

## 附 属 资 料



S/Wミッションにかかわる資料

THE SCOPE OF WORK  
FOR  
THE FISHERY RESOURCES STUDY  
OF THE AMAZON AND TOCANTINS RIVER MOUTH AREAS  
IN THE FEDERATIVE REPUBLIC OF BRAZIL

AGREED UPON BETWEEN  
CONSELHO NACIONAL DE DESENVOLVIMENTO  
CIENTÍFICO E TECNOLÓGICO  
AND  
THE JAPAN INTERNATIONAL COOPERATION AGENCY

BRASILIA, 12/JANUARY/95



*Lindolpho C. D.*

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President  
Conselho Nacional de Desenvolvimento  
Científico e Tecnológico (CNPq)

*Yasuhiro Takai*

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Director  
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Mr. José Guilherme Maia  
General Director  
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Mrs. Nilde Lago Pinheiro  
President  
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## 1. INTRODUCTION

In response to the request of the Government of the Federative Republic of Brazil, (hereinafter referred to as "the Government of Brazil"), the Government of Japan has decided to conduct the Fishery Resources Study of the Amazon and Tocantins River Mouth Areas in the Federative Republic of Brazil (hereinafter referred to as "the Study") together with the Government of Brazil and in accordance with the Basic Agreement on Technical Cooperation between the Government of Japan and the Government of Brazil signed on 22 September, 1970 (hereinafter referred to as "the Basic Agreement").

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, the Brazilian Cooperation Agency (hereinafter referred to as "ABC") as legal intervenient agency on behalf of the Government of Brazil, National Research Council (CNPq)/Museu Paraense Emilio Goeldi (hereinafter referred to as "MPEG"), and Brazilian Institute for Environment and Renewable Natural Resources (hereinafter referred to as "IBAMA") as implementing agencies, will undertake the Study in close cooperation with the authorities concerned of the Government of Brazil.

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

## 2. OBJECTIVES OF THE STUDY

The objectives of the Study are :

- (1) to evaluate fishery resources of the Amazon and Tocantins River Mouth Areas to suggest proper measures for the sustainable utilization of fishery resources,
- (2) to carry out technology transfer about fishery resources survey in the course of the Study to the counterpart personnel of the Government of Brazil.

## 3. STUDY AREA

The area of the resources survey will be defined as the Amazon and Tocantins River Mouth Areas including canals (Latitude 1° 10' S to 2° 30' N, Longitude 47° 50' to 50° 30' W) in Brazil (shown in APPENDIX-1 as attached hereto).

## 4. OUTLINE OF THE STUDY

The Study will consist of the following two phases. Work plans in each phase are as follows:

### 4-1 Work in Phase 1

#### (1) Basic investigation

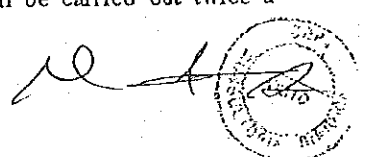
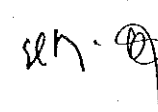
The basic investigation will consist of the collection and analysis of the following information:

- a. Natural conditions,
- b. Socio-economic conditions.
- c. Fisheries biology (catch data, length composition, statistics, etc.),
- d. Fisheries organization and insitution,
- e. Fishing communities.

#### (2) Resources survey (Stage 1)

In order to evaluate fishery resources, the resources survey will be carried out twice a year. The resources survey will include the following items:

- a. Ground fish survey.



- b. Environmental conditions (water temperature, salinity, etc.).
- c. Fisheries biological research (age, sex, maturity, etc.).
- d. Analysis of collected data.

#### 4-2 Work in phase 2

##### (1) Resources survey (Stage 2)

In order to supplement the Stage 1 survey, the Stage 2 survey will be continuation of the Stage 1 survey:

- a. Ground fish survey.
- b. Environmental conditions (water temperature, salinity, etc.).
- c. Fisheries biological research (age, sex, maturity, etc.).
- d. Analysis of collected data.

##### (2) Analysis of the collected data

The analysis of the data collected in the Resources Survey and the evaluation of the following items will be carried out:

- Stock assessment,
- Distribution patterns,
- Evaluation of the possibility of utilization of unexploited fish resources.

