Indonesia

Ex-Post Evaluation of Japanese ODA Loan

"Upper Citarum Basin Urgent Flood Control Project (I) (II)"

External Evaluator: Masumi Shimamura

Mitsubishi UFJ Research and Consulting Co., Ltd.

0. Summary

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

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

1. Project Description

Project Location

Citarum River after improvement

1.1 Background

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

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

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

1.2 Project Outline

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

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

million yen)	International (Japan)・PT. Geo Ace (Indonesia)・PT. Rayakonsult (Indonesia) ・ PT. Barunadri Engineering Consultant (Indonesia) ・ PT. Bhakti Werdhatema Konsultan (Indonesia)（JV）/ PT. Melias Kesuma (Indonesia) ・ CTI Engineering Co., Ltd. (Japan)・ Sinotech Engineering Consultant (Taiwan)（JV）	International (Japan)・PT. Geo Ace (Indonesia) ・ PT. Rayakonsult (Indonesia)・PT. Barunadri Engineering Consultant (Indonesia) ・ PT. Binatama Wirawredha Konsultan (Indonesia)（JV）
Feasibility Studies, etc.	- Feasibility Study: Upper Citarum Flood Control Study (JICA, 1988) - Detail Design: Irrigation and Flood Control Restoration Project (OECF, 1992)	
Related Projects (if any)	- Upland Plantation and Land Development Project at Citarik Sub-watershed（JBIC, 2006） - Bandung Urban Development Program (ADB, Phase 1: June, 1979, Phase 2: January, 1986) (As a part of the Phase 2 project, river improvement of the Citarum River tributaries that flow through Bandung City was conducted)	

2. Outline of the Evaluation Study

2.1 External Evaluator

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

2.2 Duration of Evaluation Study

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

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

2.3 Constraints during the Evaluation Study

None.

3. Results of the Evaluation (Overall Rating: A[1])

3.1 Relevance (Rating: ③[2])

3.1.1 Relevance with the Development Plan of Indonesia

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

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

[2] ③: High, ② Fair, ① Low

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

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

3.1.2 Relevance with the Development Needs of Indonesia

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

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

3.1.3 Relevance with Japan's ODA Policy

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

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

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

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

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

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

Planned	Actual	Comparison
Civil Works (Stage I)		
1) Improvement works of Citarum River: approx. 23.5km 2) Construction of supplementary facilities (including access road and bridges)	1) Improvement works of Citarum River and its tributaries: approx. 23.5km+6.8km 2) Construction of supplementary facilities (including access road, bridges and telemetering for flood warning system)	1) Additional scope • Additional river improvement works and removal of sediments taken place in the Citarum River tributaries (the Cipamokolan River and the Cikapundung River) to enhance project effects 2) Additional scope • Construction and improvement of access road, and installation of telemetering for flood warning system added
Civil Works (Stage II)		
1) Improvement works of Citarum River and its tributaries (Cisangkuy, Citarik, Cikeruh and Cisaranten):	1) Improvement works of Citarum River and its tributaries (Cisangkuy, Citarik, Cikeruh and Cisaranten): approx. 63.6km 2) Construction of	1) Additional scope • Additional river improvement works taken place as emergency measures against problems of land subsidence (15cm/year) between Nanjung and Dayeuhkolot areas along Citarum River

approx. 51km 2) Construction of supplementary facilities (including access road, bridges and weir)	supplementary facilities (including access road, bridges and weir)	2) As planned
Consulting Service (Stage I)		
1) Construction supervision of the Citarum River improvement works 2) F/S review and detailed design for upstream Citarum River, Citarik River and Cikeruh River	1) Construction supervision of the improvement works of Citarum River and its tributaries 2) F/S review and detailed design for upstream Citarum River, Citarik River and Cikeruh River	1) Additional scope • Additional construction supervision works conducted due to the additional scope for civil works for the tributaries (the Cipamokolan River and the Cikapundung River) 2) As planned
Consulting Service (Stage II)		
1) Detailed design of the river improvement works of the Cisaranten river 2) Construction supervision of the improvement works of Citarum River and its tributaries (Cisangkuy, Citarik, Cikeruh and Cisaranten)	1) Detailed design of the river improvement works of the Cisaranten river 2) Construction supervision of the improvement works of Citarum River and its tributaries (Cisangkuy, Citarik, Cikeruh and Cisaranten) 3) Review of flood control plan and detailed design preparation	1) As planned 2) Additional scope • Additional construction supervision works conducted due to the additional scope (river improvement between Nanjung and Dayeuhkolot areas) for civil works 3) Additional scope • Responding to serious flood occurred in February and April 2005, review and update of flood control plan and detailed design preparation conducted – the flood inundated 4,500ha with 0.5-2.0m height, forcing 14,000 people to evacuate

