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 5,633m³; 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/5,231million 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: C[2])

3.1 Relevance (Rating: ③[3])

3.1.1 Relevance with the Development Plan of Indonesia

At the time of the appraisal, a national paln “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 Project[4]), a JICA loan project following the completion of this project, has been implemented. In addition, the implementation of the Phase III Project[5] 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: 1,717.6ha	1) Denpasar: 520.0ha 2) Sanur: 330.0ha 3) Legian and Seminyak (Kuta's alternative): 295.0ha Total: 1,145.0ha
<Sewer Pipe Lines>	
- Secondary & Tertiary Sewer Pipes[6] 1) Denpasar: 126.02km 2) Sanur: 32.72km 3) Kuta: 17.60km Total: 176.34km - Main Sewer Pipes[7] 1) Denpasar: 15.14km 2) Sanur: 4.31km 3) Kuta: 11.20km Total: 30.65km - Conveyance Sewer Pipes[8] 1) Denpasar: 4.39km 2) Kuta: 1.20km Total: 5.59km - Force Main Pipes[9] 1) Sanur: 5.16km 2) Kuta: 5.20km Total: 10.36km	- Secondary & Tertiary Sewer Pipes1) Denpasar: 77.01km 2) Sanur: 30.70km 3) Legian and Seminyak (Kuta's alternative): 19.8km Total: 127.60km - Main Sewer Pipes 1) Denpasar: 23.70km 2) Sanur: 9.40km 3) Legian and Seminyak (Kuta's alternative): 11.40km Total: 44.5km - Conveyance Sewer Pipes 1) Denpasar:0km 2) Legian and Seminyak(Kuta's alternative): 0km Total: 0km - 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 Depasar 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: 8.80km
<Pumping Stations>	
1) Booster (relay) Pump Station[10] Sanur x 1, Kuta x 1 (Total: 2 stations) 2) Wet-pit Pump Station[11] Sanur x 2, Kuta x 2 (Total: 4 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)
<Waste Water Treatment Plant>	
Treatment Capacity: 44,000 m^3/day x 1	Treatment Capacity: 51,000 m^3/day x 1
<Consulting Service>	
Amount of M/M: 406M/M (Foreign: 121M/M, Local: 285M/M. TOR includes F/S review, detailed design implementation, bidding assistance, construction supervision/management, organization reinforcement, etc.)	Amount of M/M: 1,078M/M (Foreign: 236M/M, Local: 842M/M. TOR at the time of the appraisal was implemented as planned.)

Source: JICA documents, Answers on questionnaire

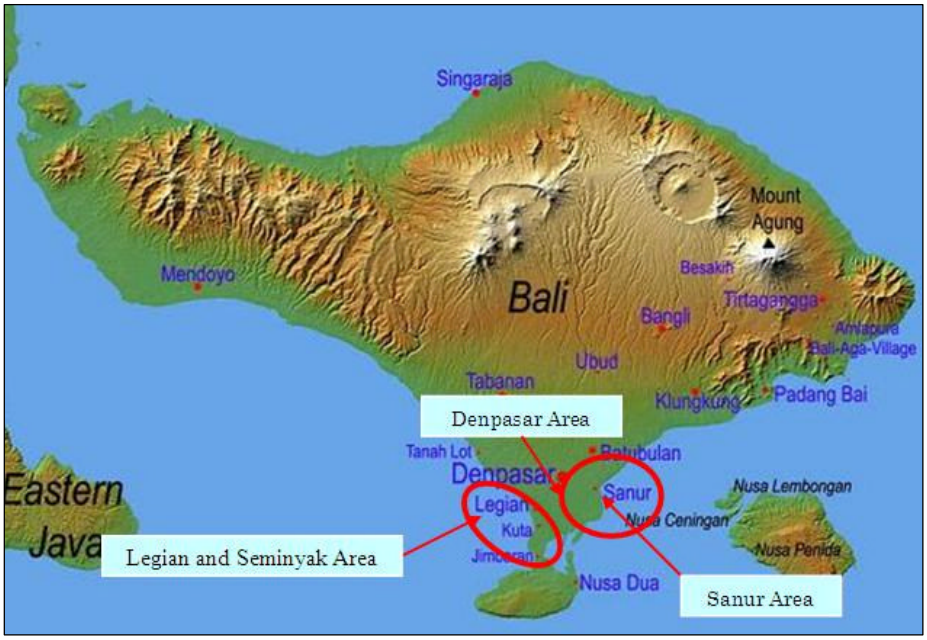


Figure 1: Project Site (1)
(Denpasar Area, Sanur Area, Legian and Seminyak [Kuta Area])

[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".