##### (3) Formulation of suggestions regarding sustainable utilization of resources, which would include the following items:

- Management of fishing ground,
- Fishery management unit and system

## 5. WORK SCHEDULE

The Study shall be carried out in accordance with the attached tentative work schedule (APPENDIX -2).

## 6. REPORTS

JICA shall prepare the following reports in English for the Government of Brazil (APPENDIX -2).

##### (1) Inception Report:

Twenty (20) copies at the beginning of Phase 1 field work.

##### (2) Interim Report:

Twenty (20) copies at the end of Phase 1 study.

##### (3) Draft Final Report:

Twenty (20) copies at the end of Phase 2 study. The Government of Brazil will provide JICA with its comments on the Draft Final Report within one (1) month after receipt of the Draft Final Report.

##### (4) Final Report:

Fifty (50) copies within two (2) months after receipt of the comments from the Government of Brazil on the Draft Final Report.

## 7. UNDERTAKING OF THE GOVERNMENT OF BRAZIL

(1) The Government of Brazil shall accord privileges, exemptions and other benefits to the Japanese Study team (hereinafter referred to as "the Team") in accordance with the Basic Agreement.

(2) To facilitate the smooth conduct of the Study, the Government of Brazil shall take



necessary measures :

- a. to secure the safety of the Team.
  - b. to permit the members of the Team to enter, leave and sojourn in Brazil for the duration of their assignment therein, and exempt them from foreign registration requirements and consular fees.
  - c. to exempt the members of the Team from taxes, duties and other charges on equipment, machinery and other materials brought into Brazil for the conduct of the Study.
  - d. to exempt the members of the Team from income tax and charges of any kind imposed on or in connection with any emoluments or allowance paid to the members of the Team for their services in connection with the implementation of the Study.
  - e. to provide necessary facilities to the Team for the remittance as well as utilization of the funds introduced into the Federative Republic Brazil from Japan in connection with the implementation of the Study.
  - f. to secure permission for the Team to take all data and documents (including maps, photographs) related to the Study out of Brazil to Japan.
  - g. to provide medical services as needed. Its expenses will be charged on members of the Team.
  - h. to secure clearance for the use of communication facilities including transceivers.
- (3) The Government of Brazil shall bear claims, if any arise against the members of the Team resulting from, occurring in the course of, or otherwise connected with the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the members of the Team.
- (4) MPEG and IBAMA shall act as counterpart agencies to the Team and also as the coordinating body in relations with other governmental and non-governmental organizations concerned with the smooth implementation of the Study.
- (5) MPEG shall, at its own expense, provide the Team with the following, in cooperation with other organizations concerned:
- a. available data, maps and information related to the Study.
  - b. counterpart personnel.
  - c. suitable office space with necessary equipment.
  - d. credentials or identification cards.
- (6) IBAMA shall, at its own expense, provide the Team with counterpart personnel and available information related to the Study.
- (7) MPEG and IBAMA will secure permission for entry into relevant areas for the conduct of the Study, within the laws and regulations in force in the Federative Republic of Brazil.

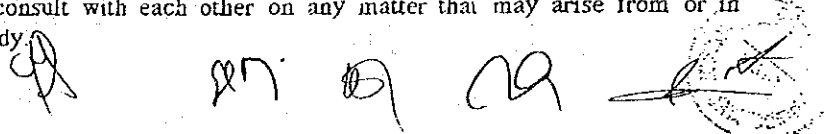
8. UNDERTAKING OF JICA (the official agency responsible for the implementation of the technical cooperation programs of the Government of Japan)

For the implementation of the Study, JICA shall take the following measures:

- (1) To dispatch, at its own expense, the Team to the Brazil.
- (2) To pursue technology transfer to the Brazilian counterpart personnel in the course of the Study.
- (3) To provide the necessary research equipment for the implementation of the Study as previously discussed and approved by both sides.

9. OTHERS

- (1) JICA and MPEG shall consult with each other on any matter that may arise from or in connection with the Study.

