

## 2 . Terms of Reference



# TERMS OF REFERENCE FOR THE MUDA RIVER BASIN FLOOD MITIGATION AND WATER RESOURCES DEVELOPMENT AND MANAGEMENT STUDY

## 1. BACKGROUND

The Muda River has a catchment area of 4,150 sq. km. and is located in the state of Kedah in the Northwestern part of Peninsula Malaysia. The lower reaches of this river form the boundary between the states of Kedah and Penang.

The Muda River has become the most important water resource for agriculture, industry and domestic consumption in both Kedah and Penang. The river is also extensively mined for construction sand. The mouth of the Muda River is also being used as a navigational channel by local fishing boats.

Rapid development within the catchment area coupled with the many functions and roles of the Muda River have resulted in many conflicting interests and problems. Among them are the flooding of riverine towns and settlements and agricultural areas, water resource shortage, river bank erosion, river siltation, water pollution and uncontrolled usage of the river corridor.

## 2. NEED FOR THE STUDY

### 2.1 Flood Mitigation

Flooding occurs in the Muda River Basin affecting towns, villages and agricultural areas. Towns such as Sik, Baling, and Kuala Ketil are flooded as often as 2 to 5 times a year. Other settlement areas such as Jeniang, Pekula and Kuala Muda are also subjected to annual monsoon flooding. Padi schemes along the river are also subjected to monsoon flooding. Flood damages amounted to about M\$1 to 2.5 million per year. Flooding not only causes damages but also results in great inconvenience and disturbance to the people living along the river. With increasing industrial development planned in and around the area, the alleviation of the flooding problem is now a prerequisite for the development of the region. Thus there is a need to formulate a comprehensive flood mitigation master plan for the Muda River.

### 2.2 Water Resources Management

The Muda River has been extensively exploited for its water resources by various agencies of the states of Kedah and Penang for agriculture, industry and domestic consumption. At present water impounded by the Muda Dam, constructed on the upper reaches of the Muda River, is diverted to the Kedah River (inter-basin transfer) for irrigating the padi areas under the Muda

Agricultural Development Authority with a total area of 98,000 hectares. The available water downstream of the dam is required to irrigate 7,860 ha of padi land in Kedah and 8020 ha in Penang. The Beris Dam, which is under design, will be constructed across the Beris River, a tributary of Muda River. Several other dams have also been identified for implementation which including the Naok Dam and the Reman Dam.

In addition, the Muda River also provides domestic and industrial water supply for both Kedah and Penang. At present there are eleven (11) stations in Kedah and one (1) in Penang abstracting 314,000 cubic metres of water per day. Another three more water supply abstraction stations with a total capacity of 227,000 cubic metres per day are planned to be constructed/ upgraded in the near future.

The continued and reliable supply of water from the Muda River is an important factor in the industrial, agricultural and overall development programmes of Kedah and Penang. It is envisaged that the dependence on the Muda Basin will continue to increase with time. With the setting up of the Kulim High Tech Park, HICOM Steel Mill, proposed textile industry, etc, there is now an urgent need to develop and manage the finite water resources of the Muda Basin to meet the ever-increasing demands of the different end users and to ensure that the quality of the water available in the basin remains in a suitable condition. In addition the water resources are shared between Kedah and Penang, so management of the water resources should look into the needs of both states. In view of the above it is necessary to carry out a study to formulate a comprehensive water resources management plan for the basin.

### 2.3 Sand Extraction And River Conservancy

The Muda River is also the main source of sand for the construction industry in the states of Kedah and Penang. At present about 87 sand extraction licences have been issued (78 in Kedah and 9 in Penang), of which about 50 are currently productive. It has long been observed that this activity is very disruptive to the river environment, causing severe and extensive river erosion affecting the river regime and endangering private properties and natural vegetation located along the river. It is therefore important that a study be carried out on the sand mining activities along the river. Appropriate guidelines for the management of sand mining activity need to be drawn up.

