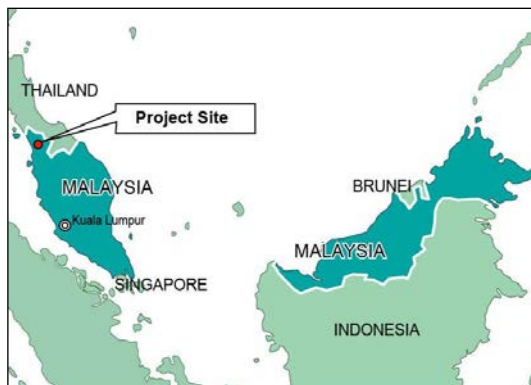


0. Summary

The project objective was to ensure a stable domestic, industrial and irrigation water supply where the water balance is tightening in the Muda river basin in Kedah and Penang State, at the Beris Dam upstream of the Muda River, Kedah State, North Malaysia. The relevance of the Project is high as it is consistent with the development policy and needs of Malaysia, and also in the context of Japanese ODA policy. In terms of effectiveness and the impact of the Project, these are high from the point of view of the stabilization of the water supply for domestic, industrial and irrigation use, particularly in response to the increasing demand for water in Penang. The efficiency of the project is high as both project cost and period were within the plan. Sustainability is also high with the evidence of a favorable condition for the structural, technical and financial aspects of operation and the current operation status.

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

1. Project Description



Project Location



Beris Dam (Main dam)

1.1 Background

In order to meet the increasing demand for domestic, industrial, and agricultural water in the country, the Malaysian Government has for some time made efforts for water resource development and management in several river basins, focusing on the balance of demand and supply. In 1995, when the Sixth 5 Year Development Plan ended, although 72 dams, with a total capacity of 25 billion m³, were in operation in the country and more 3 dams were under construction, there were still problems with limited water pressure and water shortages. This was especially the case, depending on the region, in the dry season as the supply volume did not meet the rapidly increasing water demand caused by population growth and industrial development.

In this situation, JICA conducted several water development studies including the “Malaysia National Water Resource Development Study (NERS)”. The “Perlis-Keda-Prau-Pinang Area Water Resource Development Plan Survey” that ended year 1993 examined the water demand forecast and the comprehensive water management for integrating the water flows of rivers in the Perlis, Keda, and Muda river basin, targeting the

regions where a tightened balance in water resources had been observed (i.e., Perlis, Kedah, and Prau Pinnang). After this, with the focus on the Muda river basin, the “Comprehensive Management Plan for Muda River Basin” was conducted in 1995. This survey examined the construction of Beris dam in the upper stream of the Muda river water system and the Jeniang transfer system (weir, Naok dam, transfer water conduit, Reman dam) in the middle of the Muda river, which supplies water to Keda river (refer the location to Figure1).

Water demand in the Muda river basin was for the purpose of irrigation, and for domestic and industrial water. The beneficiary area for irrigation water was the irrigation project area of the Muda Agricultural Development Authority (MADA) in Perlis and Kedah state, and also the Seberang Prai irrigation area in Penang State. For Domestic and industrial water, the beneficiary area was the Muda river basin in Kedah and Penang States. Penang State is the economic center of the northern part of Malaysia. A mixed economy of agriculture, industry, commerce, and tourism, together with international high technology industries such as computer-related industries is a feature of this area. At the time of the project appraisal, in Penang state, where the main water source is the Muda River, there was a shortage of domestic and industrial water due to an increase in population and rapid industrial development from 1980 to 1995. A serious water shortage occurred particularly during the dry season. In order to cope with the water shortage in Penang State, it was necessary to secure a source of water, and the construction of Beris dam was part of the dam and transfer system in a comprehensive management of the Muda river basin.

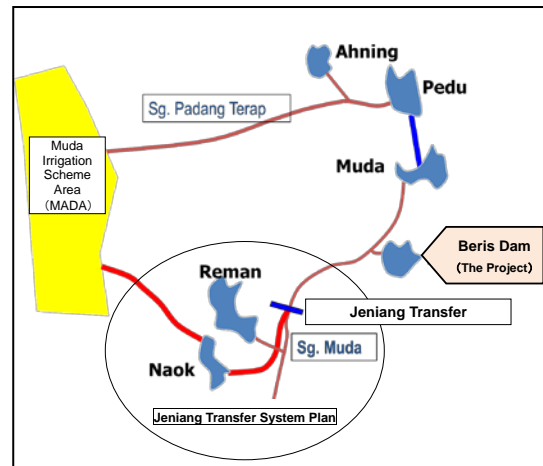


Figure 1: Beris Dam and Jeniang Transfer System

1.2 Project Outline

The objective of the project is to stabilize the water supply for urban life and irrigation in order to alleviate the water shortage by constructing a dam on the Beris River, a tributary of the Muda River in Kedah State, thereby contributing to stable living conditions and regional economic development in the Project area.

Loan Approved Amount/ Disbursed Amount	9,737 million yen / 8,578 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	March, 1999 / March, 1999
Terms and Conditions	Civil Work : Interest Rate: 1.7%, Repayment Period: 25 years (Grace Period: 7 years) Consulting Service: Interest Rate: 0.75%, Repayment Period: 40 years (Grace Period: 10 years) Conditions for Procurement: General Untied
Borrower / Executing Agency(ies)	Government of Malaysia / Department of Irrigation and Drainage Malaysia (DID), Kedah State Economic Planning Unit (UPEN)
Final Disbursement Date	March, 2009

Main Contractor (Over 1 billion yen)	Shimizu Corporation (Japan) / Muhibbah Engineering Bhd.(Malaysia) / Trans Resources Corporation Sdn. Bhd. (Malaysia)
Main Consultant (Over 100 million yen)	CTI Engineering International CO.,Ltd. (Japan) / Wan Mohamed & Khoo Sdn. Bhd. (Malaysia) /Associated Consulting Engineers – ACE (Pvt.) Ltd.(Pakistan)
Feasibility Studies, etc.	<ul style="list-style-type: none"> • “National Water Resources Study: Malaysia” (NERS)” (JICA、 1979-1982) • “National Water Resources Study, Malaysia Perlis-Kedah-Pulau Pinang regional water resources study(PKP Study)Part 1and 2 (JICA, 1982-1985 Development Study, Beris Dam F/S) • Detailed Design for Beris Dam (D/D) (Messrs. Wan Mohamed & Khoo Sdn Bhd, Associated Consulting Engineers (ACE), 1994) • Comprehensive Management Plan of Muda River Basin (JICA 1995, Development Study)
Related Projects	-

