マレイシア農科大学海洋水産学部
拡充計画打合せ調査報告書

昭和60年９月

国際協力事業団

マレイシア農科大学海洋水産学部
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昭和60年 9 月

国際協力事業団

はしがき

マレイシア国政府は，1979年にマレイシア農科大学に設立された同国唯一の海洋水産学部において水産技術者，海洋研究者等の養成を促進し，同国の水産海洋開発を拡充発展させるため，その拡充計画を立案し，我が国に対して，同計画推進に必要な技術協力を要請してきた。

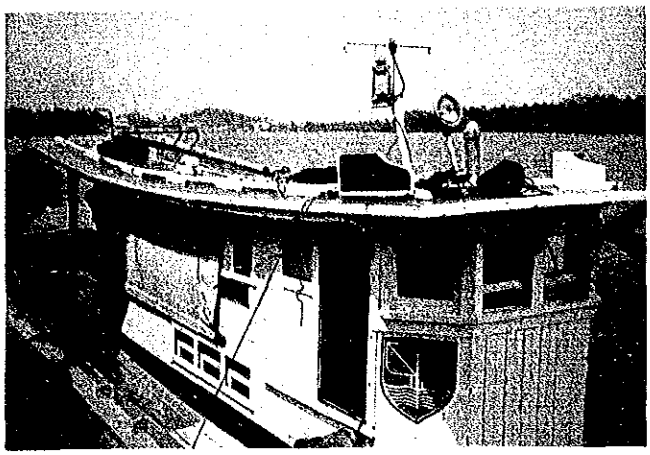
この要請に基づき，国際協力事業団は，83年8月に事前調査団を派遣，84年8月には実施協議調査団を派遣し，5ケ年間の技術協力の内容を討議議事録にとりまとめ署名を行った。さらに，85年6月，上記の討議議事録に基づく技術協力の具体的実行計画を策定するため計画打合せ調査団を派遣し，85年度，86年度の実行計画をとりまとめた。

本報告書は，上記計画打合せ調査団の調査結果をとりまとめたものである。

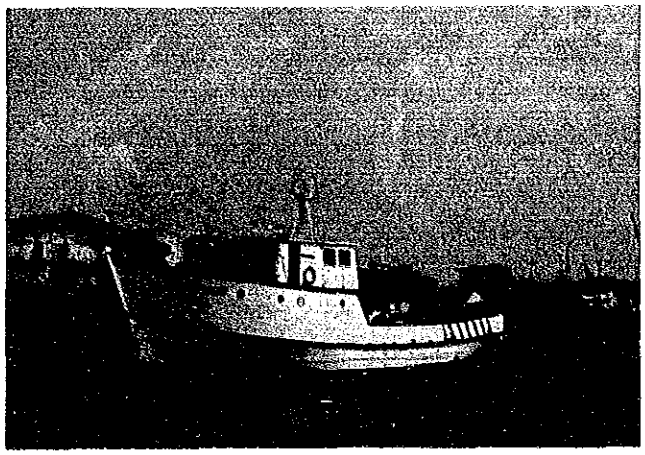
本調査団の派遣に際し，御協力いただいた関係各位に対し，心からの感謝の意を表すとともに，今後とも本プロジェクトの円滑な推進のため，御指導，御協力を賜わるよう切望するものである。

昭和60年9月

国際協力事業団
林業水産開発協力部
部長　鈴木　進



UNIPERTAMA I



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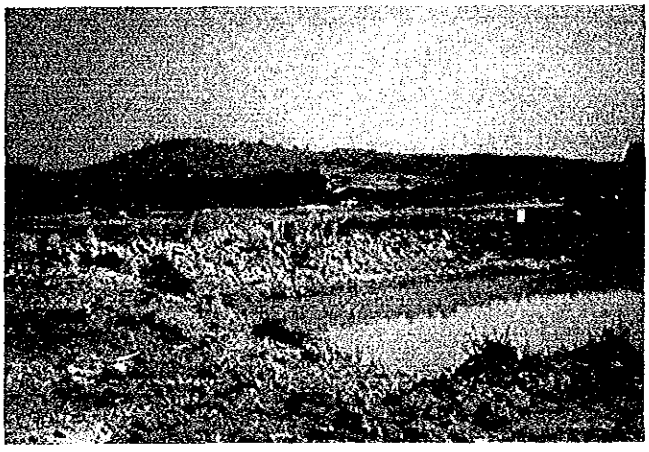
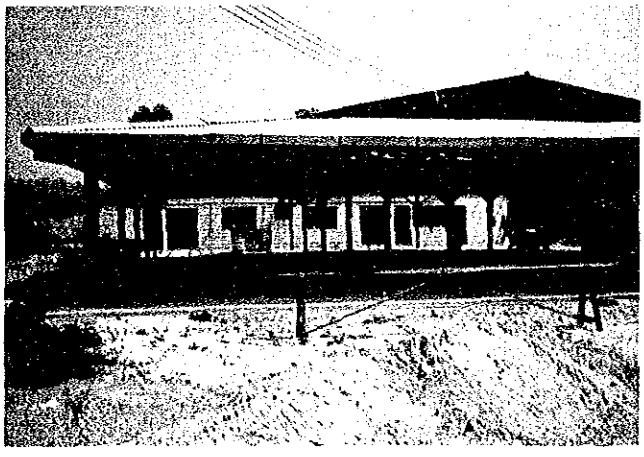


建設中の養殖池



建設中のふ化場

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I　調査内容要約

本調査団は，1984年8月に署名されたR/Dに基づき開始された「マレイシア農科大学海洋水産学部拡充計画」に関する計画打合せを目的として，85年6月25日から7月4日まで派遣された。調査を通じ，85年度および86年度の活動計画を協議するとともに，マ大側から要請のあったモデルインフラ整備，小型船供与などについての要請内容の把握なども併せて行った。

昨年の11月に長期専門家を派遣し本格的な協力を開始して以来，まだ約8ケ月を経たばかりであるが，全体的にみて協力は極めてスムースに行われており，マ大側の評価も高くまた期待も大きい。プロジェクト運営に関する手続きも，専門家とカウンターパートの協力によって迅速に行われている。

マ大側および専門家との何回かの協議の結果は，調査団団長の書簡としてまとめられ，調査団滞在中に開催された合同委員会の席上，マ大の副学長宛に提出された。また協議の結果は合同委員会においてマ側と専門家チームによって協議され，現在までの進捗状況の評価，85年度および86年度の活動計画として合意された。

モデルインフラについては，マ大側との間で要請内容を確認するとともに，今後の必要手続き，スケジュールについて，マ大側，日本大使館，JICA事務所に説明した。

小型船舶については，調査を通じ，当初はマ大側の船舶の重要性に対する認識が低かったため供与の要請がなかったが，専門家赴任後の技術指導によって，船舶の重要性に対する認識が深まり，また現有船の問題点が認識され，その結果供与の要請に至ったことが明らかとなった。調査団の見解としては，現在進行中の協力分野における，また今後開始される協力分野における効果的な技術移転のためには，小型船舶供与の早期実現が望ましいと考える。但し，供与の早期実現のために他分野の機材供与に影響を及ぼすことは得策ではなく，従って，航海に関連の深い分野の購入計画を組み換えることによって供与することが望ましいと考えられる。

II　プロジェクトの経緯

マレイシア国は，1979年に国立農科大学に海洋水産学部を設立し，水産技術者，海洋研究者等の養成を促進してきたが，教官，研究員等のレベル向上を図るため，81年にマ大副学長から鹿児島大学水産学部長宛に，JICAをベースとした協力の要請があった。

JICAは，協力要請の内容，協力可能性を確認するため，83年8月に，鹿児島大学水産学部長（当時）柿本博士を団長として，事前調査団を派遣した。さらに，協力内容の具体化のため，鹿児島大学川村助教授（現チーム・リーダー）を，長期調査員として84年4月から2ケ月間派遣した。

それら調査内容を受け，我が国としては協力を進める方針を確認し，ＪICA内に国内委員会を組織し，文部省，鹿児島大学，長崎大学，北海道大学，東京水産大学などの協力を得てプロジェクト協力を進めることとした。

８４年８月には，鹿児島大学水産学部長野澤博士を団長とし，実施協議調査団を派遣し，R/Dを締結した。

同年１１月には，川村チームリーダー，市川，河上専門家，および宇田川調整員を派遣し，本格的協力を開始した。その他，８４年度には３名の研修員受入，短期専門家の派遣，機械供与も併せて実施した。

Ⅲ　調査団派遣の目的

実施協議調査団は，R/Dとともに，T. S. I.に署名し，協力計画を策定した。本調査団はそれらを受け，８５年度および８６年度の活動計画の詳細を，マ大および専門家と協議し策定することを目的とした。また，併せてマ大側から要請のあったモデルインフラ整備，小型船舶の供与などに関する要請内容の把握も行うこととした。

Ⅳ　調査団の構成

氏　　名	担当業務	現　　職
木村喬久	団長（総括）	北海道大学水産学部教授
田口一夫	航海計器	鹿児島大学水産学部教授
松本　進	協力企画	文部省高等教育局技術教育課
小樋山覚	業務調整	国際協力事業団林業水産開発協力部，水産業技術協力室

V 調査団の日程

日順	月　日	曜日	内　容
1	6・25	火	◦東京→クアラランプール（CX501, CX721） ◦川村リーダー，宇田川調整員，中川JICA事務所職員と日程打合せ
2	6・26	水	◦JICA事務所にて，中村所長，岩佐次長と調査日程打合せ ◦日本大使館にて，石島，杉浦書記官と，カウンターパートの留学生（修士・博士課程）枠等について打合せ。 ◦川村リーダー，宇田川調整員とプロジェクトの進捗状況，今後の計画等について打合せ
3	6・27	木	◦UPM副学長PROF, DR, NAYANへ表敬訪問 ◦海洋水産学部にて，プロジェクトの進捗状況，'85-'86年の計画等について打合せ ◦FARM DIRECTOR訪問，学部のHATCHERYおよびPORT DICKSON視察
4	6・28	金	◦学部施設の視察 ◦JICAにて，モデル・インフラ整備に関する手続き等打合せ ◦クアラランプール→クアラトレンガヌ（MH148）
5	6・29	土	◦水産海洋科学センターにて，プロジェクトの進捗状況，'85-'87年の計画等について打合せ ◦河上，市川専門家，宇田川調整員とプロジェクトの進捗状況'85-'87年の計画等について打合せ
6	6・30	日	◦市内の魚市場，CHENDRING港視察 ◦水産局水産研究所にJICA派遣小林専門家を訪問，マレイシア国の水産事情について情報収集 ◦クアラ・トレンガヌ→クアラ・ランプール（MH145）
7	7・ 1	月	◦UPMにて，'86-'87年計画の打合せ ◦団長書簡案の作成，検討
8	7・ 2	火	◦UPMにて合同委員会開催，団長書簡提出 ◦川村リーダー，河上，市川専門家，宇田川調整員と教材作成等について打合せ

