

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.

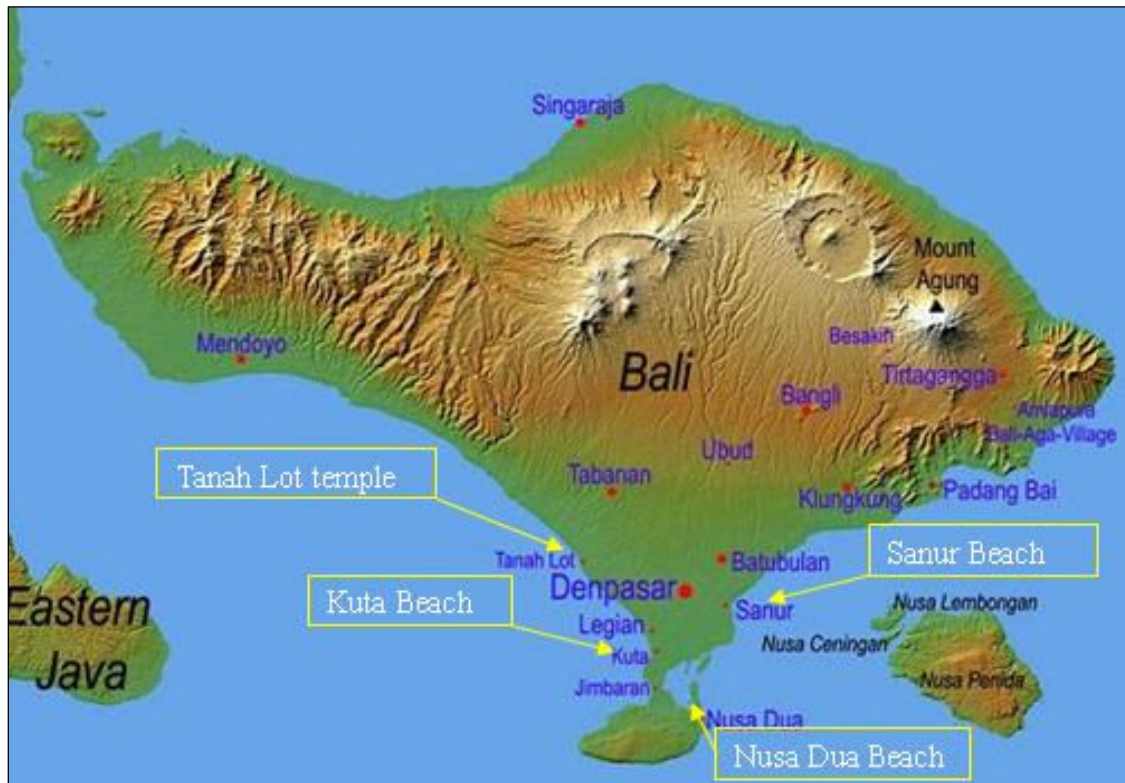


Figure 1: Project Site

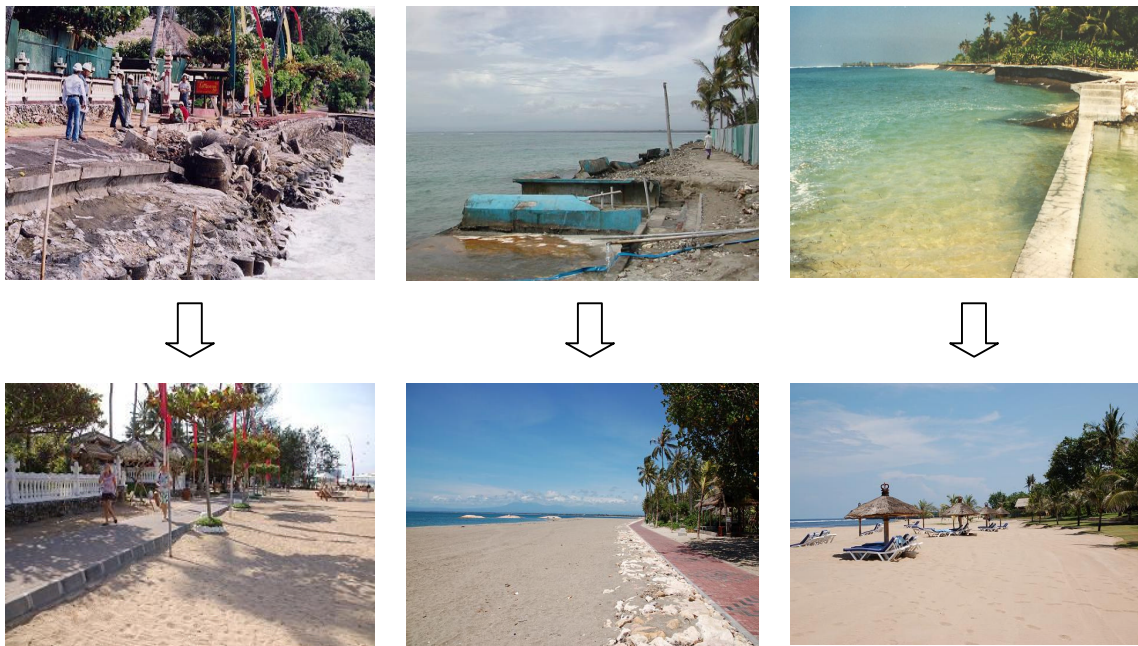


Figure 2: Change before and after the Project Implementation¹⁴
 (Left: Sanur Beach, Center: Kuta Beach, Right: Nusa Dua Beach)

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

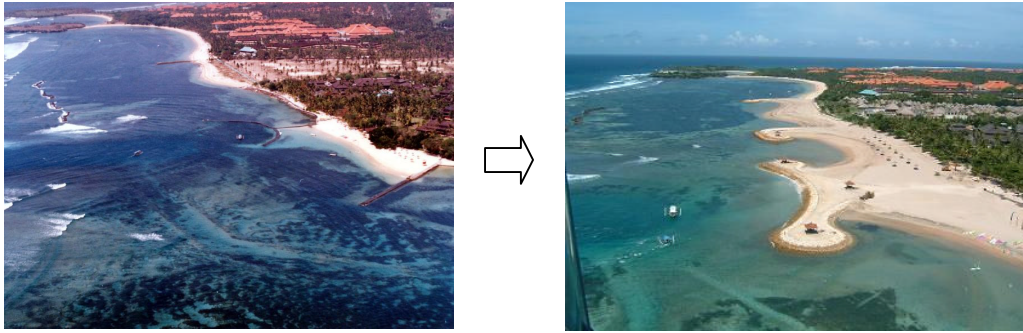


Figure 3: Change before and after the Project Implementation
(Nusa Dua Beach: Aerial Photography)