### 2.4 Maintenance Of River Mouth For Navigation

About 450 fishing boats operating from six local villages are currently using the Muda River mouth as a navigational channel. Siltation has to a certain extent made navigation during low tide difficult, hence affecting the livelihood of the fishermen. This problem is currently being studied under the National River

Mouths Study undertaken by JICA. A more detailed study to complement this study is deemed necessary. There also seems to be no proper loading and unloading facilities for the fishing boats.

## 2.5 River Management

Besides the roles of flood mitigation, water resources, navigation and sand extraction, the recreational potential as well as the preservation of the natural environment of the Muda River also need to be explored. The above functions and roles of the Muda River have given rise to many conflicting interests. To overcome the above-mentioned problems and to ensure sustainable water resources development for the future, a comprehensive river management plan needs to be developed encompassing catchment conservation, environmental enhancement, water quality, river corridor management and recreation.

## 3. OBJECTIVE OF THE STUDY

Taking into cognizance the many and diverse issues within the Muda River Basin, the objective of the Study will be to formulate comprehensive flood mitigation, water resources management and river management plan for the Muda River Basin that will include but not be limited to the following:

- i. Formulation of a flood mitigation master plan for the Muda River including river conservancy measures. This will include proposed flood mitigation works for the flood-prone areas, rehabilitation/ protection of eroded river banks as well as guidelines for sand extraction from the Muda River.
- ii. Formulation of a long-term water resources management plan for the Muda River that will ensure a reliable water supply for the various end users with due consideration to inter-state requirements of Kedah and Penang.
- iii. Formulation of a river management plan for the Muda River including aspects of catchment conservation, river water quality control and river corridor management including development of river-based recreational facilities.

The proposed plans shall inter-relate and give due consideration to other on-going projects and studies. The Study shall ensure more effective river utilisation avoiding haphazard exploitation and contribution to upkeep the river environment. The Study shall be the first comprehensive river management planning study in Malaysia and will be used as a guide and reference for other rivers in the country.

#### 4. SCOPE OF WORK

The Study shall examine the current and future trends of activities and practices which affect the Muda River and develop comprehensive plans satisfying the objective of the Study. The plans shall be formulated after close consultation with the relevant Federal, State and Local Authorities taking into consideration the related legislative and institutional arrangements. The detailed scope of work to be carried out in the Study shall comprise but not necessarily be limited to the following:

##### 4.1 Flood Mitigation Master Plan

4.1.1 Collate and review all available data and information on present and future land use, soils, sedimentation, geology, hydrology, meteorology, topography, river survey, flood and flood damages, sand mining, navigation, river bank erosion, etc.

4.1.2 Determine and collect additional data necessary for carrying out the Study.

4.1.3 Carry out hydrological and hydraulic analyses using appropriate methods and procedures including the possible use of advanced modeling techniques.

4.1.4 Formulate alternative flood mitigation plans comprising both structural and non-structural measures together with cost estimates and economic and financial analyses with a view to selecting the optimum plan.

4.1.5 Formulate a river conservancy plan, including identification of extent and causes of river erosion as well as mitigation measures both structural and non-structural for the river erosion areas. In the case of structural measures, alternatives for bank protection works together with cost estimates and economic analyses with the view to selecting the optimum plan shall be put up.

4.1.6 Review the existing sand mining practices and develop guidelines on the methods, extraction locations and conditions to be imposed on sand mining.

4.1.7 Study river sedimentation and determine the effect of river mouth siltation on flood flows as well as navigation of fishing boats and to study alternative methods of overcoming the problem.

4.1.8 Study and propose the loading and unloading facilities for fishing boats in the area.

##### 4.2 Water Resources Management Plan

4.2.1 Collate and review all available data and information on hydrology, water resources and water quality.

4.2.2 Determine and collect additional data necessary for carrying out study.

4.2.3 Review all available data and information and project future water demand for agriculture, industry and domestic consumption based on existing available development, structural and regional plans and the policies of the State Governments of Kedah and Penang.

4.2.4 Review and confirm the findings of previous studies on the water resources availability of the Muda River Basin.

4.2.5 Simulate and analyse the various water supply and demand conditions within the basin. A simulation model suitable for subsequent management of the water resources capable of variable demand and supply patterns shall be utilised for this purpose.

