (As of Apr. 1997)	Stage I: 1 IDR = 0.029 yen (Average between 1994 and 1999) Stage II: 1 IDR = 0.013 yen (Average between 1999 and 2007)

End