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

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

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

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

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

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

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

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

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

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

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

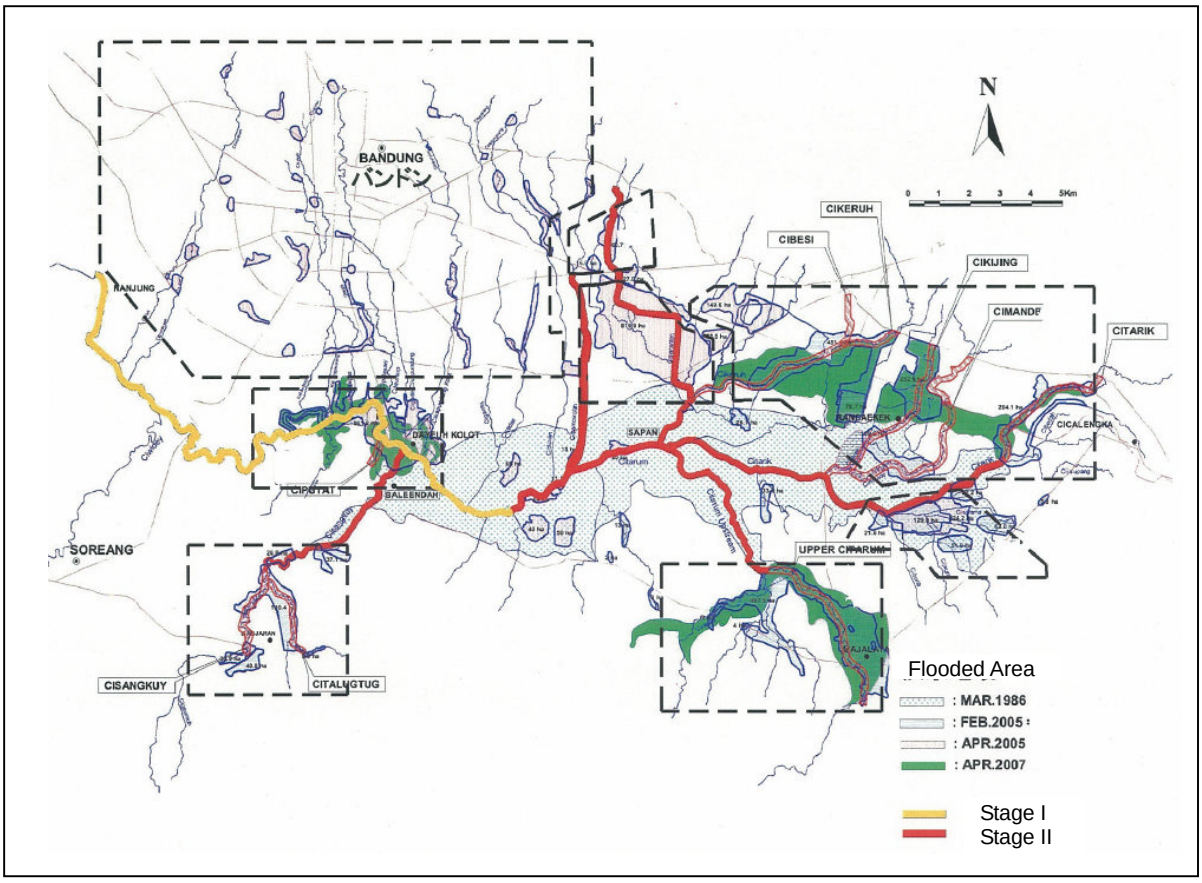

Figure 1: Project Site

Manumotive Flood Gate

River Basin near Dayeuhkolot area

3.2.2 Project Inputs

3.2.2.1 Project Cost

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

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

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

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

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

3.2.2.2 Project Period

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

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

Table 4: Comparison of Planned and Actual Project Period

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

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

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

* Project completion is considered at the time when the civil works were completed.
** Land acquisition started prior to the signing of the Loan Agreement (L/A).
*** L/A conclusion date.