日順	月　日	曜 日	内　　容
9	7・3	水	◦大使館，ＪＩＣＡへ調査内容の報告
10	7・4	木	◦クアラランプール→東京（ＭＨ０１６，ＣＸ５００）

VI 主要面会者リスト

	氏　　名	職　　名
1	Prof. Dr. Nayan bin Ariffin	Vice-Chancellor, UPM
2	Prof. Dr. Syed Jalaluddin Syed Salim	Deputy Vice-Chancellor
3	En. Mord Azni bin Awbak	Dean, Faculty of Fisheries and Marine Seience
4	Ridzwan b. Abd. Rahman	Deputy Dean
5	Sharr Azni b. Harmin	Dept. Head, Fisheries Biology and Aquaculture
6	Dr. Noor Azhar Mord Sazili	Dept Head, Fishing Technology and Marine Science
7	Haji Umar b. Salleh	Head of Marine Station
8	Dr. Ang Kok Jee	Dept. of Fisheries Biology and Aquaculture
9	Capt. Mohd Ibrahim b. Hj Mohamed	Dept. of Fishing Technology and Marine Science
10	Dr. Law Ah Theem	ditto
11	Idrisb in Abdal	Farm Director
12	Miss Daisy Rajoo	Economic Planning Unit
13	石島書記官	日本大使館
14	杉浦書記官	〃
15	中村所長	JICA
16	岩佐次長	〃

Ⅶ 調 査 結 果

1. プロジェクトを取りまく環境

(1) マ大の組織，予算等

組織に関しては，事前調査の時点から大きな変化はない。

予算規模については Ⅷ－４のとおりである。

セルダン・キャンパス，トレンガヌ海洋研究所，ポートディクソンの地図については Ⅷ－７のとおりである。このうちポートディクソンについては，マ大が今年度（１～１２月）中にトレーラー・タイプの実験室（２棟分）を購入するよう予算措置を講じた。しかし，敷地の整備はほとんど進捗しておらず，本プロジェクトのサイトとするべく要請はまだない。但し，Mariculture 分野の協力のサイトとしては，ポートディクソンが整備された場合には適しいと思われる。

(2) マ大におけるプロジェクトの評価

海洋水産学部が設立されてから５年程度しかたたず，教官の層が極めて薄く，しかも教官の何人かは海外で研究中である。従って現在の教官は自分の専門外の講義を行わざるを得ないこともある。

本プロジェクトは，この意味で，教官のレベルの向上というマ大側の要望に合致したものであり，期待も大きい。

(3) 海洋水産学部の現状

事前調査の時点と比べると，学部長，副学部長，二つの学科の長がそれぞれ交代した。

現在の教官をみると，教授がおらず，助教授の人数も少ない。さらに博士号取得者もさ程多くはない。また前述のように教官のうち何人かは海外で研究中であり，層の薄さは否定できない。

一般的にいえば，教官は理論的な教育はある程度受けているものの，実践的な知識はやや劣るように思われる。

そのため，マ大側からは本プロジェクトの専門家に対して，Joint Academic Activities への参加の要請がある。これは，博士論文等への助言，セミナーや実習，Extension Service（公開講座に該当するもの）への参加，教材作成などを含んでいる。これらのうちには，通常のプロ技協の範囲を越えたものもあるが，このような活動を通じてマ大教官への教授法などの技術移転が図れるという見地から，合同委員会の席上でのマ大の要請に対し，日本側は専門家の基本的活動に支障のない限り協力することに合意した。

(4) マ大のローカルコスト負担等

マ大の予算のなかでの本プロジェクトへの予算措置の全額を明記することは困難であるが，専門家の国内旅費については Ⅷ－４のとおりである。今後はより頻繁にクアラランプール・

クアラトレンガヌ間を往復することになろうが，その時点では，さらに予算確保をする必要があろう。マ大の本プロジェクトへの位置づけは高いため，さ程問題はないと思われる。

その他，専門家の住居手当に対する現金供与等についても，ほとんど問題なく行われている。

(5) 諸手続き

事務処理については，極めて迅速に行われている。

A_1 ～A_4 フォームは，学部からE. P. U.（A_2，A_3についてはP. S. D.）を経由してJICA事務所に到着するのが2週間前後である。

機材の引取りについては，インボイス入手後1週間前後で可能である。引取りに関する手続きはシニア・スタッフが専門に担当し，トレンガヌへの輸送も併せて相当している。

機材の管理については，調整員がリスト作成のうえ管理するとともに，マ大側も上述のシニア・スタッフが管理台帳と一品目毎の管理簿によって管理する。それぞれの実験室等に据え付けられているものの他に，共用機械や消耗品的機器などは担当管理者によって一元的に管理されていて，借用希望者は借用時と返却時にそれぞれ管理者に連絡をすることになっている。

機材の現地調達については，カウンターパートが仕様書作成にも立ち合うので，使用に際しての問題はない。

調達については，カウンターパートDr. Lawが業者との連絡等手続きを担当しているので，ほとんどの事務処理はプロジェクト・サイトで，短期間に行うことができる。従って，今後もプロジェクトの円滑な遂行のために，現地調達の必要性は高い。

2. プロジェクトの現状，実績

(1) カウンターパートの配置

Ⅷ－2ANNEX Dに示すとおりである。他のプロジェクトに比べて，専門家一人当たりのカウンターパート数はやや多いといえよう。それはマ大側の要求によるもので，できるだけ数多く教官，研究者を養成したい，という期待の現われでもある。一方，カウンターパートの数の多さは，本プロジェクトの場合，その専門分野が多岐にわたるということでもあり，ある部分では専門家の分野の範囲外にまで及ぶこともありうる。そのために，今後は，短期専門家の必要性が特に高まるものと思われる。

(2) 専門家派遣

'８４年１１月から，川村リーダー（漁撈），市川専門家（海洋学），河上専門家（航海学），宇田川調整員の計4名の長期専門家が派遣された。このうち，リーダーと調整員はセルダン本校に，また市川，河上両専門家はクアラ・トレンガヌにそれぞれ配属された。

'８４年６月にJICAで開かれた国内委員会の合意に基づき，プロジェクト開始時の１年目

はリーダーはセルダンに勤務することとなっているが，マ大側，特にクアラ・トレンガヌからは，リーダーに対しさらに頻繁にクアラ・トレンガヌにも出張するよう要望があった。今まではプロジェクトの開始直後だったせいで，リーダーも月１回程度の出張しかできなかったが，協力体制が整った今後は，さらに頻繁に，あるいは長期間出張するように約束した。

先述の国内委員会の合意によると，専門家がクアラ・トレンガヌに勤務する場合，リーダーもトレンガヌ勤務となることになるが，ふ化場管理や今後協力　開始される養殖学，魚病学，栄養学等の専門家の勤務がセルダンになると思われるため，リーダーはセルダンを中心に，トレンガヌにも長期間（例えば半月ずつとか）滞在するというような形態が望ましいと思われる。

専門家の業務は，カウンターパートに対する直接的な技術指導であるが，その他にも先述のようにJOINT ACADEMIC ACTIVITIESへの協力も要請され，実施された。JOINT ACADEMIC ACTIVITIESの内容は以下のとおりである。

a) 博士論文作成への指導，助言

漁撈学，海洋学の分野の博士論文作成に資するための講義や資料収集への助言等を行った。

b) セミナー，実習

日本の水産業に関するセミナー，漁撈学，海洋学分野の実習等を行った。

c) 公開講座

航海学分野のセミナーおよびUNJANG（パヤオに該当する）プロジェクトを行った。

d) 教材整備

各分野で教材，教本等を作成中である。

なお，この分野に関しては，専門家に対し，本調査団から指導を行うとともに，今後の必要教材のチェック等を行った。また，今後派遣される専門家については，それぞれ研究論文，その他参考資料のリストなどを携行することによって，本分野での協力が充実する旨提言があった。

e) 調査研究活動

各分野にわたる調査研究を目的とした。「かごしま丸」によるMATAHARI EXPEDITION, UNJANG プロジェクトなどへの協力を行った。特に，MATAHARI EXPEDTIONについては，テレビ放送（３０分）でも何回か紹介され，また，新聞でも紹介されるなど，マ大内だけでなく，広く国内でも評価が高かった。

短期専門家については，平田専門家（ふ化場管理）が８４年度，８５年度に１回ずつ派遣された。同専門家は，マ大から要請のあったふ化場施設内のモデル・インフラ整備（後述）に関する要請内容の検討，助言，同システムの小規模実験などにおいても，マ大側から高い評価を得ている。

今年度当初計画分としては，本調査団の団員でもある田口教授の派遣が８月に予定されている。

(3) 研修員受入

８４年度については養魚池管理，水産海洋学，電気泳動（早期帰国）分野の３名を受入れた。

８５年度については幼魚飼育・ふ化，水産海洋学，水産技術分野の３名を受入れ，来日中止となった残り１名のふ化場管理分野研修員受入れについても，８月から実施した。

カウンターパートの日本での研修に対するマ大の評価は高いが，学歴などの点で問題がないわけではない。すなわち，一部のカウンターパートは高卒程度であり，そのカウンターパートが研修員となった場合，文部省の規程上大学での受入れが困難であるため，その他の機関での受入れとならざるを得ないが，その際は国内支援体制，専門家派遣との関連が大学における受入れの場合と比較して，やや薄れてしまう恐れがあることである。

また，逆に言えば，マ大側のプロジェクト遂行の中心的立場にいるカウンターパートが，大学運営上の観点から日本での研修を受けることが困難であるということは，プロジェクトタイプの技術協力の主旨からは，問題が残る。

研修員は来日前に，プロジェクト・サイトで，専門家からの日本語研修を受けており，初歩的日本語会話については問題がない。但し，長期日本滞在のためには，特に他方での研修が中心となる研修員については，日本での日本語研修の必要性はあろう。

(4) 機材供与

８４年度の供与実績は２３,８７３,６１０円で，一部を除き，マ大に到着している。引取り管理状況は前述のように，極めて良好である。

海洋水産学部は歴史も浅く，学部運営上必要な機材でも整備されていない場合が多く，座学中心の教育に対し，実践も重視する日本型の教育理念を移転する意味でも，また，実学者養成というマレイシア国のマ大海洋水産学部への期待に応える意味でも，機材供与の意義は大きい。

さらに，各分野のマ大側教官もそれぞれの分野の必要機材のリストアップさえできない場合もあり，機材供与自体も技術移転の一部を占めるということもいえるであろう。

3. ８５年度実行計画

(1) 専門家派遣

長期専門家派遣については，ＴＳＩに基づいて進められるので，新しい要請はない。

短期専門家については，当初２名（ふ化場管理，航海計器）の計画のところ，以下の新しい要請があった。合同委員会で合意が得られたが，本調査団としてもそれぞれ妥当と認める。

但し，マ大側の要請期間は２～３ケ月間であるが，教授クラスの２～３ケ月派遣は極めて

困難であり，１ケ月程度の派遣期間でも，協力の詳細はマスタープラン作成あるいは，今後の協力への方向づけなどは可能であり，若年専門家の中期派遣と組み合わせれば，１ケ月程度の派遣でも有効であると思われる。また，マ大側もそれに対して異議はない。

a) 沿岸工学

現在派遣されている海洋学専門家の分野は，生物学的分野に重点が置かれている。しかし，一方では物理学的海洋学への協力も不可欠なものとなっている。特に，漂砂，浸食，沈殿などの工学的分野での協力への要望が強い。基礎的データの収集は，クアラ・トレンガヌで現在行なわれているため，モンスーン時期（１０月ないし１１月頃から２～３ケ月）の派遣でも問題ないとのことである。また，同専門家には，この分野で必要となる機材のリストアップについても要望がある。

b) プランクトン分類学

本分野は，生物学的海洋学の分野であり，かつ，餌料生産分野への協力にも欠かせないものであり，水産業分野の基礎ともいえる。従って，この分野での研究の遅れているマ大への協力は不可欠である。

c) 栄養学

R/Dに短期専門家による協力分野として規定されている。特にモデル・インフラを含むふ化場施設との連関が深いため，ふ化場施設の建設が完成する８５年8月ないし９月以降が望ましい。

d) ふ化場管理

今年度中に完成する予定のモデル・インフラを含めたふ化場施設を利用したふ化学分野の技術移転を目的とする。従って，モデル・インフラ完成後，すなわち，今年度末の派遣が望ましい。