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APPENDIX 2

TENTATIVE WORK SCHEDULE OF THE STUDY

	5	10	15	20	25	(MONTH)
The Study in Brasil	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The Study in Japan	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Submission of Reports	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Phase	Phase 1		Phase 2			

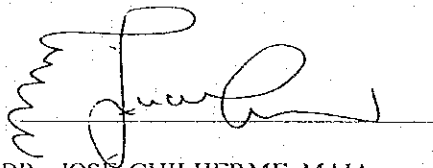
Note: IC/R: Inception Report    IT/R: Interim Report    DF/R: Draft Final Report    F/R: Final Report

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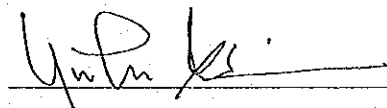
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MINUTES OF THE MEETING  
ON  
THE SCOPE OF WORK  
FOR  
THE FISHERY RESOURCES STUDY OF THE AMAZON AND TOCANTINS  
RIVER MOUTH AREAS  
IN THE FEDERATIVE REPUBLIC OF BRASIL

Belém, December 19, 1994



DR. JOSÉ GUILHERME MAIA  
GENERAL DIRECTOR,  
MUSEU PARAENSE  
EMILIO GOELDI  
BRAZIL



DR. YASUHIKO TAKI  
LEADER,  
PREPARATORY STUDY TEAM  
JAPAN INTERNATIONAL  
COOPERATION AGENCY  
JAPAN

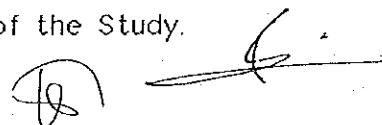
In response to the request of the Government of Federative Republic of Brazil, the preparatory study team (hereinafter referred to as "the Preparatory Team") organized by the Japan International Cooperation Agency (hereinafter referred to as "JICA"), and headed by Dr. YASUHIKO TAKI, visited Brazil from December 11 to 23, 1994 for the purpose of discussing and confirming the Scope of Work for The Fishery Resources Study of the Amazon and Tocantins River Mouth Areas in the Federative Republic of Brazil (hereinafter referred to as "the Study").

The Preparatory Team had a series of discussions with the officials concerned of Museu Paraense Emilio Goeldi (hereinafter referred to as "MPEG"), Brazilian Institute for Environment and Renewable Natural Resources (hereinafter referred to as "IBAMA"), and the Brazilian Cooperation Agency (hereinafter referred to as "ABC") on the Scope of Work for the Study. The list of participants in a series of meetings is attached in ANNEX-2.

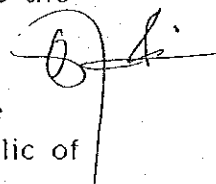
As the result of discussions, MPEG, IBAMA, ABC and the Preparatory Team agreed on the Scope of Work for the Study.

This document sets forth the main issues discussed and agreed upon by both sides in relation to the Scope of Work for the Study.

1. It was suggested by the ABC representative, and agreed that the signature of the Scope of Work will await the approval by IBAMA and CIRM (Interministerial Council of Marine Resources), in accordance with the laws and regulations in force in the Federative Republic of Brazil. This approval is expected to be obtained within two weeks.
2. MPEG will be directly responsible for the implementation of the Study, and will act as the counterpart organization to the Japanese study team and as the coordinating body in relation to other relevant authorities concerned for the smooth implementation of the Study.
3. MPEG promised to cooperate and work together with the Japanese study team for the implementation of the Study.



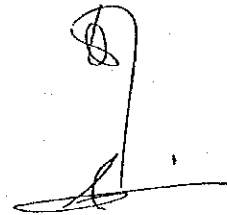
4. MPEG requested that the following equipment necessary for the Study be procured by JICA. The Preparatory Team promised to convey its request to the Government of Japan.
  - a) Navigation equipment
  - b) Fishing monitoring apparatus
  - c) Oceanographic research equipment
  - d) Equipment for preparation of rigid structures for age determination
  - e) Optical equipment
  - f) Personal computer
  - g) Photocopy machine
  - h) Vehicle
  - g) Other necessary equipment and material
  
5. Both sides discussed and agreed that a seminar on the results of the Study would be held at the end of the Study period at Belem.
  
6. MPEG promised to offer suitable office space with necessary equipment in Belem.
  
7. MPEG requested the training of counterpart personnel in Japan for effective transfer of technology in connection with the Study. The Preparatory Team promised to convey its request to the Government of Japan.
  