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.

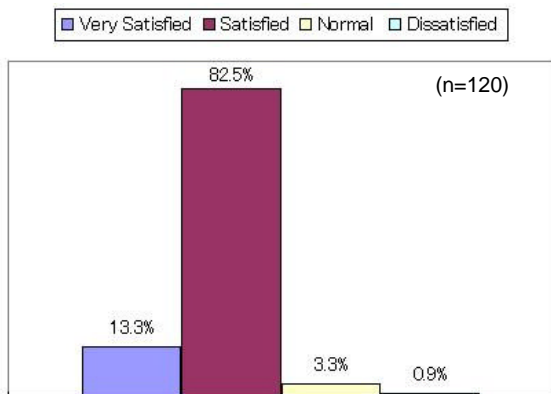


Figure 6: Are you satisfied with the coastal conservation measures (this project)?

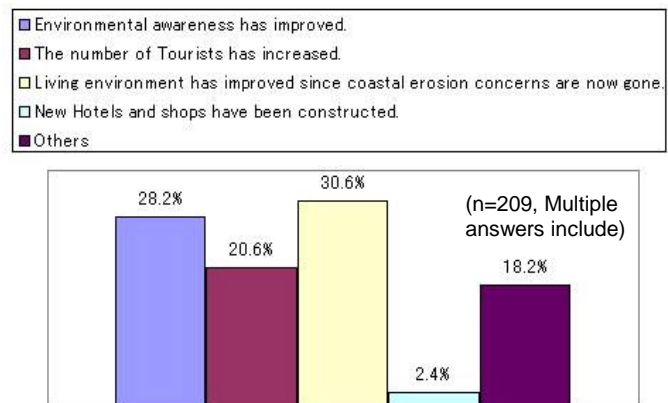


Figure 7: Reasons of “Very Satisfied” and “Satisfied” in Figure 6

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.

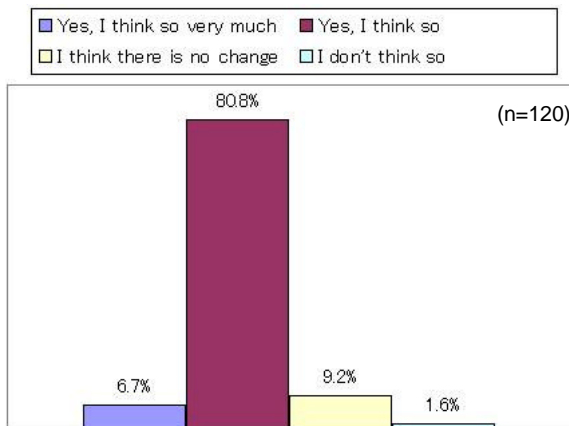


Figure 8: Do you think that Bali’s tourism resource value has improved through this project?