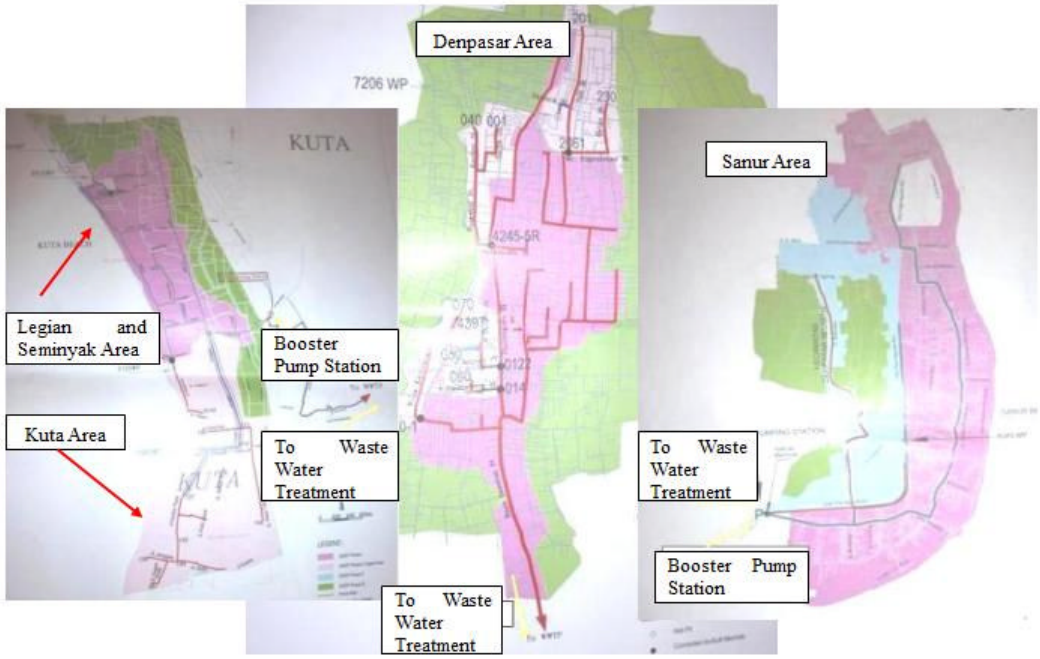


Figure 2: Project Site (2)
(Purple areas are target areas for this project [Phase I project area after scope reduction])

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 obtaied 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 m^3 per day also includes the amount of sewer water treated in the subsequent Phase II project. As of the capacity of 51,000 m^3 per day, approximately 36,000 m^3 per day[14] 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 plant[15], 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 respectively[16] 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 toook 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)

<table>
<tr><th>At the Time of the Appraisal</th><th>At the Time of the Ex-post Evaluation</th></tr>
<tr><td>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</td><td>
<table>
<tr><th>Indicators</th><th>2008</th><th>2009</th><th>2010</th></tr>
<tr><td>1) Population Treated (People)</td><td>N/A</td><td>N/A</td><td>42,155</td></tr>
<tr><td>2) Amount of Waste Water Treated (m^3/day): *Note 1</td><td>13,911</td><td>13,511</td><td>Approx. 23,000</td></tr>
<tr><td>3) Rate of Facility Utilization (%) *Note 2</td><td>27.3</td><td>26.5</td><td>Approx. 64</td></tr>
</table>
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)
</td></tr>
</table>

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 m^3 per day with approximately 23,000 m^3 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%
	Others: 1.6%
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 36,000m^3 per day, with the actual waste water treated, of approximately 23,000m^3 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 project[20] 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

