5. 研修員の受入れについて

合同委員会においてイ側は研究者等の日本での研修員受入れ割当の拡大を強く要望した（別添討議録参照のこと）ところであるが，本件にかかる討議内容については次のとおりである。

(1) 昭和57年度での受入れ

2名の受入れ枠が水産室において確保されていることから，2名の受入れは実施されるはずである。1名については農業研究開発庁Sadikin長官（Director General of Agency for Agricultural Research and Development）が57年10月16-24日まで養殖施設視察，農林水産技術会議事務局との討議等を目的として来日することになっている。

(注) 同長官は10月時期に都合により来日できなかった。再度日程の調整が試みられたが，58年5月現在まだ実現の見通しは立っていない。

他の1名については，餌料生物の培養等を主要研究テーマにするカウンターパートの来日につき，イ側から推せんがなされた。

両名の最終日程及び視察／研修内容については，日本側プロジェクト・リーダーとイ側プロジェクト・マネージャーとの間で必要な調整がなされた後，JICAに連絡されることになっている。

(2) 58年度での受入れ

養殖関連研究者の日本での研修は，イ国が将来の本格実験を遂行するに当たって，又プロジェクト自体の目標達成に極めて重要であるとの認識に立って，イ側は少なくとも3名の研修員を受け入れてもらいたいと強く要望した。

(3) 日本側としては，予算上厳しい制約があるので，最大限2名を受け入れることとしたいとのコメントが付された。

6. 専門家の派遣について

(1) 57年度における専門家派遣

長期専門家としては，下記分野において派遣されることになろう。なお，当該分野についてはすでに派遣中であるので，事実を確認したまでである。

1) チーム・リーダー　　59年3月まで
2) 魚類養殖　　〃
3) 〃　　〃

4）業　務　調　整　　59年3月まで

5）貝　類　養　殖　　58年3月まで

なお短期専門家については，57 年度予算をもって下記のいずれかの分野において，少なくとも3名が派遣される計画である。

a）化学分析

b）養殖施設

c）魚類養殖，又は

d）貝類養殖

短期専門家の詳細な作業計画及び日程については日本側リーダーとイ側マネージーとの間で今次の年間実施計画及びその進捗にあわせて，速やかに調整の上，ＪＩＣＡに連絡することになっている。

特に，化学分析及び養殖施設の短期専門家が派遣される際には，少なくとも，各々にカウンターパートが配属されるよう，日本側から強い要望がなされた。又，それらカウンターパートは，プロジェクトの残余期間中継続して手当てされるべきである。

(2)　58年度における専門家派遣

今次の年間実施計画に従って，プロジェクトの所定の目的を達成するために下記の分野の短期専門家を派遣してほしいとの強い要望がイ側からなされた。

a）魚類養殖

b）魚病対策

c）餌　　料

d）化学分析

e）養殖施設

イ側によって設定されるプライオリティ及びプロジェクト全体の進捗及び，全ての関連要素を十分考慮に入れつつ，少なくとも3名の短期専門家を派遣するよう努力することになろうとのコメントが日本側からなされた。

7.　養殖機材について

(1)　機材内容についての両国協議

今回策定された年間実施計画及びＲ／Ｄの機材供与条項に従って，プロジェクトを更に効果的に実施する上で必要とされる。

57－58 年度供与機材の詳細な内容及び仕様をできるだけ早期かつ十分協議する旨，合

同委員会で合意された。

(2) イ側は，残余協力期間において，下記の目的に沿った養殖関連資機材を供与してくれるよう強く要望した。

1) 十分機能させうる形でボジョネガラ・ステーションの全ての養殖施設をイ側が建設することができるまでの暫定的措置として，海水・淡水取水施設，空気供給システム，発電施設を改善するため資機材。

2) ボジョネガラ・ステーションにおける最少必要海水供給予定量（100ton／日）に基づいての最少限の規模の実験研究作業を実施するために必要な資機材

現在の養殖及びインフラ関連施設，機材に関する諸条件からすれば，かかる最少限の規模の養殖実験作業とならざるをえない旨，イ側は合意した。

3) 日本側からの資機材の供与と関連して，イ側はボジョネガラ・ステーションでの開所式を 58 年3月末までに行いうることを期待しているとの表明を行った。目下建設中の同ステーションは，日本がこれまでモデル・インフラ事業を行ってきたフィールド・ステーションの一つである。また，バンテン湾のカラガンツステーションに付属する主要なフィールド・ステーションでもある。

8. イ側への申し入れ事項

日本側は，合同委員会において，プロジェクトを一層効果的に実施するために，次のような措置をとるようイ側に対して強く要望した。

1) インドネシア・カウンターパートの増員

一般的に，助手を含むカウンターパートの量的拡大につき強く要望した。これは，イ側の国家政策，すなわち，より多くの養殖関連研究者を育成するという政策と合致するものであり，又，プロジェクトにおいて一層効果を上げる上で肝要である。

2) ケージ・ネットでの育成魚等の効果的な保護について

特にカラガンツ及びボジョネガラ・ステーションのケージ・ネットにおいて育成されている全ての養殖実験魚並びに他の養殖関連実験・研究施設を保護するために，もっと効果的な措置がとられるべきである。厳格な 24 時間監視システムが特にボジョネガラ・ステーションでは望ましい。

3) 日本側及びイ側によって建設／供与された施設の修理及び保守

(1) イ側のみならず，日本側によって建設された施設／供与された全ての資機材，船，車輌がイ側による効果的な予算保証をもって常時良好かつ効果的に使用しうる条件下で保

守管理されるべきであると日本側によって強く要望された。

(2) 上記の施設及び機材の点検及び保守はもっとシステム化されるべきである。

4) 施設の建設について

特にカラガンツ及びボジョネガラ・ステーションにおいてイ側による建設が予定されているか，又は建設中の全ての養殖及びインフラ関連施設は，できるだけ早期に効果的に使用しうるようイ側によって完成されるべきである。

但し，同ステーションにおける実験・研究の内容，規模にかなりの制約をもたらしているところの現存の全ての施設，機材を駆使して，上記施設の完成までの期間，可能な限りの実験，研究がなされることになろう。

5) 技術マニュアルの作成について

ＪＩＣＡが魚貝養殖にかかる技術マニュアルを作成し，プロジェクトの終了時にイ側に提出するか否かについては双方の熟慮を経て，最終結論が出されることになろう。この点，日本側も合意した。

かかるマニュアルについては，これまでの共同実験，研究作業を通じて，蓄積／開発されてきたか，又は今後そうされることになる全ての重要かつ有用な養殖関連データ及び他の情報（日本人専門家のコメント及び勧告を含めて）をインテグレートしたものが考えられている。

9. 養殖実験施設状況及び実験規模について

カラガンツ及びボジョネガラ・ステーションの施設配置状況については図１及び２のとおりである。

特にボジョネガラ・ステーションにおける養殖実験施設整備上問題になっているのは，電気供給及び海水のインテイクである。ボジョネガラ・ステーションでは電気供給及びエアレーションの目的で発電機が５台設置されているが，設置が不完全（排気ガスが室から十分排出されない，補助燃料タンク未設置等）な状態にあるか，又は，操作上の未熟・保守点検及び整備の不完全などによって２～３の発電機は十分稼動しない状態にある。この点，合同委員会において，十分な予算手当て及び常時効果的に稼動させるための措置をとるよう強くイ側に申し入れた。又，海水の取水についても，２００Ｍ沖出しされている土管（各々１Ｍ長）の接続部分から泥水が入りこみ，養殖実験に必要な海水の供給が困難であることから，改善を申し入れた。しかし，延長後の残余期間は，１年半くらいしか残されておらず早急の改善がイ側によってとられない場合は，今回作定の年間実施計画も十分達成されないという事態が予想されることから日本側