2. Outline of the Evaluation Study

2.1 External Evaluator

Mitsue Mishima, OPMAC Corporation

2.2 Duration of Evaluation Study

Duration of the Study: August, 2011 -August, 2012

Duration of the Field Study: October 10 to 19, 2011 - March 5 to 9, 2012

2.3 Constraints during the Evaluation Study

For evaluation of the Project, the target operation indicator and predicted effect indicator for Beris dam only at the project appraisal were not confirmed for a simple comparison and therefore a comparative analysis of the planned and actual operation indicators could not be conducted. Accordingly, for Project evaluation, effectiveness was evaluated on the basis of actual dam operation and water intake data from the Muda River and also using an analysis of qualitative information from interviews with institutions use water from the Muda River.

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

3.1 Relevance (Rating: ③²)

3.1.1 Relevance with the Development Plan of Malaysia

The Project was consistent with Malaysian government policy at the time of the project appraisal, which promoted the development of water sources for increases in water supply in areas with a water shortage. The project was also consistent with that described in the 10th Five Year Development Plan, and since the construction of Beris Dam, Penang State has realized rapid economic development. Furthermore, continuing development is envisaged and therefore it has been critical in securing a water source in Penang State.

At the project appraisal, water shortages were observed in various regions in Malaysia. In Kedah and Penang State in the northern part of the country where water demand and supply was tight, water shortages were anticipated after the year 2000. Under the 7th Five Year Plan (1995-2000), water source development for the long-term was emphasized in areas facing possible water shortages, together with efficient water management.

The current 10th Five Year Plan (2011-2015) states the necessity for promoting strategies for water resource management in the long-term under the premise of accelerated economic development in the future. There is still regional unbalance in water demand and supply although potential water resources in Malaysia are rich.

3.1.2 Relevance with the Development Needs of Malaysia

At the time of the project appraisal, there was water shortage in urban areas in Penang State in the northern part of Malaysia where the population had increased from 910 thousand in 1980 to 1.23 million in 1995 and where there had been rapid industrial development. The urban water demand was predicted to increase from then by 1.8 times, from 166 million m³/year in 1995 to 300 million m³/year in 2010. The amount of water supplied by the Kedah river system to Penang state reached a limit 64%, but at the same time, the amount supplied by the Muda river water system was 14%, a relatively small figure. Thus an increase in water use from the Muda river water system was required. The water supply to Penang state depends on the Muda River for 70% of its total, and therefore securing water from the Muda River has been very critical. There was therefore a strong need for the Beris dam in terms of its role in supplying water to meet the future domestic and industrial water demand in the Muda river basin, particularly in Penang State.

At the time of the ex-post evaluation, Penang state still depended on the Muda River as a water source for irrigation water, and for domestic and industrial water. Also, the Beris dam has important role in providing a sufficient amount of water from the Muda River. The most recent water resource study for the northern part of Peninsular Malaysia is the “Integrated Water Resources Study for the Northern Region of Peninsular Malaysia” (August, 2009). This study estimates the water demand for 40 years from 2010 to 2050 in Penang and Kedah states. Domestic and industrial water demand will maintain an increasing trend. In Penang state, water demand will increase by nearly two times, from 925 million liters/day in 2010 to 1,763 million liters/day in 2050. In Kedah, water demand will increase by 2.5 times from 1,130 million liters/day in 2010 to 2,799 million liters/day. In this situation, the Project remains important for the urban water supply and a stable industrial supply downstream. On the other hand, the water demand forecast for irrigation water is on a slightly decreasing trend: an 18 % reduction in Penang state and 6% in Kedah state should be seen between 2010 and 2050.

As for the Jeniang transfer system which is related to the Project, according to the Ministry of Agriculture, detailed design (D/D) for the system was already implemented. However, project budget had not been secured at the time of evaluation (March 2010) and construction had not yet started.

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

² ③: High, ②: Fair, ①: Low

3.1.3 Relevance with Japan's ODA Policy

In its development assistance policy for Malaysia under the Ministry of Foreign Affairs (ODA white paper, second volume in 1999) and through Medium-Term Strategy for Overseas Economic Cooperation Operations (December, 1999), the ODA policy of Japan towards Malaysia is for the support of environment protection, poverty eradication, rectification of the income gap, and for the support of human resources and small and medium enterprises. This takes into consideration the position of Malaysia as an upper middle-income country in the international society. This policy emphasizes support for strengthening the production infrastructure for immediate economic recovery in the short-term. The Project was relevant to this policy as it contributes to strengthening of the production base in terms of a stabilized urban water supply where there were water shortages.

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 Effectiveness (Rating: ③)

Although evaluation on the effectiveness of the Project suffered from the constraints stated in 2.3, this evaluation study examined the hypothesis that it could be considered that the Project had achieved its objective of securing a stabilized water supply for urban areas and irrigation, if it was proved that dam operation had been favorable and the water intake capacity had increased at the intake pumps station on the lower Muda River, then urban and irrigation water had been supplied stably in response to the demand in each area.

As quantitative effects, this evaluation study confirmed (1) data for dam operation (total volume of water reservoirs, changes in water level, the actual amount of water release³) and then analyzed (2) the capacity change of each intake pump station on the Muda River and the actual volume of water taken before and after dam construction.