8. Both sides discussed and agreed that a committee should be organized for examination of the Study at the time of the explanation of Inception Report, Interim Report, and Draft Final Report. The committee will be composed of members of MPEG, IBAMA, Federative University of PARA, JICA, and other interested parties, and will be chaired by the Director of MPEG. The members of this committee will be defined at the time of the explanation of the Inception Report.
  
9. If licenses are required for the implementation of the Study by the fishery regulations of the Federative Republic of



Brasil, MPEG will take the necessary measures for granting or obtaining such licenses before the commencement of the Study.

10. Both sides discussed and agreed that the research vessel for the implementation of the Study will be procured by JICA.
11. MPEG expressed to desire to receive the terms of reference of the study team members in due time.
12. In response to the request of MPEG, the DRAFT PROJECT OUTLINE, which was prepared by MPEG as materials of the explanation for the Government of Brasil is attached hereto(ANNEX-1).

Both sides agreed that the contents and schedule of the Study which were officially agreed by both sides are those described in the Scope of Wrok, and the Scope of work has priority over the the DRAFT PROJJECT OUTLINE.

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## ANNEX I

### DRAFT PROJECT OUTLINE (prepared by MPEG)

#### FISHERY RESOURCES STUDY OF THE AMAZON AND TOCANTINS RIVER MOUTH AREA

##### 1. INTRODUCTION

The fishing of piramutaba (*Brachyplatystoma vaillanti*) is one of the most important commercial activities in the estuary of the Amazon river. Increase of fishing effort in the past two decades has resulted in overexploitation of the species.

Museu Paraense Emilio Goeldi (MPEG) has been studying the biology and the ecology of piramutaba and other large-size catfishes of the Amazon river basin for the last ten years. Based on data obtained through commercial and small-scale fisheries, it is now known that many species of catfish and other economically important fishes utilize the estuary of the Amazon river as their nursery and trophic grounds. However, there is still the need for information on fish biomass, diversity, spatial and temporal distribution, and structure of fish communities, in order to understand the complete life cycle and ecology of those species. This information can be obtained by means of scientific fishing, which has not been done to date. Knowledge resulting from such work should be conducive to the sustainable exploitation of piramutaba and other important species.

This document is a tentative outline for a project aiming to study the ecology and fisheries in the Amazonian estuary conceived developed by Museu Paraense Emilio Goeldi (MPEG), with the participation of Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis (IBAMA), and the technical assistance of the Japan International Cooperation Agency (JICA). Other resource evaluation projects currently being planned for or implemented in the Amazon area, inshore or offshore, do not overlap with the present study neither in scope nor in the geographic area of investigation.

##### 2. OBJECTIVES

The basic objectives of the Study are:

- to evaluate fishery resources in the Amazon and Tocantins river mouth areas;
- to suggest proper measures for the sustainable utilization of those resources;
- to examine the possibility of sustainable exploitation of alternative fish resources;
- to contribute to the training of personnel in fish stock assessment and fish ecology.

##### 3. METHODOLOGY

###### 3.1. Area of study

The area of study is defined as the portion of the estuary formed by the mouths of rivers Amazonas and Tocantins between latitudes 2°30'N and 1°10'S and longitudes 47°50'W and 50°30'W, limited offshore by the

depth line of 20 m. For quantitative data sampling, the area of study will be limited inshore by the depth line of 4 m, except at the river channel entrances, where the boundaries will be established during the survey itself because of local topographic complexities. For qualitative data sampling, the area of study will include Marajó Bay and the inner delta of the Amazon, bound by the previously set coordinates.

### 3.2. Sampling methodology

The stratified-random bottom trawl survey method will be employed. This method consists in obtaining replicate bottom trawl samples in previously selected areas, enabling the generation of the following information on the demersal fauna:

- structure and diversity
- biomass per area
- age structure of the main species captured
- ecology of the estuary (spatial distribution of the species and their dependency on environmental variables).

The trawl survey will be conducted over a two-year period, in four stages of two months each, in different seasons of the year (see work schedule). Each 60-day stage will comprise:

- two 15-day trips, including 12 days for trawling, for quantitative data sampling. A minimum of four daily hauls are expected, totalling at least one hundred per stage.
- one trip for qualitative data sampling, the duration of which is to be kept flexible.

