

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

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0. Summary

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

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

1. Project Description



Project Location



Percut River after improvement

1.1 Background

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

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

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

1.2 Project Outline

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

Loan Approved Amount/ Disbursed Amount	9,697 million yen / 9,323 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	January, 1998 / January, 1998
Terms and Conditions	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	February, 2009
Main Contractor (Over 1 billion yen)	PT. Hariara (Indonesia) / PT. Wijaya Karya (Indonesia) / PT. Brantas Abipraya (Indonesia) / PT. Pembangunan Perumahan (Indonesia) / PT. Adhi Karya (Indonesia) / PT. Waskita Jaya Purnama (Indonesia)
Main Consultant (Over 100 million yen)	PT. Melias Kesuma (Indonesia) • CTI Engineering Co., Ltd. (Japan) • Sinotech Engineering Consultant (Taiwan) (JV)

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

2. Outline of the Evaluation Study

2.1 External Evaluator

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

2.2 Duration of Evaluation Study

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

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

2.3 Constraints during the Evaluation Study

None.

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

3.1 Relevance (Rating: ③²)

3.1.1 Relevance with the Development Plan of Indonesia

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

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

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

² ③: High, ② Fair, ① Low

3.1.2 Relevance with the Development Needs of Indonesia

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

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

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

3.1.3 Relevance with Japan's ODA Policy

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

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

Japanese assistance policies is still maintained.