(2) 研修員受入

Ⅶ－２－(3)にもあるように，今年度は８月に受入れた１名の来日により，計画はすべて完了されたことになる。

(3) 機材供与

今年度の当初実行計画額は9,000万円で，昨年度からの繰越額を含めると，１１５,０００千円である。そのうち，プライオリティの高いものは，昨年度購入できなかったもので，次には当初から今年度購入分としてリストアップされていたものであり，その他として新しい要望のあったものである。

後述のように，マ大側は小型船舶の供与を要望しており，本調査団に対しても第一回目の協議の席上からその要請を明らかにしてきた。本調査団としては，プロジェクト開始時にはマ大側が供与の要請をしない旨明言したこと，その他分野機材に影響がでることなどを理由に，今年度購入が難しいことを説明した。その結果，マ大側は合同委員会の議事録案では

８６年度要請項目とした。しかし，マ大側の潜在的要望は強く，また，本調査団としても，後述のように可能ならば今年度内購入が望ましいとの見解である。従って，もし，今年度購入の方向で検討が進めば，航海分野の機材購入リストの組み換えなどにより，他分野への影響を最小限に押える調整が必要であろう。

4. ８６年度実行計画

本調査団の主目的が，８５年度実行計画の協議であるという前提でマ大が準備を進めていたため，８６年度実行計画案は，必らずしも入念に作成され，かつ，専門家と十分話し合いが行われたものではない。むしろ，本調査団と協議を重ねていくなかで，マ大側も徐々にその要請内容が明確になっていったということのようである。合同委員会の合意事項に至るまでに，修正，削除などが行われた。

(1) 専門家派遣

長期専門家については，８６年度中に任期が終了する漁撈学，海洋学分野での後任者の要請があった。但し，海洋学分野についていえば，市川専門家の任期中に生物学的な分野での協力がある程度終了すること，８５年度の短期専門家として要請がある物理学的海洋学専門家の派遣では技術移転が不十分であることなどから，物理学的海洋学の長期専門家が要請されている。

航海学分野については，河上専門家の任期は８６年１１月までであるが，１年間の任期延長の要請があった。T.S.I.では同分野の協力は８６年度内と規定されている。従って８７年度にわたる任期延長はT.S.I.上は困難である。この要請は，マ大側が航海学分野の重要性を認識したことから生じたものであり，小型船舶供与要請とも通じるものである。現段階では，航海実習は専門家なしでは困難であり，航海が航海学分野だけでなく，海洋学，資源学など他の分野の調査研究に不可欠であることから延長要請を前向きに検討すべきであろう。また，もし小型船舶が供与された場合には，その有効な活用のためにも延長は有益であると思われる。

その他にも，T.S.I.に基づき，水産資源学，養殖学の長期専門家の要請があった。

短期専門家については以下の要請があった。

a) 電気泳動

資源学分野のうち，昨年度受入れ研修員で早期帰国したカウンターパートに対して，日本で研修できなかった部分を補うとともに，本分野の技術移転を広く行うことを目的とする。

b) 航海学

航海学分野のうち，特に航海計器を中心に，長期専門家およびカウンターパートにアドバイスを与える。

c) ふ化場管理

モデル・インフラを含むふ化場施設を使用して技術指導を行う。特に，モデル・インフラを利用した実験計画は，８５年度内にも立てられるが，その進行状況のチェックと必要な技術指導を行うことが目的となる。そのため，教授レベルの１ケ月程度の派遣と，若年専門家の中期的派遣を組み合わせることが有効であろう。本分野と長期専門家として要請のある養殖学との関係は，もし両分野を兼ねられる長期専門家であれば，短期専門家の派遣の必要はないとのことであった。しかし，マ大の要請内容としては，養殖学分野では座学を中心に，ふ化場管理分野では実習を中心に考えているようでもあり，その点で両分野を兼ねる長期専門家の派遣よりも，それぞれの分野への別々の専門家の派遣の方が現実的であるようである。

d) 栄養学

８５年度の継続として，進捗状況のチェックと，必要な技術指導を行う。

e) 魚　病

現在魚病研究室のスタッフは定員５名であるが，そのうち２名が海外留学中である。その５名（１名はカナダ人）のうち４名は博士号取得者であるが，研究論文等をみる限りレベルはまだ低く，機材にしても基本的機材（例えばオートクレーブ）に欠如，もしくは不足がみられる。そこで，８６年度は，特に微生物感染症を中心として魚病研究の方向性のアドバイスと必要機材のリストアップなどを行う。８７年度には，おそらく若年専門家を派遣しそのフォローアップを図る必要性が生じると思われる。

f) 漁獲物処理

クアラ・トレンガヌで公共魚市場等を視察したところによると，水揚げされている魚種はかなり多いものの，鮮度についてはかなり問題が多いようである。魚市場に接岸している船は100トン以内のものではあるが氷室をもち，氷の入手も可能である。従って，鮮度が低いのは漁獲物処理の方法に問題があると思われる。つまりこの分野の技術が民間に普及していないことを表わしている。

そこで，本分野の専門家は学問的な見地からの技術指導を行うことを目的とする。

(2) 研修員受入

栄養学，エビ養殖，航海計器，海洋学分野におけるカウンターパートの受入れの要請があった。

(3) 機材供与

前述のような経緯で，小型船舶供与要請が８６年度分としてあり，それを含め約6,000万円程度の要請があった。本プロジェクトが当初計画していた機材については概ね８６年度中には購入できる見込みである。但し，８５年度以降開始される協力分野に関しては，必らず

しも十分といえない部分もあり，専門家が派遣されてから，追加機材の要請が生じることは十分考えられる。

5. 小型船舶供与に関する資料

マ大側とR／D協議の際の経緯

当初より日本側は，“船の必要性”についてマ大（UPM）の意向をたゞしたが，現有2隻（UNIPERTAMA－I…8トン），（UNIPERTAMA－II…80トン）の運航で，教育研究は充分とのことであった。またKula Trengganu（KTとよぶ）を視察の際（83.8）は，UNI－IIは建造中で83.10配置とのことであった。

さらに84.5専門家（川村）調査の際，UNI－IIは配置されていたが，同船々長は同船の動揺周期が早いことを理由に，運航を好まないために乗船は短時間であった。

84.11長期専門家（河上）が現地に滞在しUPMとNavigation Seamanshipの業務を開始した。UPMとの実質的な作業が開始され，船の重要性及び運航の効果が認識されるに至り，しかも河上専門家による両船の詳細な検討が各分野に行われ，その結果多くの問題点が指摘された。

即ち，UPMの『船に対する認識の高まり』『船の自体の問題点及び運航体制』などが学び上り，今回の調査団の検討を併せた結果，次の結論を得た。

10トン型程度のFRP船を供与することが本プロジェクトの実施のため極めて必要と認められる。但し，プロジェクト全体の予算からみて，同船に最も関連の深いFishing TechnologyとNavigation & Seamanship分野の予定機器を削ることによって，船舶費用とほぼバランスさせることが望ましい。

(1) UNIPERTAMA－II

(1－1) UNI－II（80トン）の運航状態

KTにおける同船の定係地はK. Tregganu川の河口にあるKT港内のブイである。同港は河口のため水深は砂泥の堆積により常に変化し，潮の干満時の影響を受け，可航時刻が変化する。即ち，カリキュラムの円滑な実施は制限される。また北東季節風（冬季）時にはウネリが港内に浸入することから，ブイ係留は不能で河の上流に移動する。後者は当初より予想されていたが，前者は，第1回R／D時には開陳されていなかった。

(1－2) UNI－IIの構造・設備

既述のように，新船であるから充分に船体も信頼できると考えていたが，河上専門家の報告，今回の調査からみても，本船に当初予定された機材（カラー・ソナーなど）をすべて投入することは適当でない。それは，建造期間が4年近くにも及ぶ，木造船建造法が不適であることによる。甲板の材料の乾燥が不充分のため，deck plankの間隙が広くなりホーコンを含めコーキング不良である。即ち洩水がかなりみられる。これは1例

であるが，艤装にも問題点がある。

(1-3) UNI-IIの評価

以上の2点から，KT港の現状が改善されない限り，教育・研究の効率化からUNI-Iの活用を図るべきである。

(2) UNIPERTAMA-I

(2-1) UNI-Iの現況

同船の上架中に船体を検査した河上専門家によると，船体の耐用年限は後5年位という。それはさておき，今回の調査でも船体に多くの欠陥が見られた。使用木材はサラワク産のかなり密度の高い（硬い）ものと見受けられるが，UNI-IIで指摘のようにdeck plankが未乾燥のまゝであったため，経年変化により，plank間隙が増大している。これに対し，セメントなどで充塡しているから，coakingの効果なし。また機関室への洩水が多いことも報告されている。

現在の構造は，排水設備悪く，遊動水がみられるし，舷が低いので容易に波が打ち込むから，多くの学生の乗船時には，さらに波が入ると予想される。また，船室はもともと開放性であり，機器装備には不適である。

(2-2) UNI-Iの活用方針

KT地方の漁業を考えると共に，学内の教育目的から本船には生簀をぜひ設置したい。そのためには，上架して船材を乾燥させた後，改造工事に着手するが，これを行うと現在の欠陥部分はさらに大きくなる可能性があり，上架は一層の費用が求められる。

さらに，供与機材の魚群探知機送受波器の設置でも上架が必要である。もし浮かしたまゝで装備するなら舷側装備となり，測深能力の低下と漁業実習には送受波器がいくらかの妨げとなって不便である。また，今回供与の多くの電子機器の装備では，船体への接地，現機関からの発生雑音を考慮すると，できるだけ完全な装備に近づけるためには，徹底した工事が望ましい。

(2-3) UNI-I への見解

船舶の使用による教育・研究への著しい貢献について，UPMが最近目覚めてきたことは真に喜ばしい。それには，長期専門家の日頃の活動と実績が彼等を目覚したものと信じている。

しかしながら，現UNI-Iではこれらの要望と，将来のUPMの活動に対応が難しいことは明らかである。別紙のようにUNI-I，UNI-IIの運航実績，運航計画を示すが，可動性の高い，秀れた装備の船の配置は真に価値あることといえよう。

KT港の造船，補修の技術水準を考えると，補修・保守の容易なFRP船が望ましく，乗船予定学生数に見合った船型は10トン型といえよう。専門家の滞在期間，教育内容からみて，船舶発注から入手までの期間はできるだけ短くなければならない。従って，

既存の船型に小改造を加える程度で我慢し，早急にUPMに配置できることを希望したい。

(2-4) 新船の供与時期と将来展望

第2回JOINT COM. 議事録の作成に当り，調査団はUPMと2回にわたり事前協議を行った。i)新船建造は現地調達で5ケ月の納期を予定したいが，ii)この希望の達成は1986年以降となろう …とUPMは考えた。国内委員会は本部調達ならば長い期間，即ち1986年と考えた。今回の協議の席上，UPMは新船を第1順位で希望したが，調査団は従来の経緯から，その要請を直ちに認めることはできないが，上述のように強い希望と，必要性を理解した。