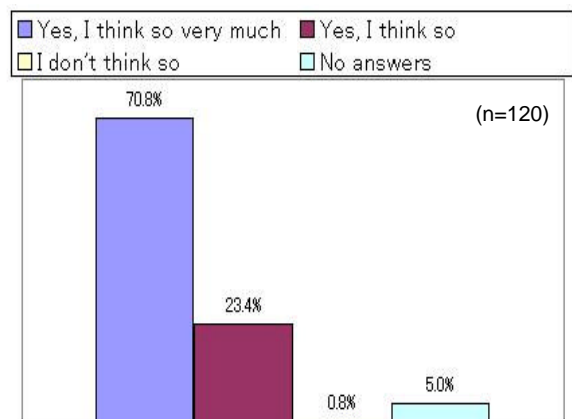


Figure 9: Do you think that coastal conservation measures continue to be necessary even in the other regions of Bali Island?

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.

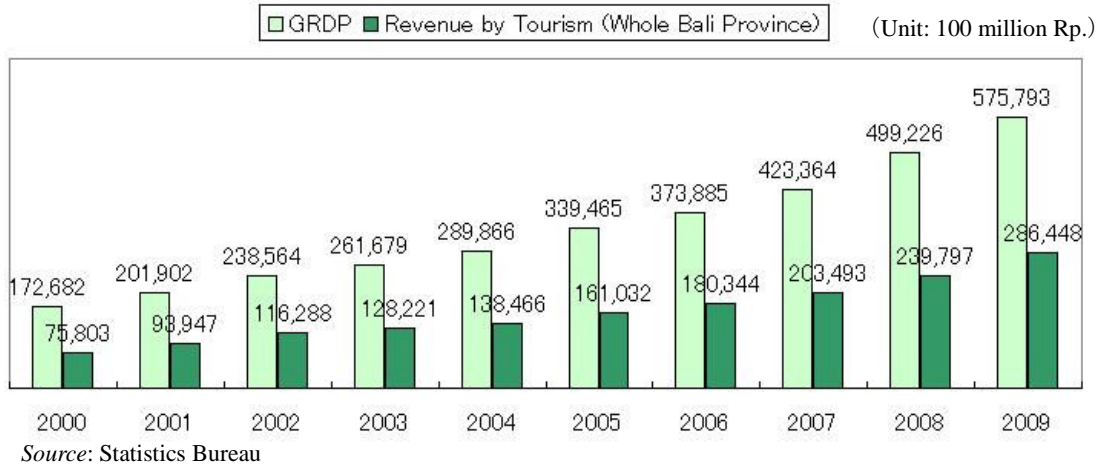
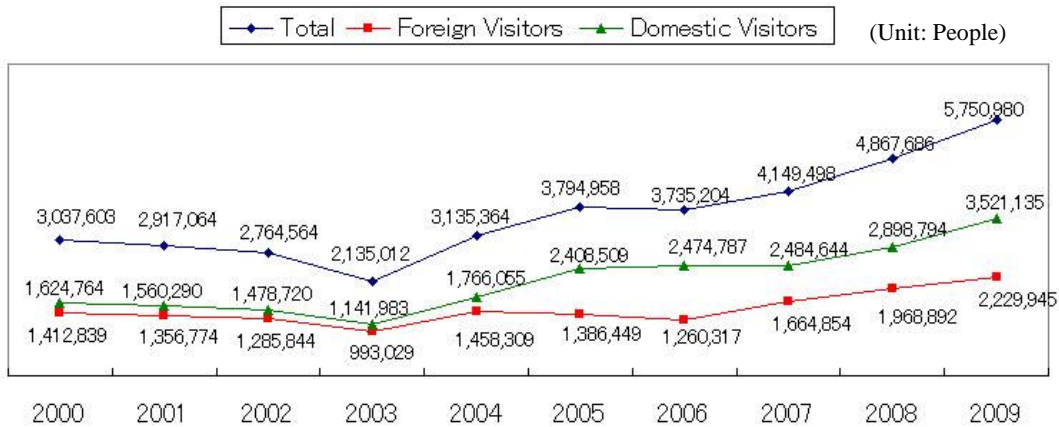


Figure 10: Transition of GRDP in Bali Province and Revenues from Tourism

(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.