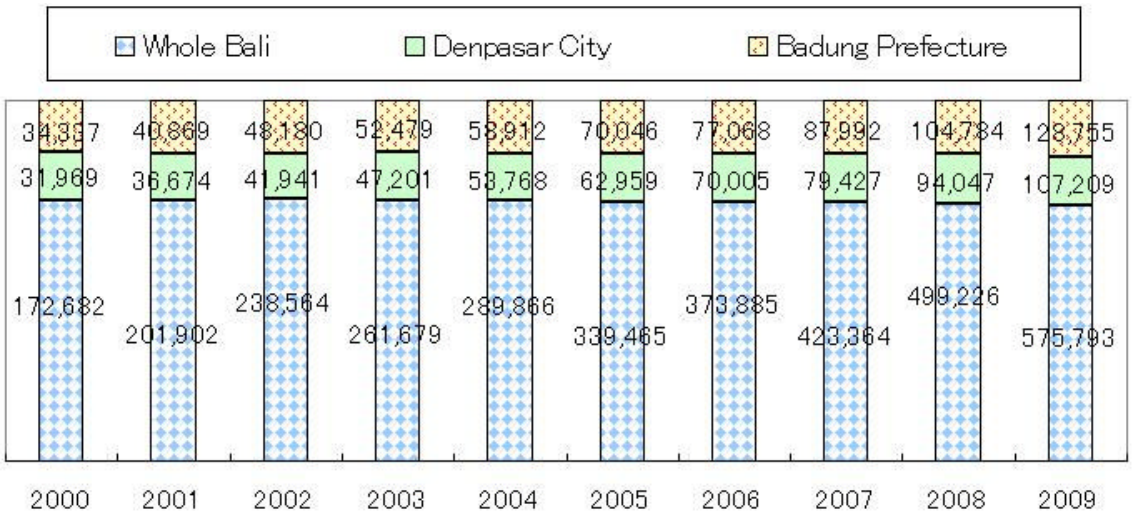
3.4.1.1 Impact on Economic Development

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 environment[21] 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 respectively[26] (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	<Sewer Service Area> 1) Denpasar: 1,038.8ha 2) Sanur: 331.8ha 3) Kuta: 355.0ha Total: 1,717.6ha	<Sewer Service Area> 1) Denpasar: 520.0ha 2) Sanur: 330.0ha 3) Legian and Seminyak (Kuta's alternative): 295.0ha Total: 1,145.0ha
	<Sewer Pipe Lines> - Secondary & Tertiary Sewer Pipes 1) Denpasar: 126.02km 2) Sanur: 32.72km 3) Kuta: 17.60km Total: 176.34km - Main Sewer Pipes 1) Denpasar: 15.14km 2) Sanur: 4.31km 3) Kuta: 11.20km Total: 30.65km - Conveyance Sewer Pipes 1) Denpasar: 4.39km 2) Kuta: 1.20km Total: 5.59km - Force Main Pipes 1) Sanur: 5.16km 2) Kuta: 5.20km Total: 10.36km	<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: 127.60km - Main Sewer Pipes 1) Denpasar: 23.70km 2) Sanur: 9.40km 3) Legian and Seminyak (Kuta's alternative) : 11.40km Total: 44.5km - Conveyance Sewer Pipes 1) Denpasar:0km 2) Legian and Seminyak (Kuta's alternative) : 0km Total: 0km - Force Main Pipes 1) Sanur: 3.90km 2) Legian and Seminyak (Kuta's alternative) : 4.90km Total: 8.80km
	<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)	<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)
	<Waste Water Treatment Plant> Treatment Capacity: 44,000 m^3/day	<Waste Water Treatment Plant> Treatment Capacity: 51,000 m^3/day
	<Consulting Service> 406M/M (Foreign: 121M/M, Local: 285M/M)	<Consulting Service> 1,078M/M (Foreign: 236 M/M, Local: 842 M/M)
2. Project Period	November 1994 to August 2001 (82 months)	November 1994 to September 2008 (167 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)