しかしながら，議事録の表現は1985/86年度として確答を避け，最善の努力をする形にした。

現地調達では見積後5ケ月との見積書があり，一方長期専門家の活動を考え，しかも新船引渡後の専門家滞在期間の問題なども併せて検討した。この結果，議事録の表現を損うことなく，最大の希望に応える最も容易な対応は1985年度中の供与が最善と考えた。

なお，Fishing Gear Technology，Navigation & Seamanshipの長期専門家の任務終了後については，次の分野が本船の使用を希望することになる。

Population Dynamics … 沿岸域におけるプランクトン及び稚魚などの採集。毎月実施。

Coastal Civil Engineering … 海洋調査ことに沿岸域における漂砂の研究は，毎月の海洋調査が不可欠であり，秀れた設備のある本船は大きい貢献ができる。

さらに，技術移転を含め，供与機材の習熟には長年月を要すると考えられる。従って，本プロジェクト期間内において，Fishing Gear Tech, Nav.& Seamanship分野は毎年短期専門家のUPM派遣を要請予定である。もし，本件が承認されれば，船舶の使用頻度を含め，本船の使用申込み数は一層増加するといえよう。

6. モデル・インフラ整備

海洋水産学部は，現在独自のふ化養殖実験施設をもっておらず，他学部の施設の一部を借用して実験を行っている。しかし，それはあくまでも実験規模で，養殖池をもたないために十分な実験研究は不可能といえる。そこで水産学部は大学敷地内に，現在ふ化場施設と約50面の養殖池を建設，本年8月には完成の見込みである。しかし，予算不足のためふ化場施設内にも，餌料生物生産，稚魚養成，幼魚養成，親魚養成などのための施設が建設されない。従って，このままでは実験施設としては極めて不十分といわざるを得ない。

そこで，マ大はJICAに対し，ふ化場に関するモデル・インフラ整備事業を要請してきた。それに対し，既に派遣されたふ化場管理平田専門家は，モデル・インフラ整備が可能ならば，

餌料生物生産池等に対し，循環水流式の施設を設備すれば，経済的にも効果があることを助言，同システムによる実験を行った。その結果，同システムが効果的であることが解明し，そのシステムを含めた要請となった。

一方，養殖池については，マ大の予算範囲内で建設するということで，要請内容からは除外されている。

本調査団は，マ大側との協議の結果，その必要性を認め，正式の承認があり次第実施設計調査団を９月頃派遣すること，また，建設は今年度中に終了させることを明らかにした。同時に，日本大使館，ＪＩＣＡ事務所にも，今後の日程，手順等を説明した。

7. 留学生受入れ問題

昨年度，国費留学生受入制度が改善され，ＪＩＣＡプロジェクトのカウンターパートの枠が実質的に確保された。

昨年度は，手続き面に時間がかかり，本プロジェクトのカウンターパートの受入れは実現されなかった。今年度については，実現を図るべく両国が努力することが確認された。

しかし，両国の教育制度の相違のため，問題が生じている。

すなわち，マレイシア国の教育制度によると，小学校（６年），中学校（２年）の義務教育を終了すると，高校（２年）に進学し，さらに大学入学志望者は１年間の学校教育を受けることになる。従って６＋３＋３制の日本と比べ，大学入学時の学歴は１年少ないことになる。

そこで，もし本制度を利用し，日本の大学院に入学する場合，さらに１年間の教育期間が必要となる。本制度は基本的には２年間の受入れであるため，その間には修士ないは取得できないことになる。

現実的には，日本での一年間の教育に引き続き，一年間の大学院での研究終了時点で１年間の延長を考えざるを得ない。その実現性は高いものの，研修生としては不安の残る制度でもある。

8. カウンターパートの受入れに係る問題

現在の専門家に対するカウンターパートは，ほぼ，大学卒業者であるが，時として高卒者が配置される場合もある。

高卒者が研修員として来日する場合，文部省（国立大学）で受入れることが困難となる。それは，「外国人受託研修員制度実施要項」に，研修員の資格として日本の大学を卒業したもの，または，これに準ずる学力があると認められたもの，と規定されているからである。

しかし，本プロジェクトを円滑に運営するためには，他機関での研修はその効果を半減させるものであると思われる。

Ⅷ 資　　料

Ⅷ－1　団長書簡

UNIVERSITI PERTANIAN MALAYSIA

FAKULTI PERIKANAN & SAINS SAMUDRA
(FACULTY OF FISHERIES AND MARINE SCIENCE)
SERDANG, SELANGOR, MALAYSIA

Telefon: 356101—10 (10 Talian)

Bil. Kami:
Bil. Tuan:

Professor Dr. Nayan Ariffin,
Vice-Chancellor,
Universiti Pertanian Malaysia,
Serdang,
SELANGOR.

Tarikh: July 2, 1985.

Dear Sir,

On behalf of the members of the Japanese Consultation Team for Development of the Faculty of Fisheries and Marine Science, U.P.M., I would like to express my sincere gratitude for all the efforts and assistance you kindly rendered during our stay in Malaysia from June 25 to July 4, 1985.

During our stay in Malaysia, we exchanged views and had a series of discussions with the officials concerned and Japanese experts for the purpose of evaluating the progress and working out the details of Technical Cooperation Program of the Project.

On the basis of the above discussions, we have formulated the Program attached hereto, while I would convey your request to JICA which you come out with at the meeting.

Your due consideration into the attached Program will be highly appreciated.

Sincerely yours,

T. Kimura

Professor Dr. Takahisa Kimura,
Leader,
Consultation Team,
Japan International Coorperation Agency.

I. PROGRESS IN 1984 - 85

Collating with Record of Discussions, signed by Professor Dr. Koji Nozawa and Professor Dr. Nayan Ariffin on August 29, 1984, and with Tentative Schedule of Implementation, all activities went well as scheduled.

1. Dispatch of Experts

Long Term experts in the field of Fishing Gear Technology, Fisheries Oceanography, Navigation and Seamanship, and Liaison Officer have been sent to U.P.M., and contribute to Joint Academic Activities such as Supervision of a academic and graduates students, Seminar and workshop, Preparation of teaching aids, and Research activities especially Matahari expedition and so.

As a short term expert, Hatchery management expert was dispatched so as to extend knowledge and Technology to local counterpart, and to prepare the model infrastructure plan as well, complying with the request by U.P.M.

2. Training of Local Counterpart in Japan

Two counterparts out of three whose field are Aquarium Management, and Fisheries Oceanography respectively completed their training in Japan, but one counterpart discontinued training course due to medical reasons.

Training of three counterparts is in progress.

Training in Japan is very essential to foster local counterpart.

3. Provision of Equipment

Equipments in the field of fishing Gear Technology, Fisheries Oceanography, Navigation and Seamanship and Hatchery Management were arrived so far in U.P.M. and were highly appreciated by U.P.M.

Procurement of equipment in Malaysia should be considered as efficient in order to shorten the time of acquisition, and to avoid the discrepancy of the specifications.

As a result of scrutinizing the equipment settled and just arrived, they are utilized properly and managed carefully by officials concerned.

II ANNUAL WORK PLAN '85 - '86

1. Dispatch of Experts

Long Term experts continue to provide technical advice to Malaysian counterparts and collaborate the Joint Academic Activities.

Besides Dr. Kazuo Taguchi, who are to assigned as a expert, dispatch of short term experts should be put into consideration to carry out the Joint Academic Activities sufficiently. The areas required are as follows:

(1) Coastal Civil Engineering

Expert who specialized in physical oceanography, as a part of fisheries oceanography which is stipulated in Record of Discussions, is needed to transfer the technology regarding to drifting sand, beach erosion, and sedimentation and so.

(2) Plankton Toxonomy

Expert in Toxonomy, also as a part of Oceanography, is important to implement the Joint Academic Activities. Expert is required to give basic knowledge of Toxonomy with reference articles.

(3) Fish Nutrition

(4) Hatchery Management.

2. Training of Counterparts in Japan

Training of one counterpart, who are replaced with the candidate originally assigned, should be arranged as soon as possible.

3. Provision of Equipment

Procurement of Equipment requested in 1984/85 but could

not be purchased and in 1985/86 is inevitable for continuation of the Project.

III ANNUAL WORK PLAN '86 - '87

1. Dispatch of Experts

One expert in Fishing Gear Technology will take over the predecessor's position. Expert in Fisheries Oceanography repleced with Dr. Ichikawa is anticipated to put the stress on physical aspect.

In accordance with Record of Discussions, experts in Mariculture and Population Dynamics are newly requested.

Request for extension of duration on Capt. Tateo Kawakami by U.P.M. would be conveyed to JICA HDQ.

Short term expert in Electrophoresis is need for following up the counterpart who discompleted the training course above mentioned.

Experts in Fish/Prawn Disease and Handling of Caught Fish are expected not only to transfer their knowledge and technology to counterparts but also to investigate the status in those field at U.P.M. in teaching and reserching in the field respectively.

Dispatch of short term experts in Navigation and Seamanship, Fish Nutrition, and Hatchery Management should be appreciated from the view point of following the activities of previous year.

2. Training of Counterpart in Japan

To keep the quota for four counterpart at least is indispensable in carrying out the Project smoothly.

3. Provision of Equipment

I would convey your request for equipment which includes a Vessel for Training and research to JICA.

Yet, I am afraid there might be some difficulties in purchasing the Vessel, partly because it is not originally requested and partly because purchasing the Vessel, estimated M$300,000.00, leads to give up another equipment.

2. 第２回合同委員会議事録

THE JAPANESE TECHNICAL COOPERATION PROJECT OF JICA
FOR THE DEVELOPMENT OF THE FACULTY OF FISHERIES AND MARINE
SCIENCE, UNIVERSITI PERTANIAN MALAYSIA

SECOND JOINT COMMITTEE MEETING

2nd July, 1985

11.00 a.m.

A G E N D A

1. Address by Chairman.

2. Presentation of Progress Report by the Dean of Faculty of Fisheries and Marine Science.

3. Presentation of 1985/86 and 1986/87 Work Plans.

4. Address by Dr. Takahisa Kimura, Leader of the Consultation Team.

5. Other matters.

LETTER OF TRANSMITTAL

2 July, 1985

Sir,

We have the honour to present herewith the 1984/85 Progress Report and the 1985/86, 1986/87 Work Plans of the Japanese Technical Cooperation Project of JICA for the Development of the Faculty of Fisheries and Marine Science, Universiti Pertanian Malaysia discussed in the Second Joint Committee Meeting held in Universiti Pertanian Malaysia on 2 July, 1985.

Kindly accept Sir, the assurance of our highest considerations.

Assoc. Prof. Dr. Gunzo Kawamura Team Leader of JICA Experts	Prof. Dr. Syed Jalaluddin Syed Salim Chairman of Joint Committee Meeting

THE JAPANESE TECHNICAL COOPERATION PROJECT OF JICA

FOR

THE DEVELOPMENT OF THE FACULTY OF FISHERIES AND MARINE SCIENCE, UNIVERSITI PERTANIAN MALAYSIA

1984/85 PROGRESS REPORT

1.0. INTRODUCTION

The Japanese Technical Cooperation Project of JICA for the development of the Faculty of Fisheries and Marine Science, Universiti Pertanian Malaysia officially began following the signing of the Record of Discussions of the Project on August 29, 1984 between Professor Dr. Koji Nozawa, Leader, Implementation Survey Team of Japan International Cooperation Agency, Japan and Professor Dr. Nayan Ariffin, Vice Chancellor, Universiti Pertanian Malaysia.