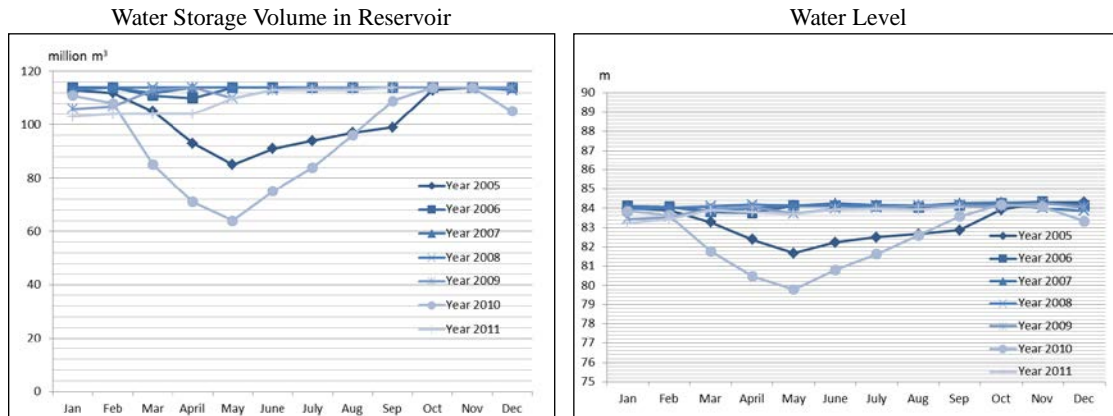
Since data for (2) from before dam construction could not be confirmed properly, in order to reveal more clearly the stabilization of the water intake and the alleviation of water shortages, this study collected information from organizations in charge of water intake from the Muda River, with regard to changes in the conditions before and after Beris Dam construction and to the effects of dam operation. The results of the qualitative analysis based on this information were carefully taken into account in order to evaluate the project effectiveness and impacts as follows.

3.2.1 Quantitative Effects (Operation and Effect Indicators)

(1) Actual Data of Dam Operation

The total water storage volume in the reservoir of Beris Dam is shown as a monthly average in Figure 2. It was low between March and July in 2005 (when dam operation started) and in 2010, almost half in some months compared to the planned indicator of effective water reserve capacity, which is 114 million m³, and to water level, which on average is 84 meters. This may have been caused by considerable shortages of rain in the dry season of those years.

³ The data of water inflow to the dam was requested; however, the executing agency answered that there was no such data.



Source: Beris Dam Administration Office

Figure 2: Beris Dam Water Storage Volume in Reservoir and Water Level (2005 to October, 2011, Monthly Average)

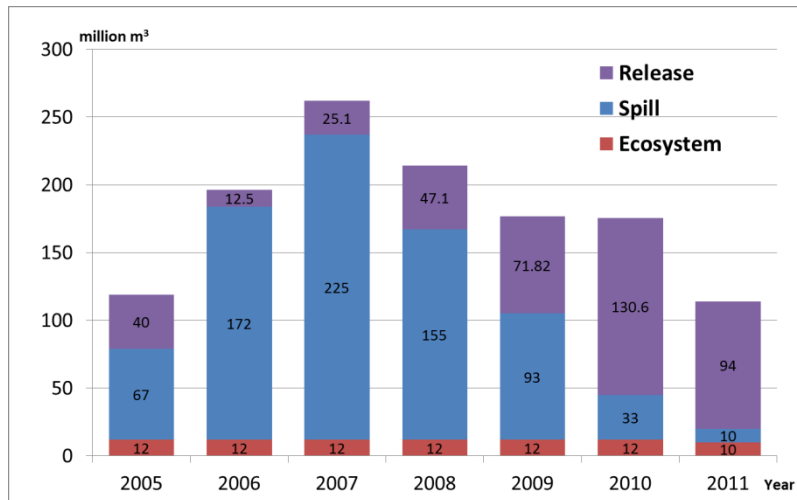
Figure 3 shows the annual amount of water release by spillway (facility to discharge excessive water when the water amount in the reservoir is above a certain level), release for water use or flood control by valve control, and release for maintaining the eco-system of the river. According to the Beris Dam administration office, since around September 20th when the monsoon season starts, dam water is released in order to keep water level to around 83 meters for flood control. Also, from February to May, dam water is generally released in response to water demand in the area of the lower river during the dry season. As seen in Figure 3, however, release for water use was observed in other months after the end of 2007, therefore, the total amount of the release for water use had increased.



Picture 1: Spillway and Water Release Canal

The maximum amount of annual water release was 262 million m³ in 2007, and the minimum amount of annual water release was 119 million m³ in 2005. From 2005 to 2008 and in 2010 particularly, DID Kedah, DID Penang, Penang Water Corporation (Perbadanan Bekalan Air Pulau Pinang Sdn Bhd: PBA) and Kedah Water Corporation (Syarikat Air Darul Aman Sdn Bhd :SADA), which take water from the lower Muda River, requested Beris Dam for water release. Since the actual data for water release was taken in response to the requests, it can be confirmed that this is effective for these organizations.

There is no record of requests for water release in 2009 and 2011. The Beris Dam administration office explained that the amount of water in the Muda River in these two years was sufficient. It can be judged that this does not show any problem as the alleviation of water shortages in Beris Dam was designed on the assumption of a drought once in every ten years. It is also recognized that a surplus of water in the reservoir can occur sometimes as dams are located in the upper river (see Figure 1).



Source: Beris Dam Administration Office

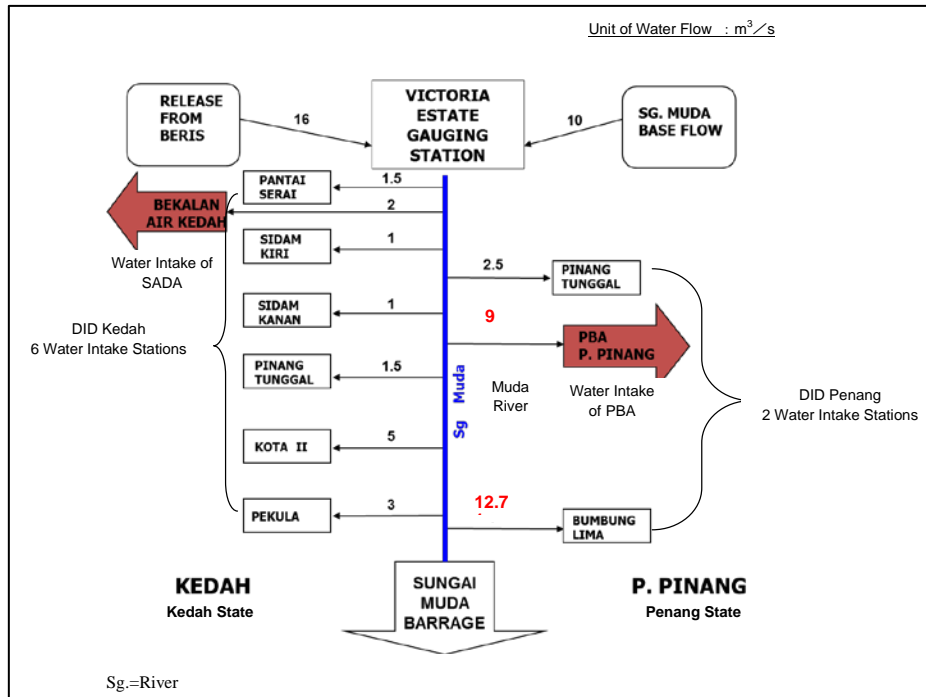
Figure 3: Annual Water Release Volume From Beris Dam (by Release for Water Use, Water Flow from Spillway, and Release for the Ecosystem, 2005 to October, 2011)