も何らかの対応策を検討すべき段階にある。

上記対応策としては，下記のことが考えられる。

(1) インドネシア人電気技師では，発電機を完全に整備・修理することは困難であるのが実情であるので，わが方から電気技師を派遣して配線・配電盤等の再整備を行う。

(2) 発電機の修理が不可能であるならば，緊急止むをえない措置として，発電機の据え換え又は新設を我が方にて実施する。その場合，操作上のミスを防止し，保守管理を徹底させるために，イ側関係者及び日本人養殖専門家にも十分な技術的指導を行うとともに，オペレーション・マニュアルを作成しておく。

取水問題については，イ側は300万ルピアの予算をもって改善を行う計画をもっている。又，専門家及びイ側関係者の間で改善案が諸々検討されている。しかし，いずれの案（塩ビパイプを現存の土管に沿って沖出しするか，土管の中を通して沖出しする。土管の上半部を取り壊わし塩ビパイプを埋めて沖出しする。塩ビパイプの経及び肉厚についての案，200M＋αの沖出しをするか否か）についても，概算見積りの結果イ側の予算をもって単独ではできないとの見通しである。応急対策費をもって，イ側予算を補いつつも，改善を完遂するか否か，協力の残余期間が短かいこと，産卵及びふ化に対応することが困難となることを考慮すれば，早急に結論を下す段階にある。

10. プロジェクトにかかるイ側の進捗報告

(1) 序

1978年8月30日締結のR／Dに基づく浅海養殖プロジェクトにかかる両国技術協力は，1982年3月31日に満了となった。それ以前の1981年11月に，笹岡博士を団長とするエバリュエーションチームがイ国を訪れ，プロジェクトを評価した。

同チームの報告及び協議の結果をふまえて，ＪＩＣＡとイ側当局者は，R／Dに基づく協力期間を1984年3月31日まで延長することにつき，両国政府に勧告することに同意した。但し，貝類養殖については1年間の延長で終了することとなった。R／Dの延長にかかる文書は1982年3月31日ジャカルタで署名された。

イ国での養殖活動，特に浮イケス網での海洋魚類養殖については，なおも初期段階にある。もっとも，ハタ（groupers）の養殖は，ジャカルタ及びタンジュンピナンの漁民，アンチョール海洋水族館等のいくつかの機関によって実施されている。

延長後の2年間における研究実験活動は，次の事項にもっと集中されることになる。

1) ハタやアカメ（Kakap：Lates spp.）肉食性魚類のための餌料生産研究

2) 餌料／プランクトン養殖

3) Siganid fryの養成と養殖――魚病対策を含む

4) ミドリイガイ及び他の貝類の養殖技術の改善

5) 専門家からカウンターパートへの養殖の基礎的技術と知識の移転

イ国の養殖発展にかかる1982年の大統領令（№23）との関連で，生物学的観点のみならず，社会的・マーケッテイング面からの研究に向けて一層の努力がなされるべきである。

(2) 施設及びインフラの現状

現在の発電機による電力供給が不十分なため，特にボジョネガラ・ステーションでの電気供給につきいくつかの問題があるが，プロジェクトの養殖実験研究を実施すべく最善の努力を払っている。

ボジョネガラ・ステーションにおける30ton丸型コンクリートタンクの新設，ブロアー・ハウスからの空気供給，その他の施設（ウエット・ラボ，取水のリハビリテーション）についてはなおも建設中か，又は予算確保のため交渉中である。

1982/83年度では，プロジェクトの実施として，ボジョネガラ及びカラガンツに倉庫（各々100m^2）を建設する予定である。又，パンジャン島の0.5ヘクタール養殖池の拡大，リンドックステーションの半塩水リハビリテーション池の建設をも予定している。

ボジョネガラ・ステーションへのアプローチ道路については現在進展はないが，1983／84年度にもっと良い新道路を建設するための十分な予算を確保したいと考えている。（ＪＩＣＡは本道路への財政的援助を困難としてきた）。

(3) 長期専門家の受入れ

プロジェクトの2カ年延長に伴なって専門家は計画どおり継続して派遣されている。

1) 吉光リーダー

2) 枝専門家（魚類養殖）

3) 平塚調整員

4) 細谷専門家（貝類養殖）

5) 田中専門家（魚類養殖）

(4) カウンターパートの手当て

1) Wardana Ismail	Co.Project Manager ATA-192
2) M.Fatuchri	Ops.Manager／shellfish sector
3) Muhari	Shellfish sector
4) Markus	Ibid
5) Ketut Sugama	Fish sector
6) Basyarie	Ibid

7) Tuti Hariati　　Food/plankton culture

8) Waspada　　Basic research

(5) 短期専門家の受入れ

1982/83 年度における短期専門家としては，電気施設，化学分析，魚類及び貝類養殖のような分野での派遣を要望したい。

(6) 日本での研修について

1982 年 4 月－8 月の間，Miss Tuti Hariati のみが貝類養殖の研修（プランクトン養殖を含む）のため訪日した。養殖研究開発の重要性からして，又特には 1984 年 3 月にプロジェクトが終了することもあり，イ側としてはもっと多くの研修員が日本で研修を受けてしかるべきである。プロジェクトの過去 3 年間をみればＪＩＣＡによる本プロジェクトに対する全経費の 3.2 %が研修のための予算として支出されている。専門家の派遣については，その 49 %を占めている。

希望する研修分野 ： 魚貝類の養殖のみならず，餌料栄養及び水質分析に関してより多くの知識を得たいと考えている。

(7) 供与機材について

第 5 次海送の資機材（36,802,060 円）を 1982 年 4 月に受領した。本海送は延長前の 3 年間のプロジェクト実施期間における最終供与・海送機材分である。

第 6 次海送予定の資機材リストについてはＪＩＣＡに提出済である。

Spectrophotometer（分光光度計）及び gas-chromathograph（ガスクロ）はまだ使用されていない。（本件については 57 年及び 58 年度に化学分析専門家を派遣し，据付けると共に操作方法等の指導を行うことになっている）。

(8) フィールド作業及び研究活動

1981-82 年におけるフィールド作業及び研究活動の主要なものとしては，魚貝類の稚魚貝の採取，ハタの親魚採取，Siganid のイケス養殖，ミドリイガイの垂下式養殖，S Siganid 及び貝類の人工ふ化，バンテン湾の環境観測である。