The Project is undertaken to enhance the fisheries and marine science education of the Faculty in the following fields:

(1) Curriculum development

(2) Fishing Gear Technology

(3) Mariculture

(4) Fisheries Oceanography

(5) Navigation and Seamanship

(6) Population Dynamics

(7) Hatchery Management

(8) Fish/Prawn Disease

(9) Fish Nutrition

(10) Handling of Caught Fish

This section discusses the 1984/85 progress of the Project Work Plan under the following headings:

i) Dispatch of Experts

ii) Training of Local Counterparts in Japan

iii) Equipment Acquisition, and

iv) Joint Academic Activities.

2.0. 1984/85 WORK PLAN

The program of activities for the 1984/85 work plan went well as scheduled and is summarized in Annex A.

2.1. Dispatch of Experts

2.1.1. Long Term

The three long term experts, the liaison officer and their families settled well at their respective duty stations. The liaison officer, the team leader, the experts and the local counterparts met regularly to discuss the implementation of the Project especially with the joint academic activities of JICA/Faculty of Fisheries and Marine Science (Annex D) which shall be highlighted later in this section.

2.1.2. Short Term

The short term expert in Hatchery Management visited the Faculty twice in 1984/85. Although the two visits were short in duration, the expert and the counterparts had successfully discussed and prepared plan for the development of the pond and hatchery complex. During the last visit, the model project on plankton rearing using a solar system was set up and experiments using the model are in progress.

2.2. Training of Local Counterparts in Japan (Annex B)

Training of local counterparts in Japan went well as planned except one, whereby the counterpart was advised to return to Malaysia without completing the whole training program due to medical reasons.

Those who had completed their training expressed their satisfaction of the training program and are now serving the Faculty in areas they had been trained.

2.3. Equipment Acquisition (Annex C)

Equipments requested for the year 1984/85 are still coming in. Todate, approximate M$370,000.00 worth of equipments have arrived and installed either at the Faculty in Serdang or at the Fisheries and Marine Science Center, Kuala Terengganu.

JICA Kuala Lumpur, as well as various Government departments and ministries have given their full cooperation in providing approvals and expediting the transfer of the equipments from the port of arrival to the University.

2.4. Joint Academic Activities Faculty of Fisheries and Marine Science/JICA

The experience and expertise of the experts in their respective areas are imparted to the local counterparts through joint academic activities. The experts have been involved in the supervision of academic and graduate students program, seminars and workshops, preparation of teaching aids and participation in joint research activities (Annex A). The cooperation between the experts and the counterparts during these joint activities has enhanced the overall activities of the Faculty to a level above that previously achieved. This is indeed one of the most rewarding part of the Project.

3.0. COMMENTS AND RECOMMENDATIONS

The Project went very well as scheduled and proposed during the August 1984 Record of Discussions meeting. However, being in the first year of its implementation, we observed that there are a few aspects of the project pertaining to procedures of implementation which could be improved in order to make the Project run more smoothly and

effectively. The following comments and recommendations are listed based on discussions held between the experts and the counterparts as well as with Heads of Departments, and the Dean.

3.1. Dispatch of Experts

The visit by the short term expert in Hatchery Management was very successful. However, the counterparts felt that they could certainly benefit more from the expert if he could be with them for a slightly longer period of time of at least one month.

3.2. Training of Local Counterparts in Japan

The training of local counterparts in Japan went on as scheduled. However, the Faculty, in an effort to make the program run more smoothly, will try to submit application forms and relevant particulars of the applicants to the departments and agencies involved in processing the applications. By doing so, we hope JICA will be able to inform the applicants of the notice of acceptance and their flight arrangements to Japan in advance.

3.3. Equipment Acquisition

Acquisition of equipments went on smoothly. All equipments arriving from Japan obtained tax exemptions and custom clearance within reasonable period of time. However,

request for the exemptions and custom clearance could be expedited if the documents of the shipment or consignment such as the bill of lading, invoice and the packaging list arrive in Malaysia before the equipments.

3.4. Joint Academic Activities

The joint academic activities were truly successful. It is hoped that when more equipments which were requested from JICA arrive, more joint activities could be carried out especially in Fisheries Oceanography, Navigation and Seamanship, and Fishing Gear Technology.

Experts are expected to be involved in the organization and implementation of various joint academic activities, workshops, seminars, research, etc.

THE JAPANESE TECHNICAL COOPERATION PROJECT OF JICA

FOR

THE DEVELOPMENT OF THE FACULTY OF FISHERIES AND MARINE SCIENCE, UNIVERSITI PERTANIAN MALAYSIA

WORK PLAN FOR 1985/86

1.0. INTRODUCTION

The Work Plan for 1985/86 is a continuation of the 1984/85 activities and is in accordance with the Tentative Schedule of Implementation of the Project agreed in the August 29, 1984's Record of Discussions, with additional request for aids included.

2.0. DISPATCH OF EXPERTS (Annex D)

2.1.1. Short Term Expert

For 1985/86, the Faculty would like to request four short term experts in the following areas.

(i) Coastal Civil Engineering

The expert in Coastal Civil Engineering envisaged by the counterparts should be a person knowledgeable in coastal zone processes and Physical Oceanography so

that he could complement the expert in Fisheries Oceanography and his counterparts in their oceanographic research programs.

(ii) Fish Nutrition

A short term expert in the field of Fish Nutrition is required to assist the counterparts in planning and development of a nutrition laboratory in Serdang. The laboratory is a necessity as it should complement the hatchery research activities.

(iii) Hatchery Management

The expertise of Dr. Hachiro Hirata, an expert in Hatchery Management is needed in order to continue in the development of the present hatchery and pond complex in Serdang as well as to assist in the development of a "to be proposed" model infrastructure of a tropical hatchery system.

(iv) Plankton Taxonomy

A short term expert in Plankton Taxonomy is required by the Faculty to assist the expert in Fisheries Oceanography and his counterparts in productivity research in the South China Sea.

3.0. TRAINING OF COUNTERPARTS IN JAPAN

For 1985/86 four counterparts have been chosen to go for training in Japan. Three of them are already in Japan, undergoing short term training in the fields of:

(i) Hatchery Management and Larval Rearing

(ii) Fisheries Oceanography, and

(iii) Fishing Technology,

respectively. Another counterpart, who is a technician, is waiting for a reply from JICA to his application for training in Hatchery Management.

4.0. EQUIPMENT ACQUISITION

Request of equipments for 1985/86 would be based on the following order of priority:

(i) Equipments requested in 1984/85 but could not be purchased due to insufficient allocation of fund.

(ii) Equipments listed on the 1985/86 priority list.

(iii) Newly proposed equipments seen to be urgently needed following recent developments.

5.0. JOINT ACADEMIC ACTIVITIES OF JICA/FACULTY OF FISHERIES AND MARINE SCIENCE

The joint academic activities of JICA/Faculty of Fisheries and Marine Science for 1985/86 are summarized in Annex E.

The activities include continuation of current activities as well as several newly proposed activities. Among the newly proposed activities are:

(i) Co-supervising of students project.

(ii) Workshops on the navigation skill, Oceanography and Fishing Gear Technology.

(iii) Seminar on Seamanship and Navigation, Fisheries Oceanography, and Fishing Gear Technology.

(iv) Simulation program of the stars etc. to be displayed on cathode ray tube.

(v) Development of a model infrastructure for a tropical hatchery which is estimated to cost M$300,000.00

THE JAPANESE TECHNICAL COOPERATION PROJECT OF JICA

FOR

THE DEVELOPMENT OF THE FACULTY OF FISHERIES AND MARINE SCIENCE, UNIVERSITI PERTANIAN MALAYSIA

WORK PLAN FOR 1986/87

1.0. The Work Plan for 1986/87 is summarized in Annex F.

1.1. Dispatch of Experts

1.1.1. Long Term

The experts in Fishing Gear Technology (Dr. Gunzo Kawamura) and in Fisheries Oceanography (Dr. Toshihiro Ichikawa) will serve the Project only for a duration of two years, i.e. until November 1986. Following their term, two more long term experts will be requested to continue the programs laid down by their predecessors.

The expert in Navigation and Seamanship (Capt. Tateo Kawakami) will be with the Project until November 1987.

In addition to the three long term experts mentioned above, the Faculty would like to request two more experts, one in each of the following fields:

(i) Population Dynamics

A long term expert in this field is required in order to develop the capabilities of the counterparts in teaching and research on Population Dynamics and in the subject of Fisheries Resource Management and Conservation. The expert will be stationed in Kuala Terengganu's Fisheries and Marine Science Center. Counterparts for this program have been identified (Annex A).

(ii) Mariculture

A long term mariculturist is required to assist the Faculty in the development of the field of Mariculture teaching and research as well as extension programs. Counterparts for this area have also been identified (Annex F).

1.1.2. Short Term

For 1986/87, the Faculty would like to request six short term experts in the following areas:

(i) Electrophoresis

To assist the counterpart in the techniques of electrophoresis and its application in fisheries research.

(ii) Navigation and Seamanship

To assist the long term experts and his counterparts in on-going programs in this field.

(iii) Hatchery Management

To check the progress of research and utilization of the proposed model hatchery.

(iv) Fish Nutrition

To check the progress of research and utilization of the proposed nutrition laboratory.

(v) Fish/Prawn Disease

To assist the counterparts in developing teaching and research programs in fish/prawn disease and to complement works in the pond and hatchery complex.

(vi) Handling of Caught Fish

To evaluate and plan the development of teaching and research programs in the field of handling of caught fish.

1.2. Training of Local Counterparts in Japan

The Faculty, in consultation with the short term and long term experts, would like to request four places for short term training of counterparts in japan in the

following areas:

(i) Fish Nutrition

(ii) Prawn Culture

(iii) Fishery Electronics (equipment maintenance)

(iv) Physical Oceanography (coastal processes)

The candidates for the short term training are yet to be reidentified.

1.3. Equipment Acquisition

Following the developments that have taken place since the inception of the Project, and in anticipation of the Faculty's needs in the future, the Faculty in consultation with the Japanese experts, would like to request for a training and research vessel for the Fisheries and Marine Science Center in Kuala Terengganu as a number one priority equipment.

Besides a vessel, the Faculty also would like to request for few equipments that are still not available.