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

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

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

Table 1: Comparison of Planned and Actual Project Outputs

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

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

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

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

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

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

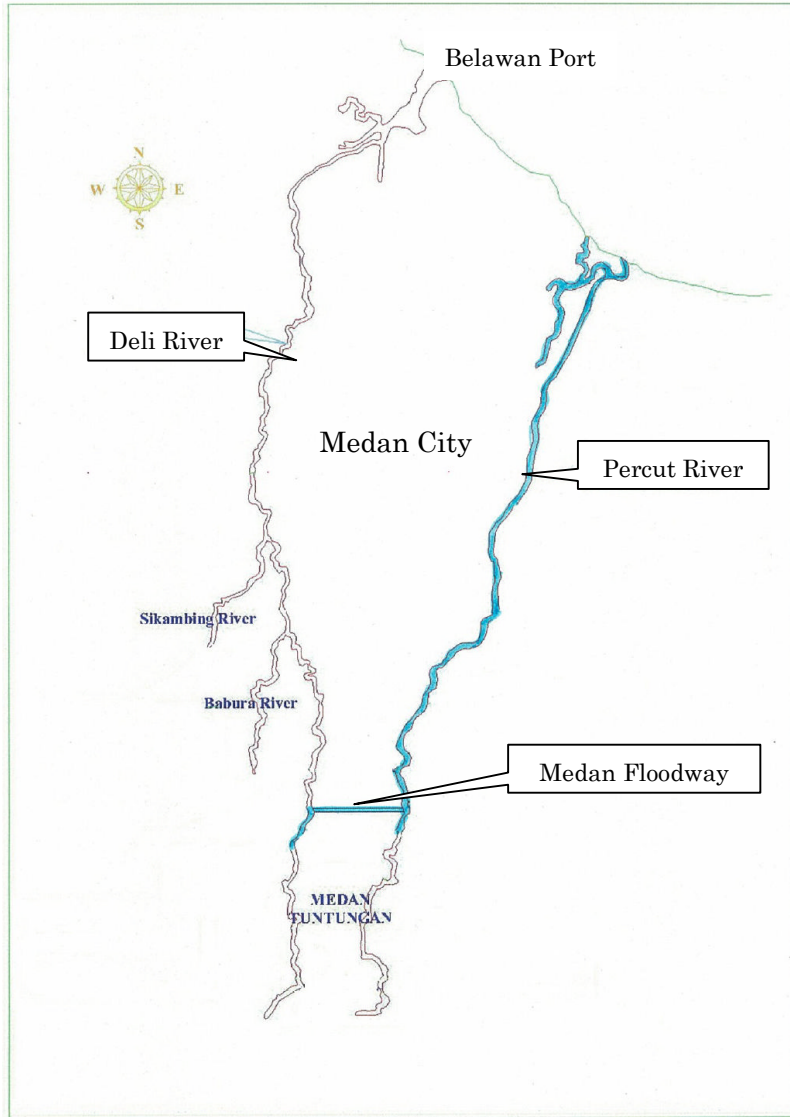


Figure1: Project Site



Medan Floodway



Rubber Dam

3.2.2 Project Inputs

3.2.2.1 Project Cost

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

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

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

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

3.2.2.2 Project Period

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

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

Table 3: Comparison of Planned and Actual Project Period

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

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

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

*** L/A conclusion date.

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

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

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

3.3 Effectiveness⁴ (Rating: ③)

3.3.1 Quantitative Effects

3.3.1.1 Results from Operation and Effect Indicators

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

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

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

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

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

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

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

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

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

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

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

Source: Sumatra II River Basin Office

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

Economic Internal Rate of Return

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

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

Table 6: Assumption and Results of EIRR Recalculation

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

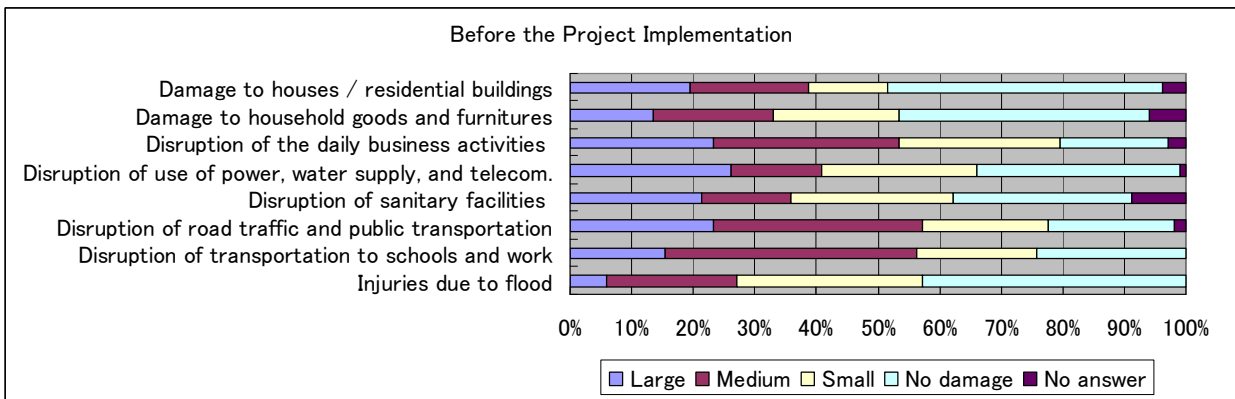
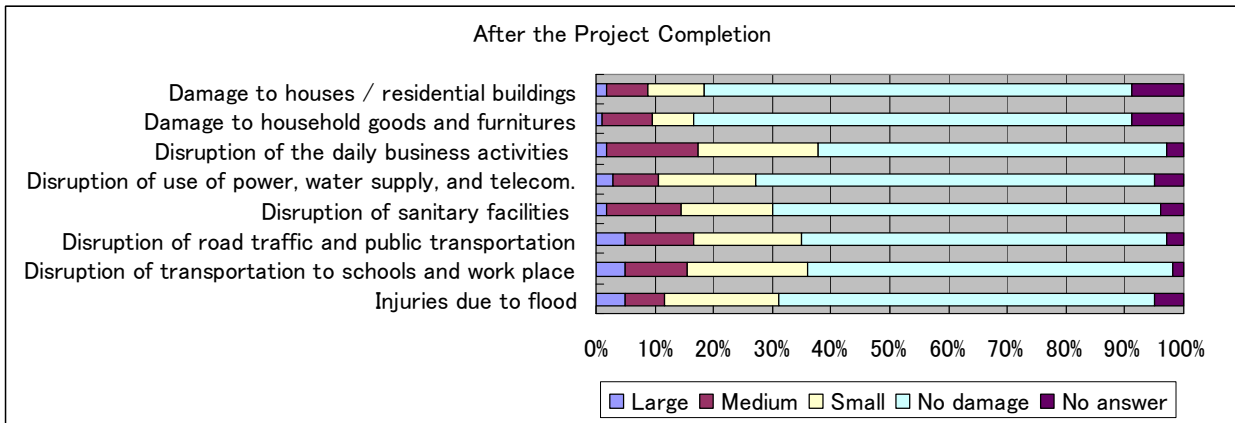
* Utilized the same assumption with that at the time of appraisal for percentage of rise.
 ** Because reliable total project cost and the amount of annual expenditures were not available, recalculation was made based on the data provided by Sumatra II River Basin Office, excluding general administration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

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

3.3.2 Qualitative Effects
 3.3.2.1 Mitigation of Flood Damage

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

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



Source: Results from the beneficiary survey

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

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

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

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

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

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

3.4 Impact

3.4.1 Intended Impacts

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

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

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

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

Source: Results from the beneficiary survey

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

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

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

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

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

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

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

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

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

Source: Results from the beneficiary survey

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

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

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

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

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

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

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

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

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

3.4.2 Other Impacts

3.4.2.1 Impacts on the Natural Environment

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

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

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

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

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



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

3.4.2.2 Land Acquisition and Resettlement

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

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

Table 10: Comparison of Areas of Land Acquisition and Resettlement

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

Source: Sumatra II River Basin Office

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

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

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

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

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

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

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

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

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

3.5 Sustainability (Rating: ②)

3.5.1 Structural Aspects of Operation and Maintenance

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

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

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

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

Source: Sumatra II River Basin Office

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

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

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

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

3.5.2 Technical Aspects of Operation and Maintenance

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

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

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

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

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

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

3.5.3 Financial Aspects of Operation and Maintenance

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

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

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

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

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

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

3.5.4 Current Status of Operation and Maintenance

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

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

the water gate during the site visit.

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

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

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

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

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

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

Importance of maintenance (especially removal of sediments)

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

Importance of undertaking measures to prevent illegal waste disposal

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

Importance of improving urban drainage

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

4.2.2 Recommendations to JICA

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

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

- Annual maximum flow (m³/s)
- Flood damage in the project area (flooded area, number of inundated houses, number of affected people, cost of flood damage)
- Rainfall data at each time of flood (cumulative precipitation)

4.3 Lessons Learned

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

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

End

Comparison of the Original and Actual Scope of the Project

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

End