バンテン湾でのプロジェクト研究活動にかかるセミナーがジャカルタで 1981 年 12 月に行われた。

(9) プロジェクトでの人員配置及びローカルコスト

本プロジェクトでは 43 名以上の人員が，バンテン湾での研究及び養殖実験のため，日イ協力して活動している。

1. 日本人専門家　　5
2. インドネシア側ＣＰ 8
3. 助　手　　7

4. 作業員　　2

5. 船の乗組員　　9

6. 運転手　　3

7. 事務関係人員　　20

ローカルコスト（1982/3）負担として次のとおり計上されている。

① 運営管理費　152,900,000（ルピア）

② 建　設　費　22,000,000（ルピア）

図1、 カラガンツ・ステーションの施設配置

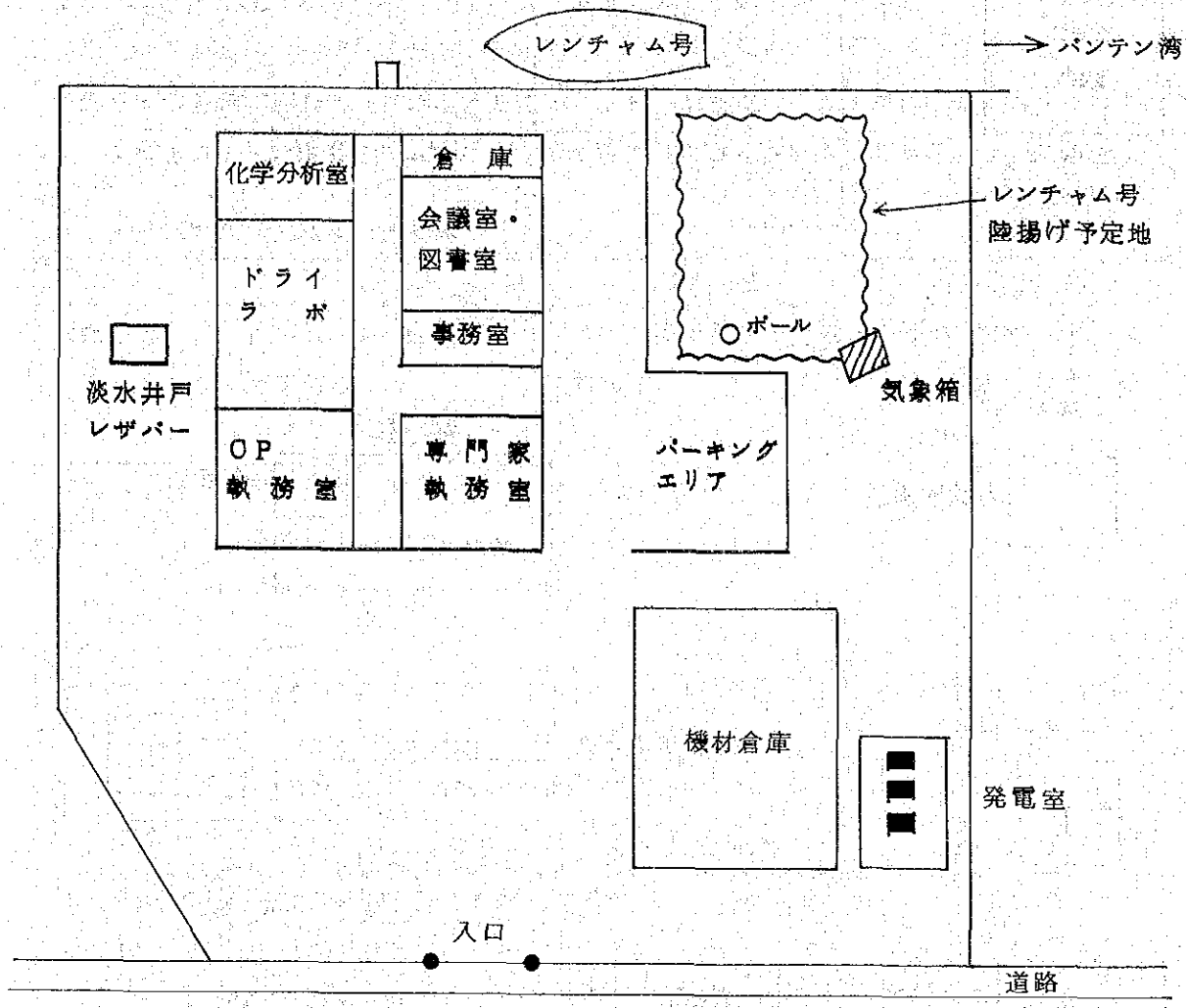
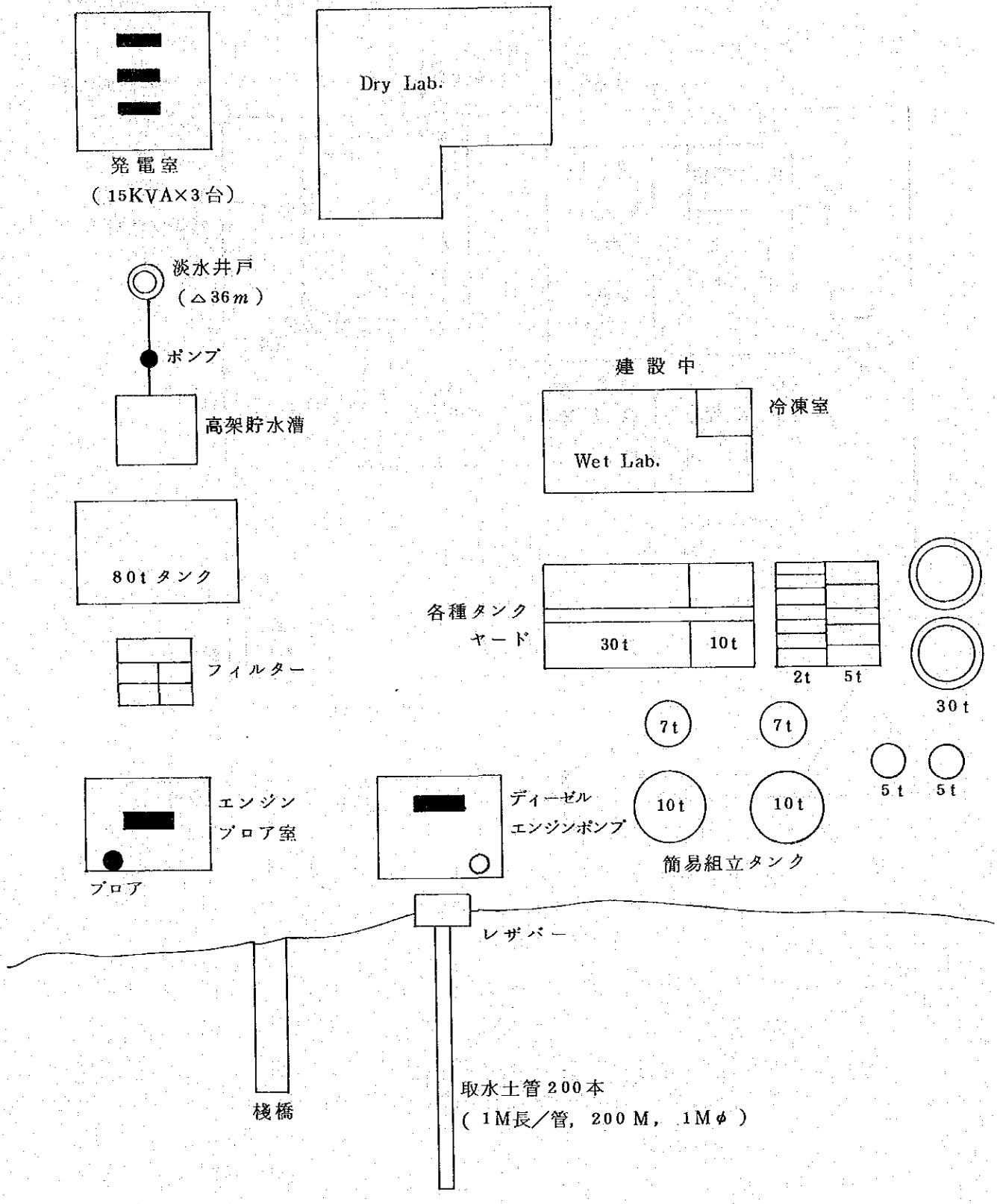