ANNEX A

Work Plan for 1984/85 and its Overall Progress

1984/85 Work Plan	Progress
(A) Dispatch of Experts	
Long term	Long term
Fishing gear technology	Dr. Gunzo Kawamura
Fisheries oceanography	Dr. Toshihiro Ichikawa
Navigation and seamanship	Capt. Tateo Kawakami
Liaison officer	Mr. Kazuo Udagawa
Short term	
Hatchery management	Dr. Hachiro Hirata 28/12/84 - 22/1/85 and 27/5/85 - 10/6/85
Navigation and seamanship	Waiting for Dr. Kazuo Taguchi
(B) Training of LOcal Counterparts in Japan	(Annex B)
Aquarium management	Completed
Fisheries oceanograpohy	Completed
Fish breeding and Electrophoresis	Discontinued
Larval rearing and hatching	In progress
Fisheries oceanography	In progress
Fishery technology	In progress
Hatchery management	In preparation
(C) Equipment Aquisition (Annex C)	In progress
(D) Joint Academic Activities of JICA/FPSS	
1. Supervision of academic/graduate students program	Supervision of Ph.D. work, in progress
2. Seminars and workshops	i. Workshop on primary productivity in the coastal waters
	ii. Workshop on fishery education curriculum
	iii. Workshop on use of computer in fishery education
	iv. Seminar on fisheries in Japan
3. Contribution to extension service program	None
4. Preparation of teaching aids	i. Acquisition of 578 articles
	ii. Preparation of samples of wire eye splices, star chart, fishing nets, fishing tackles, and fishing machine
	iii. Preparation of textbook, in progress
5. Participation in proposed JICA/RPSS research activities	
i. Research survey in Malaysian water management and conservation of resources	MATAHARI expedition '85
ii. Squid fishery	In preparation
iii Biological study of turtle	In Preparation
iv. Marine Process	MATAHARI expedition '85
v. Development of energy efficient fishing gear	In preparation
vi. Fish aggregation devices	Unjang project, in progress
vii. Development of more selective fishing gear	Trawl net mesh selectivity, in progress
viii. Mapping and charting	MATAHARI expedition '85
ix. Discription of traditional navigation technique	None, cancelled
x. Planning and development of pond and hatchery complex	In progress
	Additional activities of JICA Experts
	1. stability study of training vessel UNIPERTAMA II
	2. Japanese language class for FPSS staff at Serdang and Kuala Trengganu
	3. Condition test of navigation equipments

ANNEX B

ANNUAL WORK PLAN 1984/85 –Training of Counterparts in JAPAN–

Fields	Name of Counterparts	1984 1985 (12 1 2 3 4 5 6 7 8 9 10 11 12)	1986 (1 2 3 4)
Fish Breeding & Electrophoresis	Mrs. Siti Shapor Hj Siraj (Serdang)	←——14/11'84-11/12'84 incompleted	
Aquarium Management	Mr. Azmi Bin Yaacob (Serdang)	15/11'84-30/3'85 completed ←——→	
Fisheries Oceanography	Mr. Muhammad Bin Embong (K. Trengganu)	15/11'84-30/3'85 completed ←——→	
Larval Rearing & Hatching	Mr. Cheah Sin Hock (Serdang)	A2 A3 UPM 23/2 '85 Acceptance 20/4 '85 Departure 27/4 '85 Fisheries Laboratory, Univ. of Tokyo ←——	Untill 30/3 '86 ———
Fisheries Oceanography	Mr. Liew Hock Chark (K. Trengganu)	A2 A3 UPM 23/2 '85 Acceptance 20/4 '85 Oceanography Laboratory, Univ. of Tokyo Deparature 27/4 '85 Untill 3/12 '85 ←——	
Fishery Technology	Mr. Khalid Samo (K. Trengganu)	A2 A3 UPM 23/2 '85 Acceptance 20/4 '85 Faculty of Fisheries, Hokkaido Univ. Departure 27/4 '85 Untill 3/12 '85 ←——	
Hatchery Management	~~Mr. Ahmad Kimon Suleiman (Serdang)~~ Mr. Shamsul Bahar Bin Ahmad (Serdang)	A2 A3 UPM 22/4 '85 ———	———

ANNEX C

ANNUAL WORK PLAN 1984/85 - EQUIPMENT -

	1984 12	1985 1	2	3	4	5	6	7	8	9	10	11	12	1986 1	2	3	4
Equipment 1984		A4	4/3 1ST batch-8/4 UPM M$20,515 , 24/4 2nd batch-15/5 UPM M$208,368														
			27/6 3rd batch M$77,610 Arrival Receive & Installation														
Purchase in Japan																	
	Estimation		Purchase & Installation														
Purchase in Malaysia	7/1																
			12/2 order 20/3 UPM copier 2sets.hatchery equip. M$19,203														
Equipments carried by Experts	22/12 computer & books M$15,000 , 28/3 fish finder and etc M$1,940																
Equipment 1985		A4	Approval by JICA HQ														
		UPM 27/3 '85												Arrival, Receive and Install	ation		
Purchase in Japan		Received by Japanese Embasy. 5/4 '85															
	Estimation		Purchase														
Purchase in Malaysia			Apr.-June fishing tackles														
			9/6 automatic squid jigging mashine-27/6 UPM M$10,000														
Equipment carried by Experts			25/6 omega receiver-27/6 UPM M$15,000														
Equipment 1986														A4			

REVISED ANNUAL WORK PLAN FOR 1985

Experts and Their Local Counterparts

Fields	Name of Experts and Their Counterparts	1984 1 2 3	1985 4 5 6 7 8 9 10 11 12 1 2 3	1986 4 5....12
Long Term				
Fishing Gear Technology	Dr. Gunzo Kawamura Capt. Mohd. Ibrahim Hj. Mohamed En. Zainal Ashirin Shahardin En. Mohd. Maidin Hamid En. Tajul Aris Yang En. Sakri Ibrahim En. Abdul Rahim Ibrahim En. Khalid Samo	←	—	—
Fisheries Oceanography	Dr. Toshihiro Ichikawa En. Ridzwan Abdul Rahman Dr. Law Ah Theem En. Liew Hock Chark En. Lokman Husin Dr. Noor Azhar Mohd. Shazili	—	—	—
Navigation and Seamanship	Capt. Tateo Kawakami En. Khalid Samo En. Abdul Rahim Ibrahim En. Zainal Ashirin Shahardin En. Sakri Ibrahim Capt. Abd. Rahman Muda	—	—	—
Liaison Officer	Mr. Kazuo Udagawa (no ammendment)	←	—	—
Short Term				
Hatchery Management	Dr. Hachiro Hirata Dr. Ang Kok Jee En. Cheah Sin Hock En. Sharr Azni Harmin En. Aizam Zainal Abidin Tuan Haji Umar Salleh En. Abdullah Zaini Alias		27/5-10/6 ←	—
Navigation and Seamanship	Dr. Kazuo Taguchi Same counterparts as Capt. Kawakami		August ←	
Plankton Taxonomy	To be decided later. Dr. Noor Azhar Mohd. Shazili			—
Coastal Civil Engineering	To be decided later En. Lokman Husin		Sept-Nov ←	
Fish Nutrition	To be decided later Dr. Ang Kok Jee Dr. Chan Hooi Har En. Che Roos Saad En. Mohd. Salleh Kamarudin		Jan-Mar ←	

ANNEX E

REVISED ANNUAL WORK PLAN FOR 1985

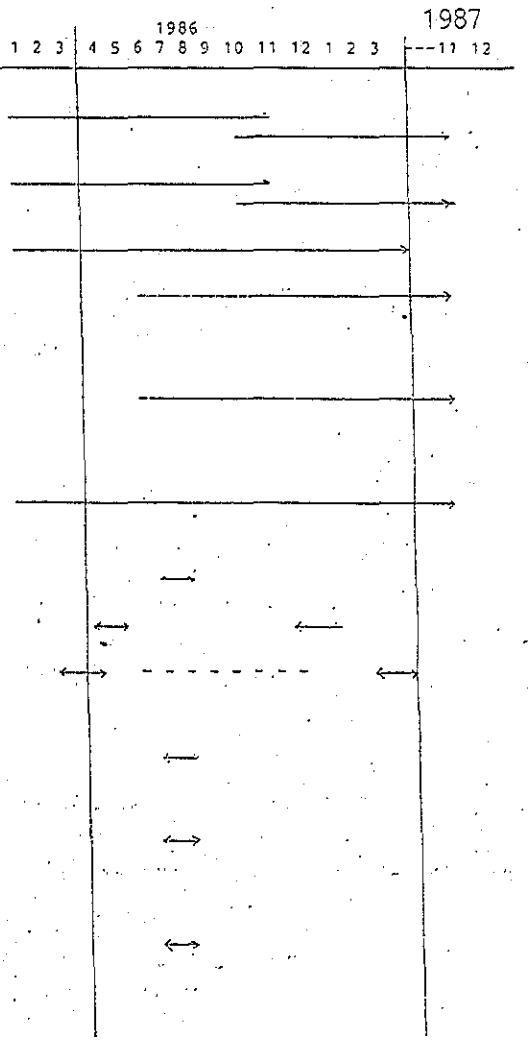
Joint Academic Activities of JICA/FPSS

1. Supervision of academic/graduate students program.
   - i) Completion of the supervision of Ph.D. work.
   - ii) Sharing supervision of academic students program.
2. Seminars and workshops.
   - i) Workshops on the navigation skill, oceanography, and fishing gear technology for FPSS staff.
   - ii) Seminars on the navigation and seamanship, fisheries oceanography, and fishing gear technology.
3. Contribution to extension service program.
   - i) Mapping and charting fishing grounds in the Terengganu waters.
4. Preparation of teaching aids.
   - i) Preparation of textbooks written in Malay.
   - ii) Acquisition of articles.
   - iii) Producing slides, transparencies, models, panels.
   - iv) Simulation program of the stars etc. to be displayed on cathode ray tubes.
5. Participation in proposed JICA/FPSS research activities.
   - i) Report of MATAHARI expedition '85.
   - ii) Squid fishery.
   - iii) Biological study of sea turtle.
   - iv) Development of energy efficient fishing gear.
   - v) Fish aggregation devices, Unjang.
   - vi) Planning and development of the pond and hatchery complex in Kuala Terengganu and Serdang (includes a model infrastructure of a tropical hatchery).
   - vi) Development of more selective fishing gear.

ANNUAL WORK PLAN FOR 1986

Experts and Their Local Counterparts

Fields	Name of Experts and Their Counterparts
Long Term	
Fishing Gear Technology	Dr. Gunzo Kawamura To be decided later Same counterparts as in 1985
Fisheries Oceanography	Dr. Toshihiro Ichikawa Physical Oceanographer En. Lokman Husin En. Isa Ibrahim
Navigation and Seamanship	Capt. Tateo Kawakami Same counterparts as in 1985
Population Dynamics	Dr. Shigeo Hayase En. Mohd. Azmi Ambak Dr. A.K.M. Mohsin En. Mohd. Saki Said En. Zaidi Zakaria
Mariculture	To be decided later Dr. Chan Hooi Har Tuan Hj. Umar Salleh En. Aizam Zainal Abidin En. Mustaffa Kamal Abd. Satar
Liaison Officer	Mr. Kazuo Udagawa
Short Term	
Electrophoresis	Dr. Yoshihisa Fujio Ms. Siti Shapor Hj. Siraj
Navigation and Seamanship	To be decided later Same counterparts as in 1985
Hatchery Management	Dr. Hachiro Hirata En. Cheah Sin Hock En. Sharr Azni Harmin En. Abdullah Zaini Alias
Fish Nutrition	To be decided later Dr. Ang Kok Jee En. Che Roos Saad En. Mohd. Salleh Kamaruddin
Fish/Prawn Disease	Dr. Takahisa Kimura Dr. Mohd. Shariff Mohd. Din Dr. Faizah Shaharom Dr. Ian Anderson Dr. Hassan Daud
Handling of Caught Fish	Dr. Terushige Motohiro 2 counterparts from Faculty of Food Science 1 counterpart from Faculty of Fisheries and Marine Science



3. 専門員によるプログレス・レポート

Progress Report for 1984/85 (Fishing Gear Technology)

1. Supervision of graduate student program
   i) Supervision of Ph.D. work on trawl nets mesh selectiviy
   ii) Lecture on fish behaviour (2 credits) given to a Ph.D. candidate
   iii) Collection of literature on trawl net mesh selectivity
2. Seminars and workshops
   i) Workshop on fishery education curriculum
   ii) Seminar on fisheries in Japan
   iii) Workshop on use of computer in fishery education
3. Contribution to extension service program
   None
4. Preparation of teaching aids
   i) Samples of fishing nets and fishing tackles
   ii) Textbook "Fishing gear technology" in Bahasa Malaysia in progress
   iii) Collection of literatures on fishing gear technology in progress
5. Participation in proposed JICA/FPSS research activities
   a) Resource survey in Malaysian Water Management and conservation of resources
      i) MATAHARI Expedition '85
   b) Squid fishery
      i) Preparation of squid jigging gear
   c) Turtle
      i) Collection of literature, in progress
   d) Development of energy efficient fishing gear
      i) Preparation of line fishing gear
   e) Fish aggregation devices
      i) Collection of literature on Unjang and artificial reef
   f) Develpment of more selective fishing gear
      This is done under the item 1.