Stratification will be defined according to depth, salinity, offshore distance and bottom substrate. The number and duration of trawls per stratum will be standardized as the strata are defined, and two trawling vessels will be needed for twin-trawling.

The total catch in weight per haul will be measured for each species, which will be identified and counted. A sample of each commercially important species will be obtained for individual weight and length measuring, and a subsample taken for determination of age, sex, maturity stage and stomach contents. All data will be immediately entered in a computer database upon landing. Age and stomach contents will be analyzed.

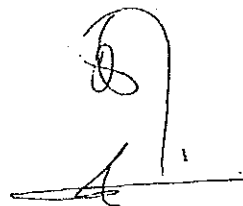
### 3.3. Age determination methodology

Age determination will be carried out by age-ring counts in otoliths, spines, scales or other rigid anatomical parts, by means of a video-monitored microscope.

### 3.4. Target species for alternative fish resources survey

In addition to the aforementioned piramutaba, the following species will be selected as target species for a resources survey:

- dourada (*Brachyplatystoma flavicans*)
- filhote (*Brachyplatystoma filamentosum*)
- pescada-branca (*Plagioscyon squamosissimus*)
- pescada-amarela (*Cynoscion acoupa*)
- pescada-gó (*Macrodon ancylodon*)
- guriyuba (*Arius parkeri*)



Complete quantitative data will be taken on all those species, as well as on any others that eventually are found to be important (regarding size, abundance and economic interest) in the course of the survey.

#### 4. HUMAN RESOURCES

##### 4.1. Japanese expert staff

The project will require the assistance of at least three experts invited by JICA, with the following professional profiles:

- Two specialists in fish ground survey, experienced in stock assessment by means of bottom trawl sampling, to travel aboard the fishing vessels and help in the trawl operations. They are expected to stay in Belém for a continuous period of at least two months.
- One specialist knowledgeable in fish age determination methods such as age-ring reading in rigid anatomical structures, use of video-monitored microscopes, etc. He/she is expected to stay in Belém for a minimum continuous period of three months.

In addition, it will be desirable to examine the possibility of asking a qualified Japanese research scientist to eventually advise and train the Brazilian counterpart personnel, either in Japan or in Brazil, in the study of fish growth and in the preparation of the final report.

##### 4.2. Brazilian counterpart staff

MPEG: 3 Ph.D.-level researchers, 1 B.Sc.-level researcher, 2 technicians, several undergraduate students.

IBAMA: 2 B.Sc.-level researchers, 2 technicians.

#### 5. EQUIPMENT AND MATERIAL RESOURCES NEEDED

5.1. Priority level one (equipment without which the implementation of the study will be impossible):

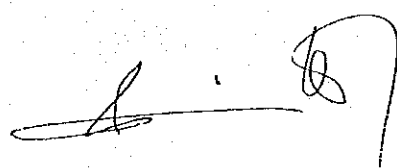
- two trawling vessels equipped with trawling nets and navigational equipment (echosound, sonar, GPS, etc.)
- oceanographic research equipment (salinometer, CTD, pHmeter, etc.)
- optical equipment (video-assisted microscope for age-ring examination, photo/video microscopes, binocular microscopes)
- equipment for preparation of rigid structures for age determination (resin-block casting equipment, block-cutting saws)

5.2. Priority level two (equipment without which the implementation of the study will be severely hampered)

- personal computer(s) and printer(s)
- variously-sized containers for sampling
- bottles
- other laboratory equipment

5.3. Priority level three (equipment without which there will be difficulties in rapid communication)

- small-load transportation vehicle (jeep, pickup truck, etc.)
- fax machine
- copying machine





## 6. TENTATIVE WORK SCHEDULE

### 6.1. Trawling operations schedule

The trawling operations are planned to be undertaken in two distinct stages in each year, in different seasons, of one or two months of duration each. In the first year, the First Stage will comprise August and September 1995 (summer, or dry season); the Second Stage will cover February and March 1996 (winter, or rainy season). The same schedule of summer and winter collections are foreseen for the same months in, respectively, summer 1996 (August-September 1996) and winter 1997 (February-March 1997).