図 2.　ボジョネガラ・ステーションの施設配置



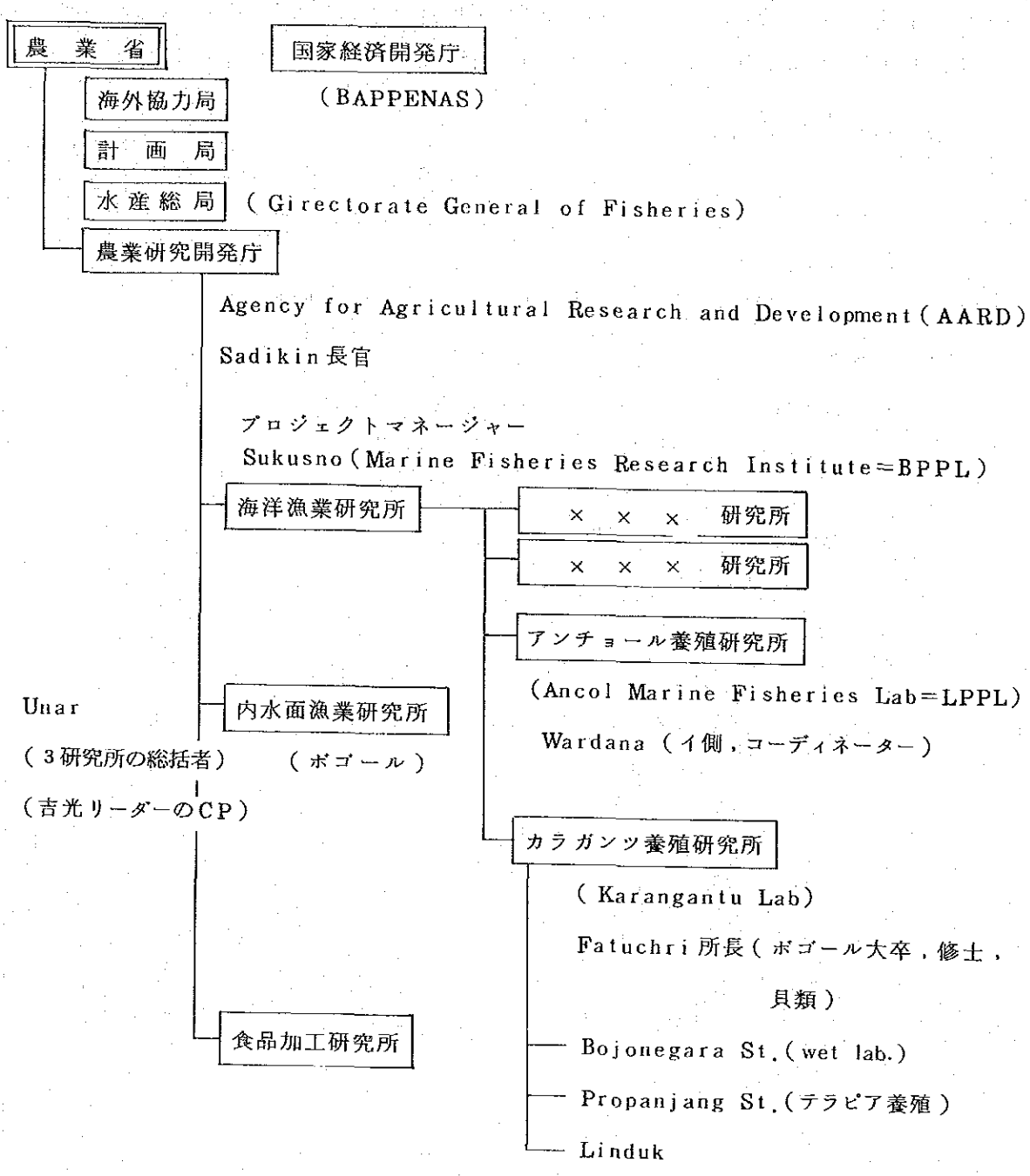
養殖実験，研究規模，内容はその施設内容，状況によって多大に左右されることは言うまでもない。今次の日・イ協議においては，施設の現状をふまえて，下記の表のA案が達成されるべき目標として設定され，合意された。すなわち，施設が大巾に改善されない限り，採卵して稚魚（1～2万尾）を5m/mサイズまで成育することを目標にする。しかし，その場合でも1日100トンの海水が確保される必要があり，ポンプ設備，パイピング，発電機等において，それなりの整備が行われなければならない。B案，C案は，施設が更に改善され，1日500トン，又は1,250トン確保されることになった場合の実験内容を示している。

魚貝類実験研究規模と基盤条件

	A 案	B 案	C 案
実験内容	採卵し，5m/mサイズまで育てる。 1～2万尾	A案プラス摂餌及び餌料培養実験	採卵養成（5m/mサイズ，10万尾），餌料培養，親魚養成
必要海水量	孵化実験　10t 貝類採苗　5t クロレラ　20t ワムシ　10t 水槽　10t （計　55t） 55t×2 mix 100t/日	100t+400t mix 500t/日	mix 1,250t
1. ポンプ	電動ポンプ（φ2インチ1台：エバラ製1－2t/分容量 エンジンポンプ（ハンディタイプ5－6t/h，3台必要）	電動ポンプ（φ3インチ1t/分　2台）	左　同
2. パイピング	・PVCパイプφ2インチ若干必要 ・フイルター装置要（1t）	取水パイプ　300m	左　同
3. 発電機	15KVA　3台	35KVA　2台 15KVA　3台	左　同

	A 案	B 案	C 案
4. プロアー	エアプロアー	エンジンプロア	左 同
5. 配 線	点検修理不可欠	全配線やり直し	

インドネシア側関係機関，関係者



資　　料

I 日イ合同委員会議事録

The Minutes of Discussions

concerning

the technical cooperation

for

the Mariculture Research and Development Project

at

the 3rd Joint-Committee

held on September 7, 1982

The Japanese Project Consultation Team (hereinafter referred to as "the Team"), organized by Japan International Cooperation Agency (hereinafter referred to as "JICA") and headed by Dr. Takeshi Nose, Director of Division of Fish Nutrition and Metabolism, National Research Institute of Aquaculture, Fisheries Agency, Japan, visited Indonesia from August 26, 1982 to September 9, 1982, for the purpose of working out a detailed Japan-Indonesia cooperative annual implementation plan (September 1982 - March 1984) concerning the Mariculture Research and Development Project in the Republic of Indonesia (hereinafter referred to as "the Project").

During its stay in the Republic of Indonesia, the Team exchanged views and had a series of discussions with the Indonesian authorities concerned with regard to the above-mentioned plan and the desirable measures to be taken by the Governments of both Japan and the Republic of Indonesia for furtherly successful implementation of the Project in accordance with the Record of Discussions signed on August 30, 1978 and the Record of Discussions of Extension signed on March 31, 1982.

The 3rd Joint-Committee was also held during its stay in the Republic of Indonesia at the JICA Office in Jakarta in accordance with Article VI (Administration of the Project) of the Record of Discussions signed on August 30, 1978 (hereinafter referred to as "the R/D") for the purpose of formulating an annual implementation plan (September 1982 - March 1984) of the Project and dealing with specific matters connected with the implementation of the Project.

As a result of the discussions at the Joint-Committee, the Japanese and Indonesian sides, composed of such members (including those of the Japanese Consultation Team) as a participants' list attached hereto, made the following minutes of discussions which is attached hereto as Appendix.

September 7, 1982

Mohamad Unar
Director
Central Research Institute for
Fisheries
Indonesia

Toranosuke Yoshimitsu
Japanese Project Team Leader
Mariculture Research and Development
Project
Japan

Takeshi Nose

Dr. Takeshi Nose
Leader
Japanese Project Consultation Team
Japan

A P P E N D I X

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. Key Notes for mariculture research and development

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. Working schedule of fish sector (Fiscal Year 1982, 1983)

. Working schedule of shellfish culture (Fiscal year 1982)

. Participants' list of the 3rd Joint-Comittee, Japan Indonesia Mariculture Research and Development Project

ATTACHED DOCUMENTS

. Progress Report of Mariculture Research and Development Project (ATA-192), Presented for 3rd Joint Committee Meeting (Indonesia)

. Data for the Third Joint Committee, Fish Sector (Japan)

1. Activities of fish sector until July 1982
2. List of activities and experiments
3. Abstracts of studies presented on December 28, 1981
4. Working schedule of fish sector for the fiscal year of 1982, 1983

. Data for the Joint Committee, Shellfish sector (Japan)

1. Activities of Shellfish sector until June 1982
2. Abstracts of studies presented on December 28, 1981 meeting
3. Working schedule of shellfish sector for the fiscal year of 1982

Key notes for mariculture research and development

The highly positive intention for the establishment and further development of mariculture along the coast of Indonesia, especially of Jawa Island, are well recognized by the authorities of both countries. The project will be the first miles stone for these purposes. There would be two phases before the start of establishment of mariculture industry. The first step would be the accumulation of the basic knowledge and the acquirement of technology, and the second phase would be the practical application of these technologies in pilot plant scale. The objective of the Project must be to assist Indonesian side by providing facilities, informations and scientific knowledge for the accomplishment of the first phase and if possible of the start of the second phase.