Work Plan for 1985/86 (Fishing Gear Technology)

1. Supervision of academic/graduate student program
   i) Completion of dissertation by Capt. Mohd. Ibrahim Haji Mohamad
   ii) Sharing supervision of academic student program
2. Seminars and workshops
   i) Attendance at the seminar held by the fishery authority
   ii) Seminar on fishing gear technology by the authors of the textbook "Fishing Gear Technology"
3. Contribution to extension service program
   i) Mapping fishing grounds in Trengganu waters
4. Preparation of teaching aids
   i) Completing models of fishing gear (gill net, purse seine, trawl net, trap, lift net, Unjang)
   ii) Finish writing textbook "Fishing Gear Technology"
   iii) Manufacturing teaching instruments for fishing gear physics
5. Field survey on local fishing gear and methods in Trengganu State
6. Collection of literatures on fishing gear technology

Fisheries Oceanography 1984 - 1985

1. Supervision of academic/graduate students program.

   Lecture on advanced marine ecology for Ph. D candidate (Mar. 1985, finish

2. Seminars and Workshops.

   Workshop on primary productivity in the coastal waters (Apr. 1985, finish

3. Contribution to extension service program.

   None

4. Preparation of teaching aids.

   Textbook of oceanography (in preparation)

5. Participation in proposed JICA/FPSS research activities.

   Studies on biological process in the South China Sea
   (MATAHARI Cruise 1985, continued)
   Oceanographic survey at unjang station (from June 1985)

Future Working Plan 1985 - 1986

1. Seminar on oceanography (from July 1985)
2. Workshop on oceanography
3. Studies on primary productivity in the water column off Trengganu coast and some physical and chemical parameters
4. Collection of oceanographic literatures
5. Collection of oceanographic books

PROGRESS REPORT FOR 1984 / 1985.

1. Supervision of academic/graduate students program.

   None.

2. Seminars and Workshops.

   None.

3. Contoribution to extention service program.

   i) Lecture : Modern navigation topics. (M.S.M.S)

   ii) Unjang project : Explanation of Japanese artificial raft. (boat owner)

4. Preparation of Teaching aids and books.

   i) Sample of wire eye splice.

   ii) Star chart and 5° N Planisphere. (in progress)

   iii) Books. (See attached sheet.)

5. Participation in proposed JICA/FPSS research activities.

   i) Matahari expedition '85 .

   *Mapping and charting. (in progress of making the report.)

   ii) Unjang project.

   *Advise for constraction. (Blueprint, floating test, etc,)

   **Positioning and acoustic survey.

6. Others.

   i) Unipertama 11 and 1 generally report to the teamleader.

   ii) Stability study of Unipertama 11.

   iii) Sextant check.

   iiii) Japanese conversation class.

** WORK PLAN FOR 1985/1986 .**

2. Seminars and Workshops. : *Navigation portable computer. (Jun or JUL.

   i) Workshops : **Transit and Protractors. (Depend on acquisition of large scale chart of k. T. area.)

   ***Omega, NNSS, Echosounder, etc,

   ii) Seminars : Navigation (for Unipertama officers and others.)

3. Contribution to extention service program.

   * Mapping and charting Unjang position in Trengganu water.

4. Preparation of teaching aids and books.

   i) Planetarum by computer. (2)

   ii) Textbook.

5. Participation in proposed JICA/FPSS research activities.

   * Continue the work of 1984/1985 .

6. Others.

   i) Unjang project. (Mantenance, improvement, etc,)

   ii) Japanese conversation class.

Preparation of teaching books.

Items	Quantity	Donor
Loran navigation system	1	J R C Co,Ltd.
satellite Omega navigation system	1	J R C
Navy navigation system	1	J R C
Marine engine 1	1	J I C A
" " 11	1	J I C A
Marine meteorology	1	J I C A
Information hand book of malaysian port facilities	1	J I C A
Reconstraction plan of Chendlin Hr.	1	J I C A
Payao (copy)	2	J I C A

4. マ大予算規模

UNIVERSITI PERTANIAN MALAYSIA AND
FAKULTI PERIKANAN DAN SAINS SAMUDERA
EXPENDITURE FOR THE YEAR 1985

1.	UPM (total allocation)	-	$75.5 millions
	Emolument	-	$47 millions
	Operational	-	$28.5 millions
2.	Faculty (total allocation)	-	$3.04 millions
	Emolument	-	$1.948 millions
	Operational	-	$1.092 millions

3. Faculty up to date expenditure, as attached.

4. Expenses involving JICA officials

Transportation (Mileage claims from Serdang to Kuala Trengganu and back	-	$7,200
5. Entertainment & hospitality	-	$3,100

****

1985 BUDGET

FACULTY OF FISHERIES AND MARINE SCIENCE

UNIVERSITI PERTANIAN MALAYSIA

	Services and Goods	
1.	Travelling and Subsistence	$117,000.00
2.	Transportation of Goods	5,000.00
3.	Communication	20,000.00
4.	Utility	138,000.00
5.	Rental	13,000.00
6.	Printing services	27,000.00
7.	Provisions and Goods	229,000.00
8.	Maintenance and Minor Repairs	96,000.00
9.	Professional services and other services bought	46,000.00
10.	Other Captial Assets	408,000.00
		$1,099,000.00

5. 小型船舶供与に関する資料

REQUEST FOR TRAINING AND RESEARCH VESSEL FROM JICA

1.0 INTRODUCTION

The need for a modern, efficient, technologically advanced vessel for the Faculty of Fisheries and Marine Science has been discussed amongst the Faculty members since 1983 As a lead institution in the development of fisheries and marine science in Malaysia, the Faculty would require a model vessel that will be able to conduct training/research and develop fisheries in the Exclusive Economic Zone in line with the national aspirations. This need cannot be fully achieved by the present Faculty facilities namely the UNIPERTAMA I and UNIPERTAMA II.

On the 8th of June, 1985, a meeting was held at the Faculty of Fisheries and Marine Science, Kuala Terengganu to discuss the matter. The Faculty unanimously approved the request for a training vessel from JICA. The acquisition of a vessel of a medium size and range, equipped with equipments and electronics, will act as a model vessel for the Malaysian Fishery and will be used for the training and aclimatization of not only students but also those local fishermen interested to expand their fishing operations beyond territorial waters.

2.0 FUNCTIONS

The vessel requested will be used primarily for training and research in fishing technology and oceanography. However, it is also intended to be a multi-purpose vessel.

2.1. Population Dynamics

The vessel will be used primarily for student training in fish stock assessments and the aspects of fish population dynamics.

2.2 Fishing Technology

Apart from population dynamics, the vessel will also be used for the purposes listed below:

i) Long lining operation
ii) Gill netting operation
iii) Trap operation
iv) Squid jigging
v) Navigation training

2 3 Oceanography

All aspects of oceanographic research and training will be conducted on the vessel i.e. physical, chemical, biological and geological oceanography.

3.0. SPECIFICATION FOR THE BOAT'S INTENDED USE

a) Function: Training and research in fishing technology and oceanography.

b) Intended area of use: Malaysian waters.
Duration of trip: 10 days maximum with stop over or 3 days maximum to continuous operation.

c) Working speed of the vessel is about 9.5 knots.

d) Annually the vessel will be fully utilized for at least 100-120 days excluding the monsoon season.

e) It should be able to carry a complement of 18 passengers.

Usage of UNIPERTAMA I and UNIPERTAMA II in 1984.

UNIPERTAMA I

The usage of UNIPERTAMA I can be categorised under:-

1. Student training

Subject	Duration (days)	Program (Dip./Degree Students)
Water safety	2	Diploma
	2	Degree
Fishing Technology	2	Diploma
	3	Degree
Navigation & Seamanship	2	Diploma
	3	Degree

2. Research

Physical Oceanography	16
Biological Oceanography	14
Fishing Technology	16

Total number of days vessel UNIPERTAMA I was in use was 60 days from March 1984 to November 1984 or 40 trips out to sea.

UNIPERTAMA II

In 1984 UNIPERTAMA II was used only for student training, in the subjects of water safety, fishing technology and navigation and seamanship. It went out to sea six times for a total time of 14 days.

Usage of UNIPERTAMA I and UNIPERTAMA II in 1985

UNIPERTAMA I

1. Student Training

Subject	Duration (days)	Program
Degree in Fisheries		
Fishing Technology	6	
Navigation and Seamanship	6	
Biological Oceanography	6	
Chemical Oceanography	3	
Physical Oceanography	3	
Diploma in Fisheries		
Fishing Technology	3	
Navigation and Seamanship	3	
Introductory Oceanography	4	

2. Research

Fisheries Oceanography	14
Biological Oceanography	21
Physical Oceanography	10
Marine Pollution	7

It is envisaged that UNIPERTAMA I will make 59 trips to sea for a total number of 86 days. The vessel will be in operation from March to November 1985.

UNIPERTAMA II

1. Student Training

Subject	Duration
Degree in Fisheries	
Fishing Technology	6
Navigation and Seamanship	6
Biological Oceanography	6
Chemical Oceanography	3
Physical Oceanography	3
Diploma in Fisheries	
Fishing Technology	3
Navigation and Seamanship	3
Introductory Oceanography	4

2. Research

Fish Taxonomy	5
Population Dynamics	4
Fishing Technology	3
Navigation and Seamanship	3

3. Crew of Vessel

Training of crew	7

It is planned that UNIPERTAMA II will be out at sea 10 times for a total duration of 56 days in 1985.

6. モデル・インフラ整備に関する資料

A plan for the development and utilization of the Universiti Pertanian Malaysia hatchery and fish pond complex at the Serdang campus.

1. Introduction

Fish and Fisheries products are very important to Malaysia because they are consumed by people at all levels of society and are a source of foreign exchange. In the marine environment, the total fish landings have generally declined over the last 10 years and in 1981 the total marine fish landings was 649315 metric tons. At the same time widespread clearing of the forests for agriculture have resulted in an upset in the ecology of the inland riverine systems causing a potential decline in inland fisheries.

2. National Agriculture Policy

Recognizing the need to ensure adequate supplies of fish and fisheries products, the Government of Malaysia has put forth the National Agriculture Policy which includes fisheries. In order to increase the marine fish landings, modern fishing methods would be used to fully utilize the marine resources. Deep sea fishing would be encouraged by using local and foreign expertise while at the same time adequate numbers of boats would be used. The development of aquaculture is encouraged because it is able to augment the supply of fish from the capture fisheries and its potential as a foreign exchange earner is also recognized.

3. Role of Universiti Pertanian Malaysia in Aquaculture Development at the Serdang Campus

In order to manage the fisheries resources of the country effectively, Universiti Pertanian Malaysia has taken on the

responsibility of training the necessary manpower at the professional and subprofessional levels in the fields of aquaculture, fishing technology, marine science and fish biology. The support of Universiti Pertanian Malaysia towards aquaculture development is expressed by the provision of a 20 acre site at the Serdang campus for the establishment of the hatchery and the fish pond complex which would be used for teaching, research and extension. The particulars of the pond complex are presented in Table 1.