4.2.6 Formulate alternative plans for water resources management including guidelines and measures for the efficient use of water resources by end users for review and consideration by the Steering Committee. A contingency plan for managing the water resources in times of water shortage shall also be included.

4.2.7 Establish the minimum flow of the Muda River required for maintaining the river ecology.

#### 4.3 River Management Plan

4.3.1 Study and propose catchment protection measures required to ensure the availability of water resources and the performance of water resources facilities such as the Muda and Pedu dams.

4.3.2 Study the river corridors and propose a development and management plan for recreation, environmental conservation, and river reserve requirements.

4.3.3 Study the existing water quality condition of the Muda River and propose measures to sustain and/or improve the water quality for the intended users.

#### 4.4 Environmental Assessment

4.4.1 Assess the environmental impacts of the works proposed under the flood mitigation plan, water resources management plan and the river management plan and other related works. Recommend the necessary mitigating measures if the impacts are negative.

#### 5. Time Schedule And Reports

The Study shall be completed within 15 months. The time schedule for the submission of reports is as follows:

5.1 Bimonthly Progress Report (10 copies) - Covering the activities of the Study Team and the findings of the Study in the preceding two (2) months and giving an outline of the progress and an indication of proposed changes to the programme of works.

5.2 Inception Report (25 copies) - Outlining the approach to the Study, methodology, review of data availability, work schedule and programs, to be submitted within two (2) month from the date of commencement of the Study.

5.3 Interim Report (25 copies) - Summarizing up-to-date progress and findings on the eighth month of the study which among others shall include the various alternative plans envisaged complete with preliminary technical and economic analyses. It shall also provide the proposed format for the Final Report.

5.4 Draft Final Report (25 copies) - Containing all the detailed proposals, technical and economic analysis, complete with maps, diagrams, plans, working appendices, etc. to be submitted on the thirteenth month of the study.

5.5 Final Report (50 copies) - Incorporating the necessary revisions deemed appropriate within one month after receiving the Government's comments on the Draft Final Report.

## 6.0 Expertise Required

The following expertise may be required for satisfactory completion of the Study:

- i. Team Leader
- ii. Hydrologist/ Water Resources Engineer
- iii. Flood Control Engineer
- iv. River/ Hydraulic Engineer
- v. Coastal/ River Estuary Engineer
- vi. Enviromental/ Recreational/ Landscaping Expert
- vi. Geotechnical engineer
- vii. Surveyor
- viii. Socio-economist
- ix. Project economist



## 7.0 On-the-job Experience

The Government of Malaysia may wish to assign one or more professional staff for on-the-job training with the Study Team.

## 8.0 Government Responsibility

To facilitate the smooth conduct of the Study, the Government of Malaysia shall take the following necessary measures:

- i. To inform the members of the Study Team of any existing risk of the Study Area and to take any measures deemed necessary to secure the safety of the Study Team.
- ii. To secure the necessary entry permits for the Japanese Study Team to conduct field surveys in Malaysia and exempt them from consular fees.
- iii. To exempt the members of the Japanese Study Team from taxes and duties, as normally accorded under the provisions of Malaysian General Circular No. 1 of 1979, on equipment, machinery and other materials brought into and out of Malaysia for the conduct of the Study.
- iv. To exempt the members of the Japanese Study Team from Malaysian income tax and their official emoluments in respect of the period of assignment in Malaysia in connection with the conduct of the Study but the Government of Malaysia shall retain the right to take such emoluments into account for the purpose of assessing the amount to be applied to the income from other sources.
- v. To provide the necessary facilities to the Japanese Study Team for remittance as well as utilization of funds introduced into Malaysia from Japan in connection with the conduct of the Study.
- vi. To secure permission for entry into private properties or restricted areas for the conduct of the Study.
- vii. To provide the Japanese Study Team with medical services when needed but the expenses will be chargeable to the members of the Japanese Study Team.
- viii. To provide or assist in obtaining all available records, data, reports, plans, maps, aerial photographs and information necessary for the execution of the Study.
- ix. To make arrangements for the Japanese Study Team to take back to the home country data, reports, maps, aerial photographs and other materials connected with the Study, subject to approval of the Government of

Malaysia, in order to prepare the reports. All such information shall be returned to the Government of Malaysia before the end of the Study.