During the extended period of the Project, one year for shellfish and two years for fish culture, the transfer of background knowledge and basic technology could be expected to be accomplished under the better function of the facilities with systematically organized working forces of the cooperative personnel.

As for the shellfish culture, transfer of knowledge and technology have been smoothly conducted during the first period of the Project, and the starting of practical production in a pilot plant scale would be possible to proceed on a certain species such as green mussels. Also, feasibility studies would be performed on the other species such as ark shell and oyster.

Thus, the shellfish culture could be the most promissing part of mariculture being planned to be developed. The representatives of the both sides of Indonesia and Japan at the Meeting understood that the more specified attention must be paid for the high possibilities of the establishment of shellfish culture in Indonesia.

On the other hand, fish culture, especially net cage culture, would be more difficult to establish and to expect rapid development at present. The transfer of background knowledge and basic technology would be able to accomplish within the extended term of the Project, however, so much knowledge and many technologies specified for the target fish must be developed before the commencement of fish culture in practice even in a pilot plant scale. As the cage fish culture industry requires rather sophiscated system, there are several areas that remained untouched within the limited term of the Project. Feed formulation, feeding standard, fish disease, etc. are the areas remained. In addition to technological problems, establishment of fish culture require social needs for cultured fish. Thus, objective of the fish culture sector would be to transfer the knowledge and technology how to find out the target fish adequate for culture and how to evaluate the feasibility of the target fish as cultured species.

The following items of the experiments are intended to list major operational sub-fields in which the Project will carry out mariculture experiments and research during the remaining cooperation period in 1982-1983 Japanese fiscal years.

I. Environmental survey of mariculture ground

The environmental researches have been conducted from the start of the Project and the information about the basic characteristics of experimental mariculture ground at Banten Bay has been obtained. In addition, the surveys in terms of occurrence of fry and spawners, amount of food organisms, as well as hydrolic conditions have been successfully conducted at properly selected experimental stations.

The techniques used in the survey have also adequately transfered in almost all the items to Indonesian side, however, continuation of the research works are still important for more precise background knowledge on environmental characteristics of experimental ground of Banten Bay, especially on bottom sediments, and water quality analysis.

Comparison and combination of data being obtained in the Project and those that will be attained by remote sensing method being planned by Indonesian side will provide full information of Banten Bay as mariculture ground.

The following will be the items to be conducted hereafter.

1. Routine observations of fixed points
2. Plankton fluctuation
3. Bottom condition

II. Shellfish culture

The high possibility of shellfish culture has been demonstrated during the past period of the Project and the main objective of shellfish research within the extended term of the Project will be the transfer of technology for the total production system from spat collection to final harvest of products using green mussel as representative and promising species for shellfish culture. A long-term farming also must be continued.

Basal physiological and ecological study would also be requested for further development of technology for ark shell and oyster.

The followings are the items to be conducted in the extended term of the Project.

1. Survey on the natural spatfall of bivalves
2. Technical development of culture method
   1) Green mussel
      Trials on the mass culture
      Investigation on the total production system
   2) Ark shell
      Basic study on the useful species
   3) Oyster
      Investigation on Japanese and local oyster
3. Artificial seed production

III. Fish Culture

During the past term of the Project, fish culture research have been conducted respectively on rabbit fish and other carnivorous fishes. However, fundamental knowledge has been piled up as for the practicability on several fishes as cultured species. Thus, research for general raising technology might be focused on the target fish listed below. Experiments for feeding behaviour would be requested after completion of facilities in Bojonegara station in order to provide additional information for feeding technology.

As for the research works on breeding of spawner and fry production, transfer for knowledge and technology must be confined to certain species due to limited term of the Project. Thus, the general principle must be transfered and further development would be completed by Indonesian side.

The followings will be the items to be conducted in the extended term of the Project.

1. Target species

1)	Giant seaperch	Lates calcacifer
2)	Rabbit fish	Siganus spp.
3)	Groupers	Epinephelus spp.
4)	Tilapia	Tilapia mossambica
5)	Rotifers	Brachiounus plicatilis
6)	Chlorella	Chlorella spp.
7)	Others	

2. General raising

1) Rearing experiments by floating cage nets

2) Rearing experiments by brackish ponds

3) Protection of disease

3. Breeding of spawner

1) Collection of natural immatured fish

2) Raising of spawners

4. Fry production

1) Collection of natural fry

2) Culture of food organisms

3) Induced spawning

4) Natural spawning in cage nets and tanks

5) Larval rearing

5. Experiments of feeding ecology in tanks

1) Satiation amount and time at each growth stages

2) Comparison of foods value

As reported by the Evaluation Team sent by JICA in November 1981, the basic conditions so as to attin the aim of this project have been mostly accomplished at the main laboratory located at Karangantu.

Thus, experiments and research works have finally come to be possible to exert their full activities for the transfer of background knowledge and basic technology as for the development of mariculture using Banten Bay as a model of mariculture ground. The facilities and installations, however, are no so well completed and organized at the laboratories located at both Bojonegara and Pulau Panjang. The completion of installations at the

two laboratories, especially at Bojonegara, must be achieved as immediately as possible for the attainment of the goal of the Project, due to research activities of fish sector and seed production sector being strongly depending on the facilities available at laboratories, especially on those at Bojonegara.

IV. Training of Inodnesian personnel in Japan (September 1982 - March 1984)

1. 1982 Fiscal Year (from present to March 1983)

1) Two (2) Indonesian personnel will be accepted during the remaining 1982 Japanese fiscal year. It will be scheduled on the Indonesian side that Mr. Sadikin, Director General of Agency for Agriculture Research and Development, visits Japan for general observation of mariculture from October 16-24, 1982. One more trainee is recommended for training in Japan especially focused on basic mariculture research and culture of food organisms.

2) Both of their final schedules and desirable observation/training contents will be informed JICA as soon as possible after all necessary adjustment between the Japanese Project Leader and the Indonesian Project Manager.

2. 1983 Fiscal Year (from April 1983 - March 1984)

1) As a strong request of the Indonesian side: technical training in Japan of more than three (3) personnel in considering that the fostering of Indonesian mariculture

related scientists through training in Japan is quite essential for future full-scale experimental works in the mariculture sector of Indonesia as well as the successful implementation of the Project itself.

2) As a comment of the Japanese side, maximum two (2) trainees connected with this Project will be accepted during the 1983 Japanese fiscal year. A strict budgetary limitation was also commented by the Japanese side.

V. Dispatch of Japanese experts (September 1982 - March 1983)

1. Long term experts (from present to March 1983/ March 1984)

In accordance with the relevant provisions of the R/D, Japanese long-term experts specialized in the following fields will be dispatched.

1)	Team leader	upto March 1984
2)	Fish Culture	Ibid
3)	Fish Culture	Ibid
4)	Coordinator	Ibid
5)	Shell-fish Culture	upto March 1983

2. Short-term experts

1) 1982 Fiscal Year (present to March 1983)

Measures will be taken as soon as possible to dispatch at least three (3) short-term experts for the remaining 1982 fiscal year as follows:

a. Chemical analysis

b. Mariculture facility

c. Fish culture, or

d. Shell-fish culture

Further detailed working contents and schedules will be promptly adjusted between the Japanese Project Leader and the Indonesian Project Manager in accordance with the established annual implementation plan and its progress and should be informed JICA as soon as possible.

As a strong request of the Japanese side, Indonesian counterparts should be assigned at least when the short-term experts on chemical analysis and mariculture facility are dispatched and functioned in Indonesia. Also such counterparts should be continuously functioned during the remaining cooperation period.