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

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

3.3 Effectiveness[4] (Rating: ③)

3.3.1 Quantitative Effects

3.3.1.1 Results from Operation and Effect Indicators

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

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

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

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

* Stage I was completed in November, 1999. The blank space indicates that data were unavailable.
Source: Citarum River Basin Office

Table 6 shows the comparison of the flood control plan of the project and the actual data of the flood which occurred on 21 February, 2005, after the completion of the Stage I project (during Stage II implementation period) [5]. According to this, as a result of river improvement works of the project, the Citarum River has gained its river flow capacity corresponding to 5 year-return period ($510m^3/s$). (The project aimed to decrease flooded areas from 10,082 ha (before the project) to 2,948 ha (after the project) in case of flood incidence of 5 year-return period.)

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

5-year return period flooding (plan)	Flooded area before the project	Flooded area after the project
	10,082ha →	2,948ha

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

It became clear that the flood on 21 February, 2005 was 10-year return period flood, not 5-year period flood as planed for the project, when taking into account of its maximum flow of the Citarum River ($572m^3/s$). The highest water level during the flood in Dayeuhkolot area was $660.95m^3/s$, exceeding the maximum safe water level of 5-year probability flood ($659.50m^3/s$). The flooded water level in the area was recorded as 1.45m. The flooded area of the 21 February, 2005 flood (corresponding to 10-year return period flood) was 1,191 ha, which was less than that of the planned area for 5-year return period flood (2,948ha). That means the project has achieved its target and has

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

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

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

Economic Internal Rate of Return

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

Table 7: Assumption and Results of EIRR Recalculation

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

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

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

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

3.3.2 Qualitative Effects

3.3.2.1 Mitigation of Flood Damage

The result of the interview survey to local residents[6] and the local NGO[7] in the project area

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

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

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

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

3.4 Impact

3.4.1 Intended Impacts

3.4.1.1 Improvement of Living Environment of the Upper Citarum River Basin

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

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

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

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

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

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

Access road constructed under the project

Open land created by change of river alignment

3.4.1.2 Acceleration of Economic Development of Upper Citarum River Basin

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

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

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

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

3.4.2 Other Impacts

3.4.2.1 Impacts on the Natural Environment

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

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

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

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

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

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

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

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

3.4.2.2 Land Acquisition and Resettlement

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

Table 9: Comparison of Areas of Land Acquisition

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

Source: Citarum River Basin Office

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

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

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

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

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

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

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

3.5 Sustainability (Rating: ③)

3.5.1 Structural Aspects of Operation and Maintenance

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

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

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

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

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

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

3.5.2 Technical Aspects of Operation and Maintenance

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

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

3.5.3 Financial Aspects of Operation and Maintenance

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

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

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

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

Source: Citarum River Basin Office

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

rehabilitation project (2011 to 2013), which covers the entire Citarum River (upper, middle and downstream), has been approved, and thus, large-scale national budget over two or more fiscal years was secured[12]. Extensive dredging as a measure to remove sedimentation will be conducted in the rehabilitation project. Hence, the capacity of the original river flow of the Citarum River is expected to recover or effects beyond this may come out through the rehabilitation.

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

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

Source: DGWRD, Ministry of Public Works

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

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

3.5.4 Current Status of Operation and Maintenance

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

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

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

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

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

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

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

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

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

Importance of maintenance

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

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

4.2.2 Recommendations to JICA

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

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

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

4.3 Lessons Learned

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

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

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

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

End

Comparison of the Original and Actual Scope of the Project

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

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

End