- x. To provide the Japanese Study Team with suitable office space with clerical services and necessary office equipment.
- xi. To provide the Japanese Study Team with adequate means of local transport for official travel only.
- xii. To indemnify any member of the Japanese Study Team in respect of damages arising from legal action against him in relation to any act performed or omissions made in undertaking the Study except when the two Governments agree that such a member is guilty of gross negligence or willful misconduct.

#### 9.0 Project Study Coordination/Monitoring

The Department of Irrigation and Drainage(DID), Malaysia shall be nominated as the main counterpart agency for the Study and the Economic Planning Unit as the main monitoring and coordinating body in relation to other relevant Government and non-Government organisations.

#### 10.0 Local Cost

The local costs of the proposed Study, which cover the provision of local facilities such as reasonable transport, office space, etc., for the Study Team, shall be met from the development vote of the Department of Irrigation and Drainage in accordance with the Malaysian General Circular No.1 of 1979.

### 3 . Scope of Work



SCOPE OF WORK  
FOR  
THE STUDY  
  
ON  
  
COMPREHENSIVE MANAGEMENT PLAN  
OF  
MUDA RIVER BASIN

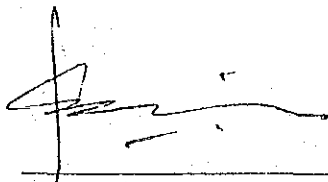
AGREED UPON BETWEEN

ECONOMIC PLANNING UNIT  
OF  
PRIME MINISTER'S DEPARTMENT  
ON BEHALF OF  
THE GOVERNMENT OF MALAYSIA

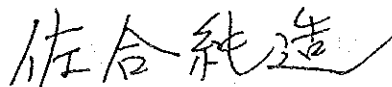
AND

JAPAN INTERNATIONAL COOPERATION AGENCY

KUALA LUMPUR, 27 OCTOBER, 1993



MR. KASSIM BIN SARBANI,  
for DIRECTOR GENERAL,  
ECONOMIC PLANNING UNIT,  
PRIME MINISTER'S DEPARTMENT  
on behalf of  
THE GOVERNMENT OF MALAYSIA.



MR. JUNZO SAGO,  
LEADER,  
PREPARATORY STUDY TEAM,  
JAPAN INTERNATIONAL  
COOPERATION AGENCY.

## I. INTRODUCTION

In response to the request of the Government of Malaysia, the Government of Japan has decided to conduct the Study on Comprehensive Management Plan of Muda River Basin in Malaysia (hereinafter referred to as "the Study") in accordance with the relevant laws and regulations in force in Japan.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programs of the Government of Japan, will undertake the Study in close cooperation with the authorities concerned of the Government of Malaysia.

The present document sets forth the scope of work with regard to the Study.

## II. OBJECTIVE OF THE STUDY

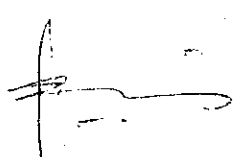
The objective of the Study is to formulate a comprehensive management plan of Muda River Basin, including flood mitigation, water resources management and river environment management.

## III. STUDY AREA

The Study will cover Muda River Basin and areas to which its water resources are supplied.

## IV. SCOPE OF THE STUDY

In order to achieve the objective mentioned above, the Study shall cover the following items.