(2) Actual Data for Water Intake from the Muda River

Water intake from the Muda River is used for irrigation, and as domestic and industry water. This project was expected to meet the demands for domestic and industrial water, particularly in Penang State. The plan at project appraisal said that after project completion, for a drought once in ten years, the water supply volume was expected to guarantee up to 22.7 m³ per second, compared to 8.2 m³ per second. Due to the limited availability of actual data for before and after project implementation at each water intake station, the evaluation study analyzed effectiveness by examining current water intake capacity for respective usages, comparing this to before the Project, while also taking into account actual data for water intake in recent years.

Verifying the present condition of the water intake capacity of respective organizations at the time of the ex-post evaluation, it was found that both the capacity and amount of water intake had increased in recent years. The actual data for water intake from the Muda River is shown in Figure 4. In Kedah State, water intake is 13 m³/s in total for the 6 water intake stations for irrigation water, and the amount of water intake for SADA is 2 m³/s. In Penang State, the amount is 15.2 m³/s in total for the 2 water intake station for irrigation water, and the amount of water intake for PBA is 9 m³/s. It is confirmed that water intake capacity in total is 39.2 m³/s.

According to actual data for recent years, it can be seen that respective organizations have pumped almost the same amount of water on an annual average. This can be considered as an effect of water release from Beris Dam in response to requests made by the organizations after 2005. According to data provided by Beris Dam, while past data for the water intake capacity of water intake stations was 6 m³/s for PBA and 8 m³/s for the Bumbung Lima Station of DID Penang, at the time of the ex-post evaluation these had increased to 9 m³/s for PBA and 12.7 m³/s for DID Penang. Comparing the increase in water intake capacity to that of the past, it can be seen that this is a significant project effect, now that almost the same amount of water intake can be achieved on an annual average. In addition, the respective organizations coordinate the water intake volume from the Muda River through mutual consultation, and there has been no dispute to date.



Source: Beris Dam Administration Office
 Note: Figures in red letters are the latest based on direct interviews with the respective institutions in charge at the time of this evaluation study.

Figure 4: Water Intake Volume from the Muda River for Irrigation and Domestic & Industrial Use

3.2.2 Qualitative Effects

In terms of the alleviation of water shortages in the Muda river basin as a project effect, analysis was made based on interviews from the viewpoints of change after project completion and imagined situation as it would have been without the project. The project effects were examined based on information received from the office responsible for the operation and management of Beris Dam and also from DID Kedah, DID Penang, SADA and PBA. These organizations are responsible for the operation and maintenance of water intake facilities on the lower Muda River, and they are also expected beneficiaries (see the details in the Box).

(1) Domestic and Industrial Water Supply

With regard to water supply in Penang State, raised as a main objective of this project at the time of project appraisal, the amount of water intake has increased every year through the expansion of the water intake facilities after project implementation. From 2005 to 2010, the amount of water intake increased by 10 percent. PBA pointed out that Beris Dam had contributed to guaranteeing a stable amount of water intake. Also, there was the opinion that water supply restriction would have been conducted if this project had not implemented, although there was no water restriction before in the targeted areas. In view of the above, it can be confirmed the project has produced positive effects on the stable supply of domestic and industrial water in Penang state, which is a major effect expected for the project. Although there was no change in the amount of water supply in Kedah State, SADA indicates, as a project effect, that it has become possible to maintain the water level in order to guarantee a stable intake of water throughout the year.



Picture 2: PBA's Water Intake Pump House from the Muda River

(2) Irrigation Water Supply

Only product grown in the area where the Muda River provides irrigation water is rice. It can be seen that the irrigation water supply has become stable in irrigation areas of Kedah and Penang State. While the amount of water intake in Penang is more than that of Kedah, water level apparently became stable in Penang State after the construction of Beris Dam, as was the case for domestic and industrial water supply.

<BOX> Results of Interviews with Beneficiary Organizations on the Project Effects and Impacts

1. Water Supply

1.1 Penang Water Corporation (PBA)

- ◆ The water supply demand in Penang State in 2010 was 298 million m³ per year. The current demand in the State, for water supply from the Muda River, is 800 thousand m³ per day and the amount of water intake is 900 thousand m³ per day. It is planned that water intake in the future will be 1.27 million m³ per day after 2015. Water intake from the Muda River is sent to the Sungai Dua Water Supply Treatment Plant, which is 14 kilometers distant from the river. The amount of water supply taken from the Muda River is equivalent to 80 percent of the water supply in Penang State as a whole. Particularly, the water source for the Penang Island area is dependent on the Muda River alone.
- ◆ Since 2005, water intake facilities have continued to be extended in response to increasing water demand. Water supply treatment also increased from 720 thousand m³ per day in 2005 to 800 thousand per day in 2010. Currently, a program to expand water intake facilities is underway up to 2015.
- ◆ Water supply restriction had not taken place before 2005 when the Beris Dam began operations. Although water pressure in the dry season was sometimes low, operation continued without restriction. Considering the increasing water supply demand after the starting of operation of the Beris Dam, however, it is believed that water supply restrictions would have been inevitable without the dam.
- ◆ When the water level of the river drops lower than 2.28 meters, a request for water release is made to Beris Dam through DID Penang. Water shortages in the dry season have not been observed since 2008.
- ◆ While the amount of water decreases from January to March in the dry season, it is sufficient in a normal season.
- ◆ Due to the water level of Muda River becoming stable, there is no change in the operation cost of the water intake pump.
- ◆ The water supply in Penang State consists of 75 percent for domestic water and 25 percent for industrial water. The number of domestic water consumers is approximately 440,000.
- ◆ Demand for the industrial water supply has continued to increase due to industrial development. In particular, firms producing semi-conductors require an extensive quantity of industrial water, and these are the main beneficiaries.