### 6.2. Timetable for the expert staff

#### 6.2.1. First Stage (Dry Season I)

In June 1995 a scientific meeting involving all Japanese and Brazilian team members is expected. In this meeting the fine details of the study will be jointly worked out, establishing the number of sampling areas, the number of replications, etc. By that time the *Inception Report* should be prepared.

The three experts should arrive in Belém by June 1995 to help making all necessary preparations. The survey proper will begin in August 1995. The specialists in fish ground survey (FGS) will be asked to help in the stratification of the study area and take turns in the experimental fishing trips. The expert in fish age determination (FAD) should set up his/her laboratory with all necessary optical instruments assembled and readied by the time the first trip leaves port. As stated before, the FAD specialist is expected to stay at least until October 1995, in order to analyze and discuss the data obtained.

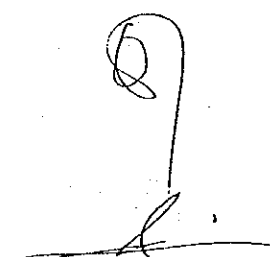
#### 6.2.2. Second Stage (Rainy Season I)

The time commitment required for the three experts will be about the same as for the first Stage, except for the pre-survey preparatory period which could be shortened. The experts should be in Belém by March 1996 and expected to resume the activities of the previous stage; they should stay over a period of two (FGS specialists) or three (FAD specialist) months. The *Interim Report* should be prepared around May 1996.

#### 6.2.3. Third Stage (Dry Season II) and Fourth Stage (Rainy Season II)

These stages will extend over the same calendar months covered, respectively, by the First and Second Stages as defined above. The preparatory period envisioned for the First Stage will probably be dispensed with for the Third Stage.

The *Draft Final Report* will be prepared in May 1997 and the *Final Report* should be issued by July 1997.



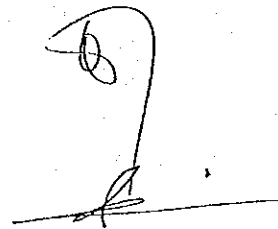
6.2.4. Summary of the timetable

month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
year	1995										1996				
calendar month	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M
FGS experts				x		x	x					x	x		
FAD expert				x		x	x	x				x	x	x	
inception report				x											
interim report															x

month	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
year	1996										1997				
calendar month	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A
FGS experts			x	x					x	x					
FAD expert			x	x	x				x	x	x				
draft final rept.												x			
final report														x	

7. OTHER ASPECTS AND DETAILS OF THE PROJECT

All other aspects and details of the project are to be proposed and discussed between the involved parties.



ANNEX-2

LIST OF PARTICIPANTS

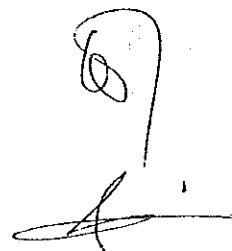
Subject : Discussion of the Scope of Work  
Date : From December 14 to 17, 1994  
Place : MPEG

Brasilian Side

Name	Position
Dr. José Guilherme Maia	General Director, MPEG
Dr. Ronaldo Borges Barthem	Research Associate, MPEG
Dr. Horacio Higuchi	Research Associate, MPEG
Dr. Victoria J. Isaac	Visitant Research Associate, MPEG
Ms Elyan Dias Lopes	International Cooperation , MPEG
Mr. Francisco Osvaldo Alves Barbosa	Assessor Internacional, IBAMA
Mr. Italo José A Vieira	Chefe do Centro de Pesquisa e Extensao Pesqueira do Norte, IBAMA
Mr. Aquiles Rodrigues de Oliveira	Chefe Procuradoria Juridica, CNPq-Brasilia
Ms Katia Lanvzia	Advogada, CNPq-Brasilia
Mr. Marcos Lins Faustino	Staff, ABC-Brasilia

Japanese Side

Name	Position
Prof. Dr. Yasuhiko Taki	Leader of Mission, JICA Preparatory Study Team
Mr. Noritaka Asakawa	Member, JICA Preparatory Study Team
Dr. Kazuya Nagasawa	Member, JICA Preparatory Study Team
Mr. Akinori Ono	Member, JICA Preparatory Study Team
Mr. Ryouichi Ideguchi	Member, JICA Preparatory Study Team
Mr. Akihiro Matsumoto	Staff, JICA-Belém
Mr. Yasuhiro Onishi	Staff, JICA-Belém











JICA