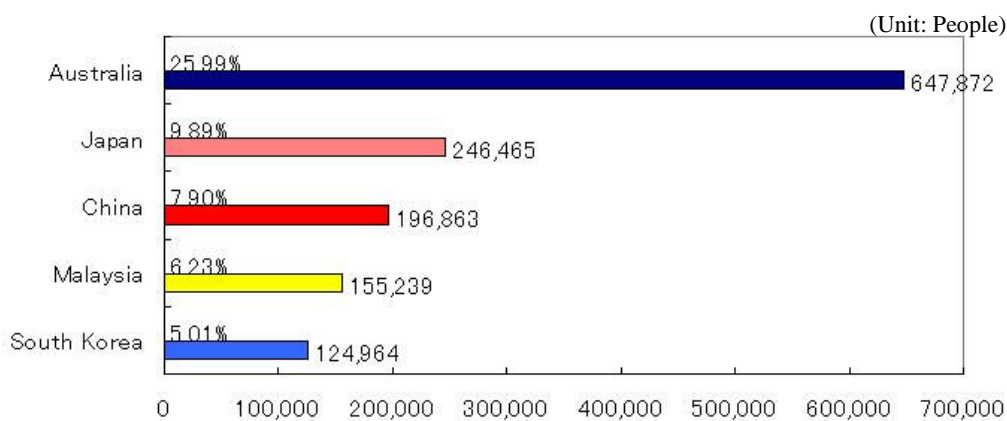
²⁵ (Reference) Indonesia's average household income is approximately 5,300 US dollars (as of 2008). The percentage of middle class/wealthy (household income of more than 5,000 US dollars) has drastically increased from 5.8% in 1990 to 39.9% in 2008. (Source: Euromonitor "World Income Distribution 2009/2010".)



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.



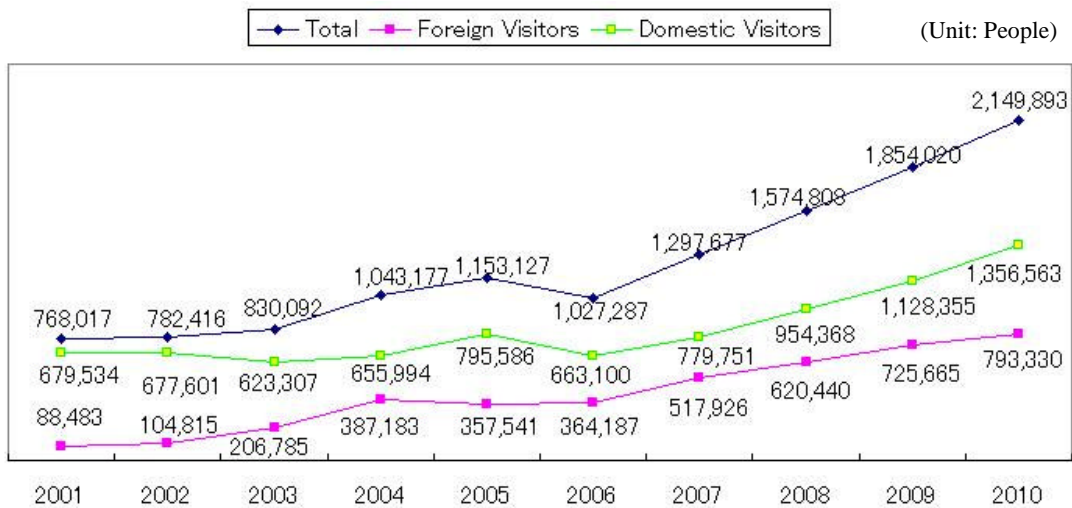
Source: Bali Tourism Bureau

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

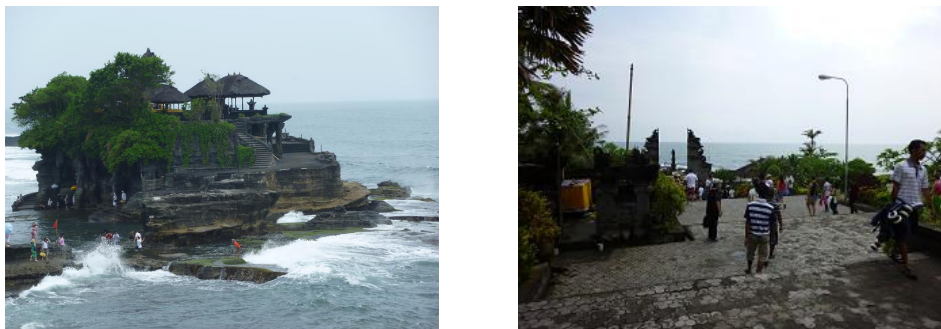


Figure 14: Tanah Lot Temple
(Left: Status after the Reinforcement Works, Right: Entrance of the Temple)

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)