1.2 Kedah Water Corporation (SADA)

- ◆ Water taken from the Muda River has been supplied to areas from the middle to the southern part of Kedah State. There has been no change in the amount of water taken from the Muda River so far.
- ◆ Before Beris Dam started operations, when the water amount was relatively low in the dry season, it was necessary to use dry-pit pumps for drawing up water twice and/or to put sand bags into the river in order to maintain the water level necessary for water intake. Currently, the intake pump is used only once and even this has not been necessary as the required water level has been ensured throughout the year. Since using the pump requires an energy cost, decrease in pump use has resulted in a reduction of maintenance and management costs.
- ◆ There are 11 water supply treatment plants around the Muda River. There is a plan to expand the Kulim High-Tech Water Supply Treatment Plant in the future.

2. Irrigation Water Supply

2.1 Hearing with DID Penang, IADA and the State Agriculture Department Penang

- ◆ Irrigation areas in the Integrated Agriculture Development Area (IADA) are located in 4 Districts

cover a total area of 10,305 hectares. Out of these 4 districts, the Seberan Perai Utara Irrigation Area takes irrigation water from the Muda River. The size of irrigated land is 6,751.34 hectares and the number of farmers is 3,533. This area alone amounts to approximately 65 percent of the total irrigation area of Penang State. (IADA)

- ◆ The operation and maintenance of water intake facilities for irrigation water in Penang State, including facilities in IADA, is managed by DID Penang. (IADA)
- ◆ Forty percent of water in irrigation areas is supplied from rainwater, and the remaining 60 percent from the river. Farmers conduct planting twice a year and the main season for rice production is from July to December, the off-season being from March to July. Output is 5.5 tons per hectare on average, which is more than that of Kedah State. The capacity of the water intake pump is also larger than that of Kedah. (DID Penang)
- ◆ Before the construction of Beris Dam, the water level sometimes decreased to 1 meter, in which case it was not easy to draw up water through the water intake pump. Water level needs to be maintained at above 1.5 meters for pumping water. The current water level is 2.49 meters. (DID Penang)
- ◆ While the rice crop in target areas amounted to 3 to 4 tons per hectare in the years immediately before the construction Beris Dam (up to 2005), it has since increased by 1 ton, resulting in 5 to 6 tons per hectare since 2006. There is no difference in production volume per unit between the main season and the off-season. While the rice crop has increased through improvements in rice variety, assistance for fertilizer provision, and the promotion of mechanization, the stable water supply has also contributed to the production increase. Without the Beris dam, it would have taken more than 10 years in order to achieve such an increase in rice production. Through increased production, in addition, an increase in income has also been observed. (State Agriculture Department Penang)
- ◆ While the planting schedule in dry seasons had been delayed before the start of operations of Beris Dam, such delays have not occurred since a stable water supply has been achieved. (DID Penang, State Agriculture Department Penang)

2.2 Hearing with DID Kedah

- ◆ The area where irrigation water is taken from the Muda River in Kedah State is the Kuala Muda area in the southern part of Kedah. The size of irrigated land is approximately 5,800 hectares. Planting is made twice a year.
- ◆ Compared to before the dam was constructed, a stable supply of irrigation is now possible throughout the year, even in the dry season. Although in the past it was sometimes necessary to delay the planting schedule due to water shortages, such delays do not currently occur.
- ◆ Even though there has been no change in the size of irrigated land before and after the construction of Beris Dam, the rice crop has increased. While the rice crop before dam construction was 2.5 to 3.0 tons per hectare, after dam construction it increased by 3.5 to 4.5 tons per hectare on average. This may have been caused, to some extent, by the fact that the water supply has become stable. However, the impact may not have been that significant. The larger impact of the Beris Dam Project is, rather, mitigation of the situation in which the planting cannot be made due to water shortages.
- ◆ It is considered that there has been a positive impact on flood control around the Kula Muda District, lowlands in Muda river basin.

3.3 Impact

3.3.1 Intended Impacts (Contribution to the stabilization of people's livelihoods and the development of the local economy)

(1) Penang State

Through this project, a positive impact on the stabilization of people's livelihoods and the development of the local economy in Penang State has been partly achieved. At the time of project appraisal, water demand in Penang State was estimated to be 300 million m³ per year. In 2010, PBA supplied 298 million m³ per year as an actual amount, which was almost the same as the estimation before project implementation. Thus, it can be seen that the negative impact of water shortages in the dry season on people's livelihoods and industrial activities has been avoided after the operation of Beris Dam started.

In terms of contribution to the local economy, the real growth rate of the Gross Regional Domestic Product (GRDP) in Penang State after the completion of Beris Dam was 10.4 percent in 2006, 6.9 percent in 2007, 5.8 percent in 2008, -10.8 percent in 2009, and 10 percent in 2010. This was much higher than the economic growth of Malaysia as a whole in the same period, which was 5.8 percent in 2006, 6.7 percent in 2007, 4.8 percent in 2008, -1.6 percent in 2009, and 7.2 percent in 2010, showing a high growth rate except in 2009. Water demand in the industrial sector has increased year by year due to the stimulation of economic activities. With this background, Beris Dam has responded specifically to the demand of firms in the area producing semi-conductors, which require an extensive quantity of industrial water.

With regard to positive effects of the project on irrigation water, it is now possible to conduct planting as scheduled. According to DID Penang and the State Agriculture Department Penang, the unit yield of the rice crop has increased by approximately 1 ton per hectare due to the stable supply of irrigation water before and after the Beris Dam began operation, although the increase can be attributed not only to the stable water supply but also to the mechanization of farming and fertilizer. The State Agriculture Department Penang pointed out that there was actually fertilizer development and promotion of agricultural machinery usage in the same period, but in addition, a stable and increased water supply also contributed to the increase in rice production. It is considered, therefore, the project has partly contributed to the increase rice production in the beneficiary areas.



Picture 3: Irrigation Water Supply from the Muda River and Paddy Fields in Penang State

(2) Kedah State

With regard to the water supply in Kedah State, according to SADA, since the completion of the Beris Dam, the water level has been ensured enough to guarantee enough water in the dry season and energy costs have also been cut by the decrease in the use of the intake pump, which also resulted in reduction in operation and maintenance costs. It is considered the fact that decrease of rice production was mitigated by ensuring stable water supply is positive impact on irrigation areas.