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1. Data Collection and Review of Previous Studies

- 1) national, regional and local socio-economic data
- 2) topographical data and maps
- 3) meteorological and hydrological data
- 4) soil and geological data
- 5) river and its water utilization
- 6) existing hydraulic structures and other relevant facilities
- 7) present and future land use
- 8) existing projects and plans
- 9) institutions and regulations
- 10) land status
- 11) navigation activities
- 12) natural and social conditions
- 13) other related data and information

2. Field Investigations

(1) Field Reconnaissances

- 1) present river condition
- 2) flood damage
- 3) water utilization
- 4) sand mining
- 5) debris and sediment
- 6) river mouth condition
- 7) environment
- 8) institutions and regulations
- 9) others

(2) Field Survey

- 1) meteo-hydrological survey
- 2) topographic and river survey
- 3) aerial photography and mapping

- 4) hydrological survey
- 5) river-bed material survey
- 6) water quality survey
- 7) others

3. Study and Analysis

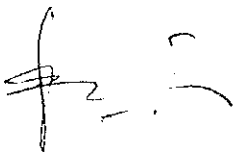
- 1) hydrological and hydraulic analysis
- 2) river-bed fluctuation analysis
- 3) flood mitigation
- 4) water demand and supply balance
- 5) river maintenance flow
- 6) river space environment
- 7) others

4. Formulation of a Comprehensive River Management Plan

- 1) formulation of a comprehensive river management plan, including flood mitigation, water resources management and river environment management
- 2) preliminary design of major facilities
- 3) cost estimation
- 4) initial environmental examination
- 5) project evaluation
- 6) implementation plan

V. STUDY SCHEDULE

The Study will be executed in accordance with the attached tentative schedule as in Appendix I.

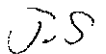
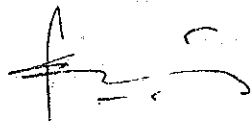




## VI. REPORTS

JICA shall prepare and submit the following reports in English to the Government of Malaysia.

- (1) Inception Report (IC/R)  
Forty (40) copies within forty-five (45) days after the commencement of the Study.
- (2) Progress Report(1) (P/R 1)  
Forty (40) copies within four (4) months after the commencement of the Study.
- (3) Interim Report (IT/R)  
Forty (40) copies within eight (8) months after the commencement of the Study.
- (4) Progress Report(2) (P/R 2)  
Forty (40) copies within eleven (11) months after the commencement of the Study.
- (5) Draft Final Report (DF/R)  
Forty (40) copies within fourteen (14) months after the commencement of the Study.  
The Government of Malaysia shall submit their comments within thirty (30) days after the receipt of the Draft Final Report.
- (6) Final Report (F/R)  
Eighty (80) copies within two (2) months after the receipt of the Government of Malaysia's comments on the Draft Final Report. All comments given by the Government of Malaysia will be complied with in the preparation of the Final Report.

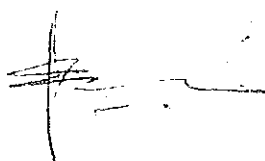


A Japanese study team (hereinafter referred to as "the Study Team") shall ensure that all data, information, maps, materials and findings connected with the Study are kept confidential and not revealed or disposed of to any third party except with the prior written consent of the Government of Malaysia. Such maps and aerial photographs are to be returned to the Government of Malaysia immediately upon completion of the Study. All reports when finalized and submitted to the Government of Malaysia shall remain the property of the Government of Malaysia.

## VII. UNDERTAKINGS OF THE GOVERNMENT OF MALAYSIA

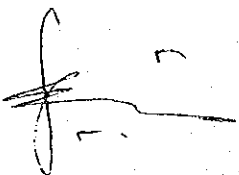
To facilitate the smooth conduct of the Study, the Government of Malaysia shall take the following necessary measures:

1. To inform the members of the Study Team of any existing risk in the study area and to take any measures deemed necessary to secure the safety of the Study Team.
2. To secure the necessary entry permits for the Study Team to conduct field survey in Malaysia and exempt them from consular fees.
3. To exempt the members of the Study Team from taxes and duties, as normally accorded under the provision of Malaysian General Circular No. 1 of 1979, on equipment, machinery and other materials brought into and out of Malaysia for the conduct of the Study.
4. To exempt the non-Malaysian members of the Study Team from Malaysian income tax on their official emoluments in respect of their period of assignment in Malaysia in connection with the conduct of the Study, but the Government of Malaysia shall retain the right to take such emoluments into account for the purpose of assessing the amount to be applied to income from other sources.
5. To provide the necessary facilities of the Study Team for remittance as well as utilization of funds introduced into Malaysia from Japan in connection with the implementation of the Study.