2) 1983 Fiscal Year (April 1983 to March 1984)

As a strong request of the Indonesian side: the dispatching of five (5) short-term experts at least in the following fields with a view to achieving furtherly the given objectives of the Project in accordance with the established annual implementation plan:

a. Fish culture
b. Fish pathology
c. Feed preparation
d. Chemical analysis
e. Mariculture facility

As a comment of the Japanese side, it will make as much efforts as practicable to dispatch at least three (3) short-term experts in due consideration with not only the priority to be set up by the Indonesian side but also the progress of the Project as a whole and all the relevant factors thereof.

VI. Provision of machinery and equipment

1. The both sides agreed that the Japanese Project Team Leader and the Indonesian Project Manager should hold much heavier discussions as promptly as possible with regard to the detailed contents and specifications of 1982-83 fiscal years' machinery and equipment, which will be required for future successful and effective implementation of the Project in accordance with the established annual plan as well as the provisions of Article III of the R/D and Annex III attached thereto.

2. The Indonesian side strongly requested to receive during the remaining cooperation period mariculture-related machinery, equipment, and materials for the following purposes:

1) to improve, as a tentative measures until the Indonesian side can construct all mariculture facilities especially at the Bojonegara Station in a substantially functionable manner, fresh and sea water supplies, air blower system, and electric generation.

2) to carry out at least a minimum-scale experiment and research work based upon a minimum volume of sea water supply (100 per day) at the Bojonegara Station. During the stay of the Japanese Consultation Team, such a minimum-scale work was agreed upon by the Indonesian side, because of the present conditions at the station concerning the existing mariculture-and infrastructure-related facilities and machinery.

3. In connection with the provision of machinery and equipment from the Japanese side, the Indonesian side stated that an opening ceremony at the Bojonegara Station is expected to be held by

the end of March 1983. The Bojonegara Station now under construction is a field station where the Japanese side has done a model infrastructure construction and also a major field station annexed to the Karagantu Research Laboratory in Banten Bay.

VII. Special Requests and Comments by the Japanese side

The Japanese side strongly requested the Indonesian side to take the following measures for the purpose of implementing the Project in a furtherly successful way:

1. Increasement of Indonesian counterparts

In general, numerical increasement of Indonesian counterparts (including assistants) is strongly requested. This is in conformity with the Indonesian national policy, that is, the fostering of more number of mariculture-related scientists and also is essential for furtherly successful implementation of the Project.

2. Effective Protection of Fishes in Floating Cage Nets and all other Facilities.

Most effective countermeasures should be taken for protecting fishes in all cage nets/ponds and other mariculture-related experiment and research facilities especially at the Karagantu and Bojonegara Stations. A whole-day strict watching and patrol systems are definitely desired especially at the Bojonegara Station.

3. Repairment and Maintenance of Machinery and Equipment Provided by and Facilities Constructed by the Japanese Side and the Indonesian Side.

1) It is also strongly requested that all machinery and equipment, vessels, and vehicles provided by and facilities constructed by not only the Indonesian side but the Japanese side should be maintained all the times in good and effectively usable conditions with efficient budgetary guarantee of the Indonesian side.

2) Inspection and maintenance of the above-mentioned facilities and machinery should be much furtherly systematized.

4. Construction of Facilities

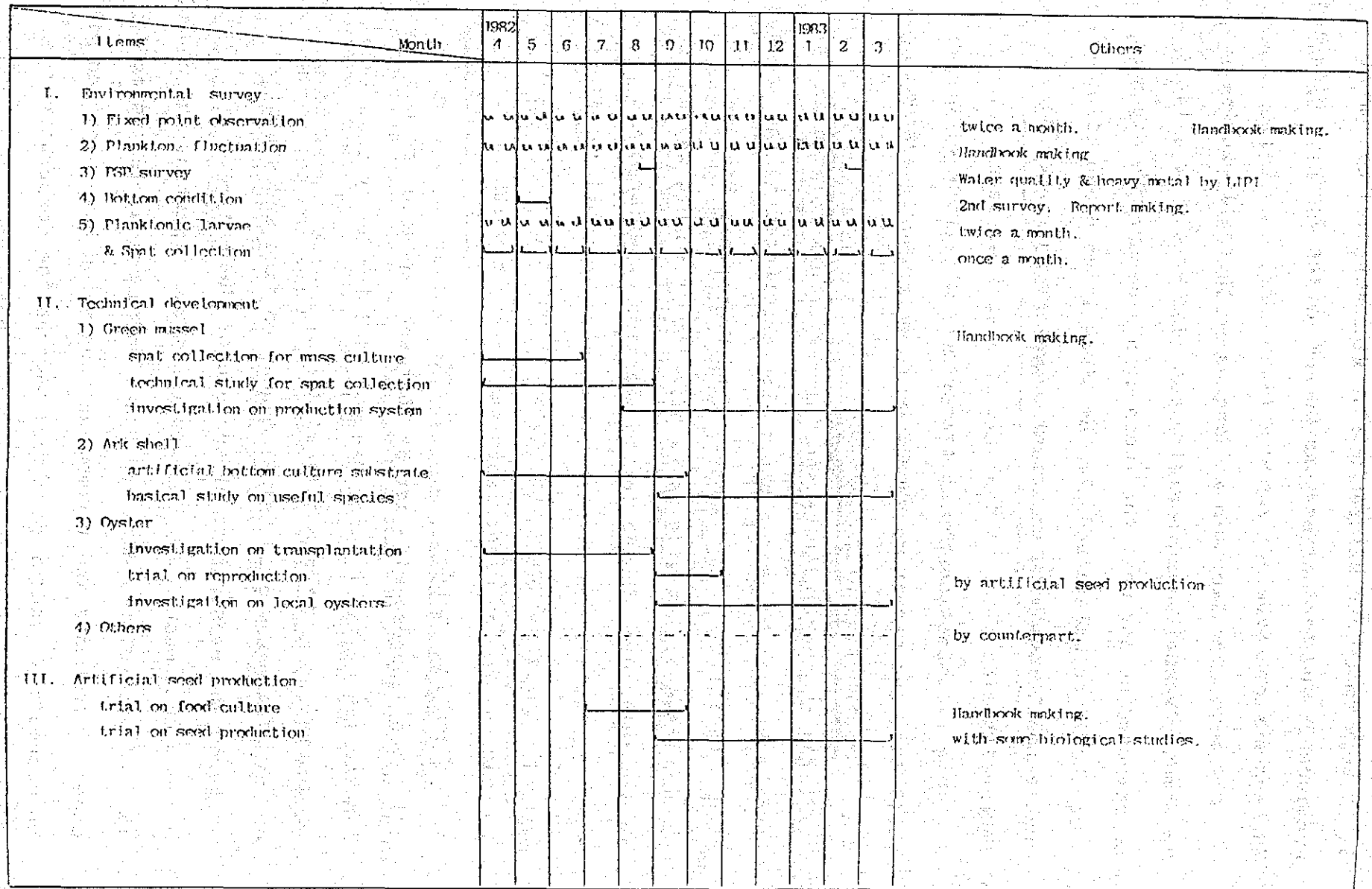
All the mariculture- and infrastructure-related facilities under construction or planned to be constructed by the Indonesian side especially at the Karagantu and Bojonegara Stations should be completed by its side in an effectively usable way as soon as possible, even though in the meantime experiment and research works threat will be carried out as much as possible with all the existing facilities and equipment which give considerable limitations to the experiments and research works threat.

5. Technical Manual

The Japanese side agrees that the Japanese Project Leader and the Indonesian Project Manager will furtherly take into consideration and reach a final decision with regard to whether or not JICA makes a technical manual on fish and shellfish cultures and presents it at the end of the Project.