Also, as another impact of the project, it has been identified that economic activities around the dam in Kedah State have been stimulated. These activities include the aquaculture implemented after dam construction as economic assistance for resettled residents, eco-tourism around the dam reservoir, and the construction of a vineyard. These newly developed private projects have contributed to the creation of jobs in the local economy.



Picture 4: Aquaculture (Left), Tourism (Middle), and Vineyard (Upper and Lower in Right) in the Surrounding Areas of Beris Dam

3.3.2 Other Positive and Negative Impacts

At project appraisal, it was planned that environmental monitoring of the project would be conducted for three years after the dam reservoir was filled with water, and that ex-post monitoring of the resettlement of residents would be implemented for five years after resettlement. It was also planned that consultants would assist the executing agency in conducting ex-post monitoring of environmental and social impacts, since as the agency was obliged to submit reports on the ex-post monitoring of the natural environment and residents' resettlement to JICA quarterly.

In fact, while monitoring by consultants had been conducted until the completion of construction works, ex-post monitoring was not implemented. However, the executing agency outsourced the ex-post monitoring for the environmental and social aspects including the situation after resettlement. At the time of the project appraisal, specifics on how to conduct environmental and social monitoring after project completion had not been clearly provided, as the current "JICA' Guidelines for Environmental and Social Considerations" were not at that time in effect. In any case, however, the submission of a quarterly report after project completion seems a somewhat unreasonable request for an executing agency in terms of its necessity and the workload involved. Thus, there was in fact little possibility that ex-post monitoring would be conducted as planned. It would be more realistic to create an opportunity to reconsider what kind of ex-post monitoring should be conducted paying attention to: 1) by whom, 2) how, and 3) on which items, while confirming the situation before and after project completion.

In the following sections, evaluation is discussed based on the results of environmental and social monitoring by the executing agency and on the field survey.

(1) Impacts on the Natural Environment

In this project, in addition to the report on environmental monitoring during dam construction and the Project Completion Report (PCR), DID confirmed before and after the project whether or not there had been a negative impact on the natural and social environment by drawing up the "Beris Dam Environmental, Health and Safety Audit" (EHS Audit, December 2005), which was outsourced under Universiti Sains Malaysia. DID also confirmed changes in water quality by conducting a survey on the water quality of the dam between 2007 and 2008, three years after dam completion. The results of this appeared in the "Beris Dam Water Quality Monitoring Report" (August 2008).

In the "Beris Dam Environmental, Health and Safety Audit" of 2005, no issues concerning the natural environment were pointed out. In the PCR made in 2010, it was reported that: (1) vegetation from the reservoir was disposed of by smokeless incineration by the Department of the Environment, and (2) endangered species were not found and some endemic species of flora discovered in the reservoir during the ex-ante study were transplanted to other places. Endemic species of bird, mammal and fish were not found. According to the results of the survey conducted in 2008, no problem was detected in the water quality of the dam.

In this evaluation study, in addition a review of the above stated reports, hearings with the executing agency and sight visits were also conducted, with any problems to be identified as a result. Water release from the dam for maintenance of the river eco-system in the lower river is currently implemented at a rate of 0.4 m³ per second. In an interview survey at the time of evaluation, no endangered species were confirmed.

(2) Land Acquisition and Resettlement

In the project, the resettlement of 659 households in 16 villages was implemented due to the dam construction. Following resettlement, related economic and social development projects were implemented, including the construction of houses and infrastructure (water, electricity, public facilities, etc.) in resettled places, land compensation (provision of houses, farm land for cash crops and rubber, land for stores) and assistance projects for livelihood improvement (economic activities such as aquaculture). Land compensation was implemented for 1,915

residents.

Post-resettlement survey in EHS Audit as of December 2005 stated that residents complained that there was a delay in the procedure and economic support activities. Through a comprehensive analysis of PCR submitted later in 2010 and hearings from DID and UPEN, a field survey of resettled places in the Sik District of Kedah State and interviews with 18 representatives of resettled residents (members of Village Development Committees, JKKK” in Malay), it was recognized that compensation had been provided for the most part as planned and there had been an increase in income for many residents. With regard to procedure and contents of compensation, residents answered that they were “satisfied a little” except one respondent who was “unsatisfied”.

As remaining issue, residents pointed out that land titles had not yet been provided so they were unable to obtain Certificates of Fitness (CF) for their houses; notice of resettlement came at fairly short notice⁴, and they were not clearly informed of the place where claims would be handled etc.

According to UPEN and the Land Office (which was in charge of the procedures for the provision of land titles) in Sik District and in the state office of Alor Setar, the state capital of Kedah, land titles has not been granted to anyone yet and the procedure would begin in March 2012. This delay in administration had been caused by the time taken transfer the land titles from the State Development Corporation to the state government. This was finally completed in 2011. The granting of land titles to residents would start from March 2012, with the present condition confirmed by staff in charge at the Sik District Land Office who will contact all the residents. It is expected that to finish the land title transfer of more than 600 households will take several years because of the limited number of staff members in charge.

UPEN is the executing agency for resettlement. However, with regard to processing claims, UPEN was not involved in the matter of land titles. UPEN felt that the procedure should be carried out by the organization in charge, and that Sik District Land Office should be responsible for land title issues. As indicated in the comments of residents, claims to organizations such as UPEN and the Land Offices about delays in the transfer of land titles took a considerable amount of time. It would be better if the organization in charge of handling claims were integrated into the one authority before and after resettlement. There should be a system whereby the representative authority is made responsible for coordination among the ministries and for follow-up, in order to speed up the response to claims.



Picture5: Resettled Area in the Sik District of Kedah State
House (Upper Left), Mosque (Upper Right),
Enterprises (Lower Left), Hospital (Lower Right)

⁴ A resident pointed out notice of the resettling date was announced just prior to its date, while the implementation agency insisted that notice had been given some months before resettlement. It cannot be verified which testimony is true.

In light of the above, the project has largely achieved its objectives, therefore its effectiveness is high.

3.4 Efficiency (Rating: ③)

3.4.1 Project Outputs

Outputs such as the construction of the main dam and the saddle dam of Beris Dam, road replacement, and land preparation for the resettlement of residents were implemented mostly as planned. After the signing of the L/A in March 1999, Special Assistance for Project Implementation (SAPI) was implemented that year, and recommendations were made, such as the expansion of the plunge pool, as a result of the SAPI review of the dam design. The change was accomplished within the project cost.