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6. To secure permission for entry into private properties or restricted areas for the implementation of the Study.
7. To make arrangements for the Study Team to take back to Japan the data, maps and materials connected with the Study, subject to the approval of the Government of Malaysia, in order to prepare the reports.
8. To provide the Study Team with medical services when needed but the expenses will be chargeable to the members of the Study Team.
9. To provide the Study Team with available data, maps and information necessary for the execution of the Study.
10. To appoint counterpart personnel to the Study Team during the Study period.
11. To provide the Study Team with suitable office space, with clerical service and necessary office equipments in Alor Setar and Kuala Lumpur.
12. To provide the Study Team with adequate means of local transport for official travel only.
13. To indemnify any member of the Study Team in respect of damages arising from any legal action against him in relation to any act performed or omissions made in undertaking the Study except when the two Governments agree that such a member is guilty of gross negligence or willful misconduct.
14. To nominate the Department of Irrigation and Drainage to act as a main counterpart agency for the Study and the Economic Planning Unit as a main coordinating body in relation to other relevant Governmental and non-Governmental organizations.



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## VIII. UNDERTAKING OF JICA

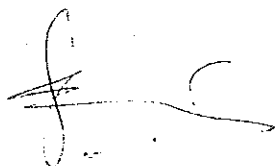
In order to conduct the Study, JICA shall take the following measures:

1. To dispatch, at its own expense, the Study Team to Malaysia, and
2. To pursue technology transfer to the Malaysian counterpart personnel in the course of the Study.

## IX. CONSULTATION

JICA and the Government of Malaysia shall consult each other in respect of any matter that is not agreed upon in this document and which may arise from or in connection with the Study.

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# APPENDIX I TENTATIVE STUDY SCHEDULE

MONTH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
WORK IN MALAYSIA																		
WORK IN JAPAN																		
REPORTS																		

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#### 4 . Minutes of Meeting





MINUTES OF MEETING  
ON

SCOPE OF WORK  
FOR  
THE STUDY

ON

COMPREHENSIVE MANAGEMENT PLAN  
OF  
MUDA RIVER BASIN


AGREED UPON BETWEEN

ECONOMIC PLANNING UNIT  
OF  
PRIME MINISTER'S DEPARTMENT  
ON BEHALF OF  
THE GOVERNMENT OF MALAYSIA

AND

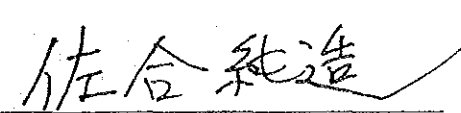
JAPAN INTERNATIONAL COOPERATION AGENCY

KUALA LUMPUR, 27 OCTOBER, 1993

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MR. ABD. BAKIR BIN HJ. ZIN,  
for DIRECTOR GENERAL,  
ECONOMIC PLANNING UNIT,  
PRIME MINISTER'S DEPARTMENT  
on behalf of  
THE GOVERNMENT OF MALAYSIA.

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MR. JUNZO SAGO,  
LEADER,  
PREPARATORY STUDY TEAM,  
JAPAN INTERNATIONAL  
COOPERATION AGENCY.

**MINUTES OF MEETING ON SCOPE OF WORK FOR  
THE STUDY ON COMPREHENSIVE MANAGEMENT PLAN  
OF MUDA RIVER BASIN**

DATE : 25TH. OCTOBER 1993

TIME : 10.00 am.

PLACE : BILEK GERAKAN,  
ECONOMIC PLANNING UNIT,  
PUSAT BANDAR DAMANSARA,  
KUALA LUMPUR.

1. INTRODUCTION

1.1 The Chairman welcomed all present to the meeting and he explained that the meeting was called to discuss The Scope Of Work for the Study on Comprehensive Management Plan of Muda River Basin that had been prepared by the JICA Preparatory Study Team.

2. ATTENDANCE

The list of attendance is as shown in Annex I.