Such a manual may integrate all the important and useful mariculture-related data and other information, including Japanese experts' comments and recommendations which have been and will be accumulated and/or developed through the cooperative experiment and research works of the Projects.

WORKING SCHEDULE OF SHELLFISH SECTOR FOR MARICULTURE RESEARCH AND DEVELOPMENT PROJECT (FISCAL YEAR 1982)



WORKING SCHEDULE OF FISH SECTOR (FISCAL YEAR 1982, 1983)

Items \ Month	1982 4	5	6	7	8	9	10	11	12	1983 1	2	3	4	5	6	7	8	9	10	11	12	1984 1	2	3
1. General raising																								
1) Rearing experiment by floating cage nets			Rabbitfish, Giant sea perch, Groupers and Others																					
2) Rearing experiments by brackish ponds							Tilapia (Panjang Island)																	
								Rabbitfish & others (Bojonegara)																
3) Protection of disease						Rabbitfish and others																		
2. Breeding of spawners																								
1) Collection of natural immatured fish			Rabbitfish, Giant sea perch, Groupers and others																					
2) Raising spawners			Rabbitfish, Giant sea perch, Groupers and others																					
3. Fry production																								
1) Collection of natural fry			Rabbitfish																					
			Giant sea perch																					
			Groupers																					
2) Culture of food organisms			Chlorella and ratifer																					
3) Induced spawning									Rabbitfish and Giant sea perch															
4) Natural spawning in cage nets and tanks									Rabbitfish and Giant sea perch															
5) Larval rearing									Rabbitfish and Giant sea perch															
4. Experiments of feeding ecology																								
1) Satiation amount and time at each growth stages									Rabbitfish, Giant sea perch and Groupers															
2) Comparison of foods value									Rabbitfish, Giant sea perch and Groupers															

Participants' List (including observers)
of
the 3rd Joint-Committee
Japan-Indonesia Mariculture Research and Development Project

I. Indonesian side

1. M. Unar, Director, Central Research Institute of Fisheries
2. Sukusunu, Manager, Marine Fisheries Research Project, Marine Fisheries Research Institute
3. Wardana Ismail, Co-Project Manager ATA-192, Ancol Marine Fish Research Laboratory
4. M. Fatuchri, Head, Serang Marine Fisheries Research Laboratory
5. I. Ardha, Chief, Foreign Aid Planning Section, Bureau of Planning, Ministry of Agriculture
6. Soeyanto, Head, Subdirectorate of Fisheries Resources Management, Directorate General of Fisheries
7. Fuad Cholik, Head, Research Results Dissemination Division, Central Research Institute for Fisheries
8. M. Subakti, Staff, Local Government of Serang
9. Azhary, Staff, Local Government of Serang.

II. Japanese side

1. S. kadoya, First Secretary, Embassy of Japan.
2. M. Miyamoto, Representative of Jakarta Office, Japan International Cooperation Agency (JICA)
3. K. Yoshimoto, Staff in charge of the Project, JICA Jakarta Office
4. T. Nose, Leader, Japanese Consultation Team for the Project
5. K. Fukusho, Member, Japanese Consultation Tkam for the Project
6. S. Funakoshi, Member, Japanese Consultation Team for the Project
7. K. Nakauchi, Staff, Fisheries Division, JICA and Member of Japanese Consultation Team for the Project
8. T. Yoshimitsu, Project Leader, Mariculture Research and Development Project (MRDP)
9. H. Tanaka, Fish Culture Expert, MRDP
10. H. Eda, Fish Culture Expert, MRDP
11. M. Hosoya, Shellfish Culture Expert, MRDP
12. M. Hiratsuka, Coordinator, MRDP

PROGRESS REPORT OF MARICULTURE RESEARCH AND DEVELOPMENT PROJECT (ATA - 192).-

Presented for 3rd Joint Comm. Meeting , September 7, 1982 , Jakarta.

1. INTRODUCTION

The Technical Cooperation between the Japanese Government and the Government of the Republic of Indonesia on Mariculture Research and De - velopment Project (ATA-192), based on the Record of Discussion signed at Jakarta on August 30, 1978, had already expired on March 31, 1982.

For the period from November 4 to November 17, 1981, the Project Evaluation Team from Japan, headed by Dr. Hisao SASAOKA, had come to In donesia, in order to evaluate the results attained so far.

Based on the report of the Team and a result of the talks, the JICA and Indonesian authorities concerned agreed to recommend to their respective Government to extend the period of Technical Cooperation based on the above mentioned Record of Discussion until March 31, 1984, on the understanding that the cooperation in the field of shellfish culture will be finalized within one year.

The Record of Discussion of Extension of the Record of Discussion on Technical Cooperation for ATA-192, was signed at Jakarta on March 31, 1982.

It is realized that mariculture activities in Indonesia, especially marine fin-fish culture in floating net cages, is still under initial stage, eventhough, the culturing of groupers are being conducted by some institutions, such as DGF, Oceanarium Ancol, and fishermen at Jakarta and Tanjung Pinang (Riau Archipelago).

For the coming two years extension of the project, research & experiment activities are better consentreted on : study of seed production, especialy for carnivorous species, such as groupers and Lates, including food/plancton culture ; rearing/culturing Siganid fry, with more intention on fish parasite & diseases and feeding ; improvement of culturing method

of green mussel and other shellfish, besides the transfer of basic techno logy and basic knowledge of mariculture from Japanese experts to the counterparts.

Considering the Presidential Decree no. 23, 1982, about the develop ment of mariculture in Indonesia, more efforts must be given to the research, not only from the biological point of view, but also from social and marketing aspects.

2. PRESENT CONDITION OF FACILITIES & INFRASTRUCTURES

Eventhough we often faced some problems with the electric supply, especialy at Bojonegara Station, due to not enough electric power from our excisting generators, however, we always doing our best to carry out research and culture experiments assigned in this project.

Besides, the newly establishment of two 60 tons concrete round tanks, aeration supply from blower house, and a construction of 0.5 ha culture ponds, another facilities at Bojonegara Station, such as wet laboratory , rehabilitation of water intake, are still under construction / negotiation.

In the implementation of the project, in 1982/83 fiscal year, we intend to establish warehouses at Bojonegara and Karangantu (100 sq. m each), expanded 0.5 ha pond at P. Panjang, and rehabilitation brackish water pond at Linduk Station.

At present, we are still using excisting road to reach Bojonegara Station, but for the coming 1983/84 fiscal year, we hope to get enough budget to construct new better road, since JICA's plan to finance this road is canceled.

3. RECEIVING THE JAPANESE EXPERTS.

For the two years extension of the ATA-192 (1982 - 1984), substitution of the experts assigned in this project was done, to conduct further research and culture experiments in Banten Bay.

The successor of the experts are listed as follows :

No.	Name	Qualification	Date of Arr./ Duration	Remarks
1.	T. YOSHIMITSU	Team leader	April 22, 1982 / two years	
2.	H. E D A	Fish culture	May 7, 1982 / two years	
3.	M. HIRATSUKA	Coordinator	July 18, 1982 / two years	
4.	M. HOSOYA	Shellfish culture	July 10, 1982 / one year, 2nd assignment	
5.	H. TANAKA	Fish culture	July 18, 1979 / two years, remaining (total 5 years)	

We organize the counterparts as are listed below, hoping better cooperation with the experts in the implementation of the project.

No.	Name	Scope of works	Remarks
1.	WARDANA/ISMAIL	Co Project Manager ATA-192	Counterpart to Team Leader/Coordinator
2.	M. FATUCHRI	Ops. manager/shellfish sector	
3.	M U H A R I	Shellfish sector	
4.	M A R K U S	-ditto-	
5.	KETUT SUGAMA	Fish sector	
6.	BASYARIE	-ditto-	
7.	TUTI HARIATI	Food/plankton culture	
8.	WASPADA	Basic research	

3.1. Short term expert

In 1982/83 fiscal year we intend to receive some shorts term expert with qualification as electrical engineer, chemical analyzer, fish culture and shellfish culture, respectively.