Picture 6: Overview of Beris Dam Site

3.4.2 Project Inputs

3.4.2.1 Project Cost

In comparison with the total amount of project cost at planning, 14,585 million yen (9,737 million yen for the yen Loan out of the total cost), the actual total amount of project cost was 11,825 million yen (8,578 million yen for the yen Loan out of the actual total cost). The actual project cost was 81 % of the planned cost, and thus the actual cost was lower than planned.

A breakdown of the actual cost is as follows. While the actual construction cost was 102 percent of that planned, which was slightly higher than planned, the other main project costs were lower than planned. Compensation costs for resettled residents were at 72 percent (a decrease of 1,166 million yen), consulting services were at 58 percent (a decrease of 502 million yen), and management costs were at 5 percent (a decrease of 605 million yen) compared to the planned cost. This resulted in a decrease of the actual project cost in total. The executing agency pointed out the planned cost had been estimated with some allowance, so that the actual cost might be lower than planned.

3.4.2.2 Project Period

In the project appraisal, the completion of the project was defined as “the completion of ex-post environmental monitoring by the consultant” which was June 2008. In the rating evaluation system on project period in an ex-post evaluation of a dam project, project completion is normally the completion of dam construction or when the dam reservoir is filled with water. In this project, therefore, the difference between the plan and results between the signing of the L/A and the completion of dam construction was analyzed.

Following the above stated definition, the project period was planned from March 1999 to March 2005 (73 months). The actual result was shorter than planned: from March 1999 to July 2004 (67 months). Thus, the actual project period was within the planned period (92 percent compared to planned). The dam construction period was reviewed at the time when the contract was concluded with the contractor, and efforts were made to complete the dam construction works earlier than the plan at the time of appraisal.

3.4.3 Results of the Calculations of Internal Rates of Return (IRR)

Due to the fact that the data needed for quantitative analysis was not available in order to verify the basis of the Economic Internal Rates of Return (EIRR) calculated upon project

appraisal, EIRR was not recalculated in this ex-post evaluation study.

In light of the above, both project cost and project period were within the plan, therefore efficiency of the project is high.

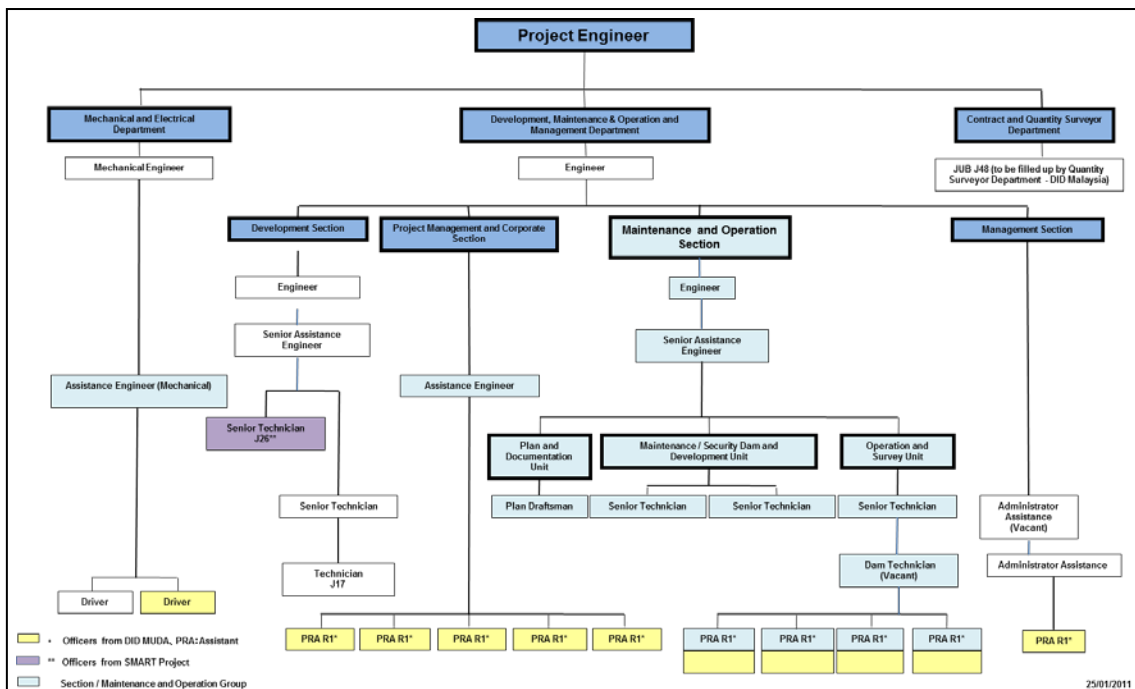
3.5 Sustainability (Rating: ③)

3.5.1 Structural Aspects of Operation and Maintenance

After project completion, a part of the DID in the Ministry of Agriculture was divided into the DID of the Ministry of Natural Resource and Environment (NRE) as part of reorganization of the government. At the time of the ex-post evaluation, the new construction of a dam for the purpose of agriculture came under the DID in the Ministry of Agriculture while the operation and maintenance after dam construction came under the DID in NRE. In addition, the replaced road in the project has been maintained by the Public Work Department in Kedah State.

Staff belonging to the Special Project Department of the DID in NRE and also those of the Maintenance and Operation Section of the Project Engineer's Office of Water Resource Development Programs (Beris) (Pejabat Jurutera Projek Rancangan Pembangunan Sumber Air (Beris) in Malay) are in charge of operation and maintenance of Beris Dam. The office is also responsible for the operation and management of the Timah Tasoh Dam in Perlis State. (In this report, the Beris Dam administration office means the staff in charge of Beris Dam in that office.)

As seen in Figure 5, a senior engineer and 14 supporting staff under a project engineer (the head of the office) are engaged in operations of the Beris Dam Management Office. Although the dam engineer in the organization chart has actually been appointed, there have been no problems caused by staff shortages and a system to deal with requests for water release has been ensured. Thus, staff placement is considered to be mostly appropriate.