3. BRIEFING ON DID REQUEST

3.1 The Director of River Engineering, Department of Irrigation and Drainage (DID), Ir. Teh Siew Keat briefed the meeting on the proposed study. The objective of the study is to formulate a comprehensive management plan of Muda River Basin. The three main components of the study are flood mitigation, water resources management and river environment management.

4. DISCUSSION

4.1 Overall Scope Of Work

The meeting agreed with the proposed scope of work with a few changes and clarifications mentioned below.



#### 4.2 Title Of Study

The meeting agreed that the study be called **The Study On Comprehensive Management Plan Of Muda River Basin.**

#### 4.3 Equipment

The following equipment to be used for the study was requested for JICA to acquire and subsequently to hand it over to the Malaysian Government (DID) on completion of the study. JICA Preparatory Study Team agreed to consider this.

- \* Two (2) numbers of desktop 486 computers with accessories and the necessary software,
- \* One (1) number of notebook computer,
- \* One (1) number of computer printer,
- \* One (1) number of fibreglass boat with outboard engine,
- \* One (1) number of photocopying machine, and
- \* One (1) number of facsimile machine.

#### 4.4 Study Period

It was agreed that the study period will be a total of 18 months, depending on the availability of data and information. There may be a need to extend the study period if certain data such as aerial photographs, survey, etc. need to be carried out. The study is expected to start in early 1994.

#### 4.5 Transfer Of Technology

4.5.1 Regarding the request by the Malaysian side to involve local consultants in carrying out the study, JICA Preparatory Study Team will consider the request.

4.5.2 Regarding the request by the Malaysian side, JICA Preparatory Study Team agreed to consider organizing a seminar to disseminate the study findings and recommendations at the end of the study as Muda River management involves many agencies and departments.

#### 4.6 Monitoring System

Regarding the Malaysian side's request that there should be an effective monitoring system, JICA Preparatory Study Team explained that a plan for monitoring system would be proposed wherever needed, hence there is no necessity to itemise it separately.

#### 4.7 Geographical Information System

The Malaysian side requested that Geographical Information System (GIS) be set up as part of the study and subsequently handed over to the Malaysian Government (DID) on completion of the study. JICA Preparatory Study Team mentioned that satellite imagery would be used as part of the study.

#### 4.8 Reservoir And Water Bodies

The meeting agreed that water bodies such as reservoir are considered as part of the river system. Their usage for recreation should be looked at and guidelines should be drawn up in this respect.

#### 4.9 River Mouth Problem

The meeting agreed that navigational problem at the river mouth should be studied leading to recommendations and proposals but no design would be put up for loading and unloading facilities.

#### 4.10 Counterpart Agency

The meeting agreed that the Department of Irrigation and Drainage is to act as the main counterpart agency for the study and the Economic Planning Unit as the main coordinating body.

#### 4.11 Committees

During the study, the Steering Committee (with EPU as chairman) and the Technical Committee (with DID as chairman) would comprise of all relevant agencies/departments as members.

### 5. CONCLUSION

The Chairman thanked the members and the JICA Preparatory Study Team for their contribution to the meeting. The meeting was adjourned at 12.30 pm.

LIST OF ATTENDANCE

MALAYSIAN SIDE

Mr. Abd. Bakir bin Hj. Zin  
Economic Planning Unit - Chairman

Mr. Badaruddin bin Mahyudin  
Economic Planning Unit

Ir. Teh Siew Keat  
Department of Irrigation and Drainage

Ir. Chop Ai Kuang  
Department of Irrigation and Drainage

Mr. Koshy Thomas  
Ministry of Agriculture

Mr. Hideaki Kawasaki  
JICA expert with DID

JICA PREPARATORY STUDY TEAM

Mr. Junzo Sago  
Ministry of Construction - Team Leader

Mr. Kesajiro Yanagisawa  
Ministry of Construction

Mr. Kiyotaka Otsuki  
JICA, Japan

Mr. Takashi Hiruta  
Nippon Koei Co. Ltd.

Mr. Shusuke Minato  
Nippon Koei Co. Ltd.

JICA MALAYSIA

Mr. Satoru Kohiyama

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