4. DISPATCHING TRAINEES TO JAPAN

During April - August 1982, only one trainee had sent to Japan (Miss Tuti Hariati, from April - June/July) to undergo training on shellfish culture, including plancton culture.

Regarding the importance of mariculture research and development in near future, especially when the project is expired on March 1984, we should send more trainees to Japan.

Looking back to the last 3 years of the project, we had evaluated that the budged for training only 3.2 % of Total expences of JICA's financial support to ATA-192, compared with 49 % expences expert.

Field of training we need, not only fish and shellfish culture method/technique, but also we like to get more knowledge on food nutrition for feeding fish, as well as water quality analysis, which are more and more important in mariculture.

5. RECEIVING MATERIALS AND EQUIPMENTS

The 5th shipment of material and equipment from Japan, had already received on April 1982 with amount 36,302,060 Yen, which was the last shipment of the 3 years project implementation. Unfortunately, some of the equipment are not good condition or not complete, such as Water checker instrument, scientific calculator, and Ban-no toeki profile projector.

List of material and equipment for the coming 6th shipment has already submitted and sent to JICA.

Some of sophisticated instrument, such as spectrophotometer and gas-chromathograph have not yet been used in our project, and also some other equipments.

We do hope that the transfer of knowledge in using operating some sophisticated instruments [illegible] during the extension the project.

6.FIELD WORKS AND RESEARCH ACTIVITIES

In 1981/82, field works and research activities conducted were mainly fish and shellfish fry collection, collecting adult groupers, cage culture of Siganid, raft culture of green mussel, induced spawning of Siganid and shellfish, and environmental observation of the Banten Bay.

Seminar on the research activity of ATA-192 in Banten Bay was carried out on December 1981 in Jakarta.

More detailed report of field works and research activities will be submitted by the experts and their counterparts.

7. MANPOWER AND LOCAL COST

More than 43 personals are involved in this project, cooperate with Japanese expert to conduct research and culture experiment in Banten Bay. Qualification of the personal are listed as follow:

1. Japanese expert	5
2. Indonesian counterpart	8
3. Assistants	7
4. Operator	2
5. Crew of boats	9
6. Driver	3
7. Administration	20

Budget for local cost (1982/83) :

- Operational cost 152,900,000
- Construction cost 22,000,000 (in rupiah)

DATA FOR THE THIRD JOINT COMMITTEE IN 1982

FISH SECTOR

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2. List of activities and experiments p. 4 - 7

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ACTIVITIES OF FISH SECTOR UNTIL JULY 1982

INDONESIA - JAPAN
MARICULTURE RESEARCH
AND DEVELOPMENT PROJECT
(ATA - 192)

1. REARING EXPERIMENT

1) Floating cage nets

In accordance with the Japanese evaluation team's suggestion, six rafts for rabbitfish culture at the front of Kambing Island were sifted to the front of Tarahan Island in March, and at the same time there were annexed with three rafts of carnivorous fish culture located at the front of the Bojonegara station. Afterward, three more rafts were increased in order to expand the scale of rearing experiment. There are at present 12 rafts in total, consisting of 4 steel rafts (5 x 5 m) and 8 bamboo rafts (5 x 5 m).

2) Rabbitfish culture

The first natural seed collection of this year was conducted at the coasts of Bojonegara and Kambing Island during the period of March to May, by using a seine-net. In this year the possibility of seed collection by Bagan was investigated as trial. Consquently, the Bagan was considered as an adequate fishing gear for seed collection. The second trial of pond culture was done in Panjang Island experimental ponds (200 m^2) during the period of January to March. The experimental ponds were fertilized only and no supplementary food was given during this period. Although three different species of rabbitfish were stocked in the ponds, no rabbitfish was harvested. However, 11.9 kg of Tilapia were harvested from the experimental ponds (3,570 kg/ha/year). It is assumed that these Tilapia entered to the ponds naturaly in larvae stage and then they grew up in the ponds.

High mortality caused by monogenetic trematoda was again occured in May 1982, in spite of treating periodical dippings in Dipterex solution. This outbreak at present interfers siriously with the rearing experiment.

3) Giant seaperch culture

All stock of giant seaperch in the cages were lost by frequent robberies until February 1982. Natural seed and spawner collection was conducted in the east coast of Lampung, Sumatra, in May and June, and totaly 150 fishes including a few spawners were purchased from Sero fishermen. Size of fishes was not unified and varied from 50 g to 2 - 3 kg. A rearing experiment in different size has started in Aug. by using floating cage nets.

4) Groupers culture

As same as giant seaperch , almost of all experimental groupers were also stolen until February. In June and July, totaly 147 groupers were obtained from Seribu islands. Its size ranged from 400 g to 800 g. Main species obtained were Epinephelus fuscoguttatus, E. merra and E. summana . An experiment of growth comparison among those species has started in July in floating cage nets. The collection of natural seed of E. tauvina which is an important species in Banten bay was scheduled in the beginning of this year. However, its implementation was unrealized.

5) Other fish spesies

Lutjanus spp , Lethrinus lentjan, and Carangidae species are now under-rearing in the cage nets.

2. EXPERIMENT ON SEEDLING PRODUCTION

1) Spawners raising

a. Rabbitfish

Although real implementation of seedling production was scheduled from May 1982, it was oblized to be suspended because all 202 spawners and pre-spawners were stolen in April. 150 immatured Siganus chrysospilos of which mean body weight was about 300 g were captured and transfered from Kongsi Island, the Seribu islands. They are now under-rearing in the cage net as spawner to be.

b. Giant seaperch

In June 6 spawners (mean body weight 8 kg) which were reared in 30-ton tank at the Bojonegara station were transfered to the floating cage net (5 x 5 m) because of some defects of sea water supply and air supply. Presently there reared 12 spawners in the cage net.

c. Groupers

15 adult groupers were newly obtained in June from the Seribu islands, and they were stocked in 10-ton tank at the Bojonegara station. However, on June 29, all fishes were dead because of water change in bad quality caused by suspension of sea water supply and air supply. Main constraints of the Bojonegara station are deficiency of facilities such as electric supply, air supply, and sea water intake.

2) Food organisms culture

Culture of Chlorella, used as feed for rotifer, started in such large scale as 5-ton, 7-ton, and 10-ton seat tanks, in Bojonegara station since April 1982. Culture of rotifer in large scale started also since April 1982 in Bojonegara station by using four 5-ton tanks. However, the both Chlorella and rotifer culture was interrupted from July, because of defects of electric supply. All large-scaled experiments related to food organisms culture are now suspended in Bojonegara station.

LIST OF ACTIVITIES AND EXPERIMENTS IN FISH SECTOR

I. Rearing experiment

I-1. Raft (floating cage net)

1) Tranc̈port of the culture raft for rabbit fish (March 1982) : Kambing Island— Tarahan Island

2) Transport of the culture raft for carnivorous fish (March 1982): Sojonegara— tarahan Island

3) Set up the new fish cultural area(March 1982) : Tarahan Island
   1) Selection of the fish cultural area
   2) Anchoring

4) An increas of rafts (March 1982- July 1982)
   Existing number : 12 rafts — 8 bamboo rafts(5m×5m), 4 steel rafts (5m×5m)

I-2. Natural seeds collection

I-2-1. Rabbitfish

1) Collection period : Middle of March -Middle of May
2) Collection area : Sea area of Sojonegara and Kambing Island
3) Collection method : Seine-net (2m/w x 50m/L)
4) Number : 65,000 (size: 4cm)
5) Investigation of the possibility for seeds collection by "Bagan"

I-2-2. Giant seaperch

1) Collection period : May 1982 - June 1982
2) Collection area : Seribu Islands
3) Collection method : Consighment collection
4) Number : 160 (size: 50g - 1000g)