Source: Beris Dam Administration Office

Figure 5: Organization Chart of Divisions in Charge of Beris Dam (As of October, 2011)

3.5.2 Technical Aspects of Operation and Maintenance

As a result of the analysis of PCR, the Inspection Report by the Beris Dam Office, a site visit and an interview with staff in charge of dam operation, it is clear that the basic technical matters required for dam operation are implemented and that operation and maintenance have been conducted properly. Also, the staff have received training for the operation of Beris Dam and it is considered they have obtained the technical skills necessary for the operation and maintenance of the dam.

3.5.3 Financial Aspects of Operation and Maintenance

The budget for operation and maintenance has been allocated after project completion to the present through the DID headquarters of the central government. Although, at the time of project appraisal, budget allocation from Kedah State was planned for after project completion, the budget continued to be allocated from central government at the time of the ex-post evaluation. Budget allocation from the state government hereafter is not specifically scheduled, and the budget will be allocated from the central government for the time being. The budget has been assured each year.

The budget was estimated as RM600,000. It was confirmed in the filed study that on average RM1 million was allocated as the annual budget for operation and maintenance for the last seven years and that is considered that sufficient budget has been ensured.

Table 1: Actual O & M Cost for Beris Dam

Unit: 1,000RM

Fiscal Year	O & M Cost		Total
	Spare Parts and Service Cost, etc.	Personnel Cost	
2004	50.0	595.0	645.0
2005	144.0	624.8	768.8
2006	197.5	656.0	853.5
2007	319.5	688.8	1,008.3
2008	483.5	723.2	1,206.7
2009	416.0	780.0	1,196.0
2010	483.5	723.2	1,206.7
2011	416.0	780.0	1,196.0

Source: Beris Dam Administration Office

3.5.4 Current Status of Operation and Maintenance

According to the staff in charge of the operation and maintenance of Beris Dam, the structures, such as the dam, spillway, and intake tower are currently in good condition. At the time of the site survey, the dam was operating smoothly without any problem in its structure; therefore, as reported from the staff in charge, the current status of the operation and maintenance of the dam is evaluated to be satisfactory.

From the above, no major problems have been observed in the operation and maintenance system, therefore sustainability of the project effect is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The project objective was to ensure a stable domestic, industrial and irrigation water supply where the water balance is tightening in the Muda river basin in Kedah and Penang State, at the Beris Dam upstream of the Muda River, Kedah State, North Malaysia. The relevance of

the Project is high as it is consistent with the development policy and needs of Malaysia, and also in the context of Japanese ODA policy. In terms of effectiveness and the impact of the Project, these are high from the point of view of the stabilization of the water supply for domestic, industrial and irrigation use, particularly in response to the increasing demand for water in Penang. The efficiency of the project is high as both project cost and period were within the plan. Sustainability is also high with the evidence of a favorable condition for the structural, technical and financial aspects of operation and the current operation status.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency (UPEN) and the Land Office

Provision of Land Titles to Resettled Residents

In an interview with a representative of the resettled residents, it was pointed out that land titles had not at that point been granted. Land title provision had been delayed and it would start this year.

The Land Office is the organization in charge of handling land title transfer. However, UPEN is defined as executing agency of the project and it is thus recognized that UPEN is responsible for compensation issues regarding the resettlement of residents after project completion.

Seven years have now passed since the completion of residents' resettlement, and UPEN should support the Land Office in taking the necessary actions as soon as possible. It is also advisable that the Land Office speeds up the procedures by any measures, for example, increasing its number of staff.

4.2.2 Recommendations to JICA

JICA should follow the situation with regard to the provision of land titles to residents.

4.3 Lessons Learned

(1) Reinforcement of the Function to Handle Claims of the Environment Management /Resettlement Committee

A committee, consisted of DID, UPEN and some government organizations, was established to respond to claims from residents. However, it was not clear exactly who was to handle claims and how, and this partly caused the delay in the transfer of land titles.

Important is clearly stipulated, in advance, what the function, authority and responsibility of such a committee is, as well as the responsibility of the representative organizations in taking prompt action. One representative authority, for example, should handle claims.

(2) Environment and Resettlement Monitoring after Project Completion

Although the project placed importance on the monitoring of the natural environment and of residents' resettlement after project completion, and a monitoring schedule was planned, monitoring was not been actually implemented according to the plan.

In case a project is categorized as an "A project" in its environmental and social aspects, and ex-post monitoring is considered to be very important due to a lack of capacity of the organization in charge of environmental and social monitoring in the recipient country, it is critical that JICA and the executing agency agree in advance which section should be in charge of ex-post monitoring, the administrative structure for implementation, detailed monitoring items, and the period for monitoring, having given thorough consideration to the objectives and feasibility of the monitoring beforehand.

There may cases, however, that it is too late at the time of ex-post monitoring to effectively

take action against problems, when a negative impact is confirmed. Also, there is a high possibility that the organization in charge of ex-post monitoring has not been clearly defined due to administrative changes after project implementation. Taking the above into consideration, in the case of a Category A project that ex-post monitoring is important, it is desirable that JICA confirm, through a site visit right after project completion or at another ideal time, whether the system to conduct ex-post monitoring is ensured or not, and whether there were any problems during the survey.

End

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Project Outputs	<p>(1) Dam Construction (Concrete Face Rockfill Dam)</p> <ul style="list-style-type: none"> · Catchment Area: 116 km² · Effective Storage Capacity: 114 million m³ · Average Water Level: 84m · Main Dam, Saddle Dam <p>(2) Relocation of Road 10.9km</p> <p>(3) Development of Resettlement Area</p> <ul style="list-style-type: none"> · Construction of Houses for 575 households · Construction of Basic Infrastructure(Water system, electricity, schools, Mosques and other public utilities) · Support for Economic Activities for Resettled residents 	<p>(1) As planned</p> <p>(2) As planned</p> <p>(3)As planned (Actual number of resettled households:659)</p>
2. Project Period	March, 1999 - March, 2005 (73 months)	March, 1999 - July, 2004 (67 months)
3. Project Cost		
Amount paid in Foreign currency	2,796 million yen	677 million yen
Amount paid in Local currency	11,789 million yen (369 million RM)	11,148 million yen (366 million RM)
Total	14,585 million yen	11,825 million yen
Japanese ODA loan portion	9,737million yen	8,578million yen
Exchange rate	1RM = 31.9 yen (As of November, 1999)	1RM = 30.4 yen (Average between 1998 to 2009)