Facility	Area (Acre)	Number	Specification (Feet x Feet)	Area (Acre)
Hatchery	0.14	1	105 x 60	0.14
Breeding ponds	0.04	12	40 x 40	0.48
Nursery ponds	0.08	12	89 x 40	0.96
Broodstock ponds	0.14	17	80 x 80	2.49
Grow out ponds	0.60	8	171 x 151	4.80
Water storage ponds	1.78	1	363 x 211	1.78
Bunds, Roads and Reserve Land				9.35
		50 ponds		20.00

Table 1. The proposed distribution of ponds at the Serdang pond complex.

The development of the pond complex is broken up into 3 phases namely

Phase I - Hatchery 1.34 acres
Breeding and Nursery Ponds 3.23 acres
Phase II - Broodstock ponds 3.17 acres
Phase III - Grow out ponds and water storage ponds 8.16 acres.

The hatchery building has been constructed and the ponds in phase I and II have been excavated. The water supply system for the ponds are in the final phase of construction. The Universiti Pertanian Malaysia farm office has given its committment to excavate the phase III ponds.

4. Potential problems in the development of the hatchery and pond complex

Several aquaculture research projects under tank conditions have been completed by the staff of the faculty and it is felt that the results obtained should be tested under field conditions. One of the basic elements in pond trials is the supply of fry for the on going projects. Eventhough hatchery techniques have been established for Puntius gonionotus, Cyprinus carpio and Macrobrachium rosenbergii, there is a need to up grade exhisting techniques and to expand such techniques to cover other local or exotic fish and prawns of economic importance in Malaysia.

5. The Bio-Physico-Chemical Hatchery System

The visit by Prof. H. Hirata from Kagoshima University in December 1984 as a short term JICA Aquaculture expert was a meaningful one. After several on site visits and discussions, the staff of the Faculty of Fisheries and Marine Science were convinced of the importance of the Bio-physico-chemical hatchery system for phytoplankton and zooplankton culture. Eventhough the capital cost of this system may be high, the operating costs appeared to be reasonable in principle. The hatchery system when operational would be able to produce the much needed phytoplankton and zooplankton which are important in larval rearing of fish and prawns. The post larvae would then be used for related studies in ponds and in tanks.

6. Planning for the usage of the hatchery and fish pond complex

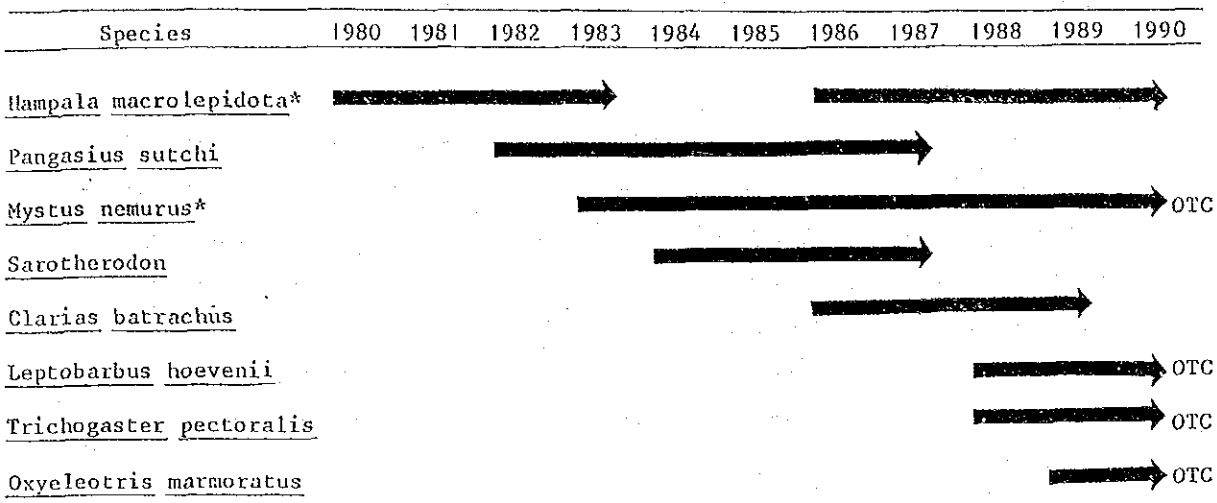
The hatchery and fish pond complex would be essentially used for running of small scale or laboratory scale mariculture experiments, moderate scale brackishwater aquaculture activity and large scale freshwater aquaculture projects.

6.1 Teaching: The facilties would be used for teaching purposes to Diploma, Degree and post graduate students. The students would be taught established methods for induced spawning of fish, nursery management and grow out techniques. Culture of phytoplankton and zooplankton would also be emphasized. The students would also be exposed to larval rearing of Penaeid and Caridean prawns.

6.2 Research: In the case of research, the facilities would be used for studies covering the broad area of biology and culture of local or exotic species of economic importance. The tentative programming for present and future research that would use the hatchery facilities for several species is presented in Table 2 and 3.

The subject areas in the biology thrust area would include ecological requirements, reproductive biology, food and feeding habits, genetics and endocrinology. The subject areas in the aquaculture thrust area would on the other hand include broodstock management, culture of phytoplankton and zooplankton, hatchery techniques and larval rearing, nutrition, water quality management and fish disease.

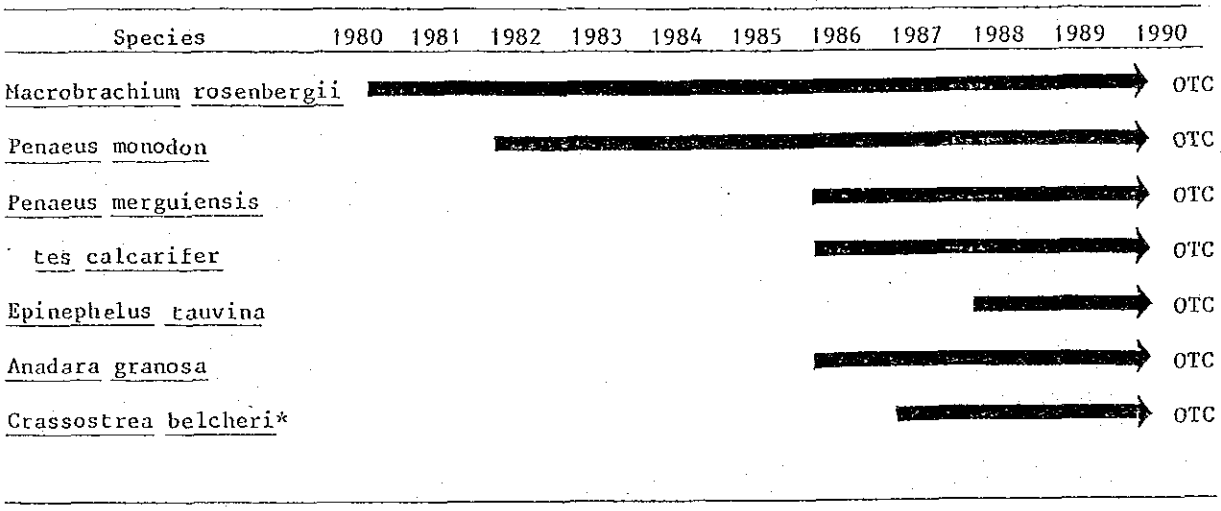
6.3 Extension: The result of all the research activity would then be the establishment of standard techniques for culture of the respective species. The hatchery and pond complex would thus be used as a training and demonstration centre for interested participants on the latest aquaculture technology.



Note: OTC - Option to continue.

* - Biological studies to precede breeding activity.

TABLE 2. List of freshwater species for research activity 1980 - 1990.



Note: OTC - Option to continue.

* - Biology to precede actual breeding activity.

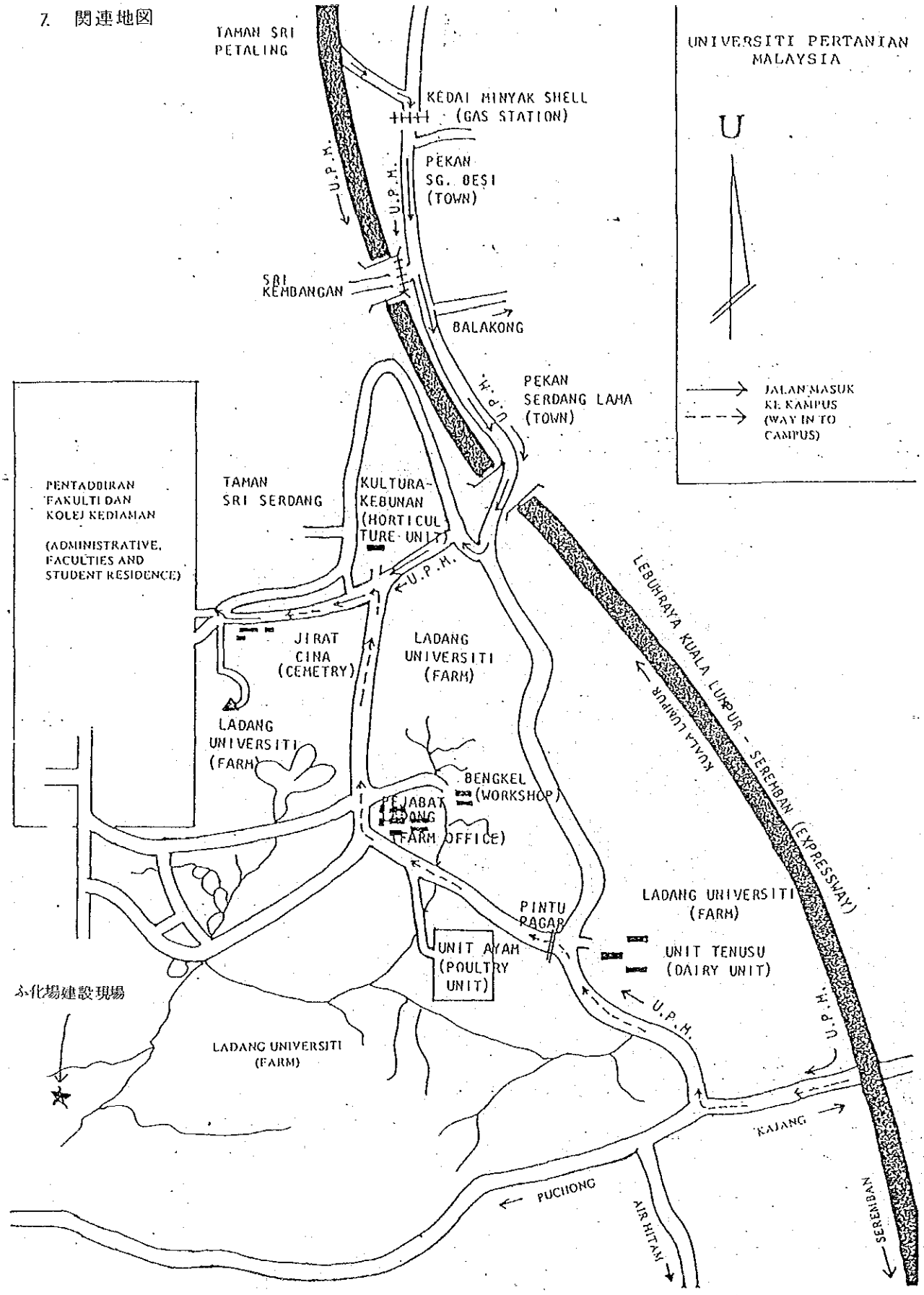
TABLE 3. List of brackishwater and marine species for research activity 1980 - 1990.

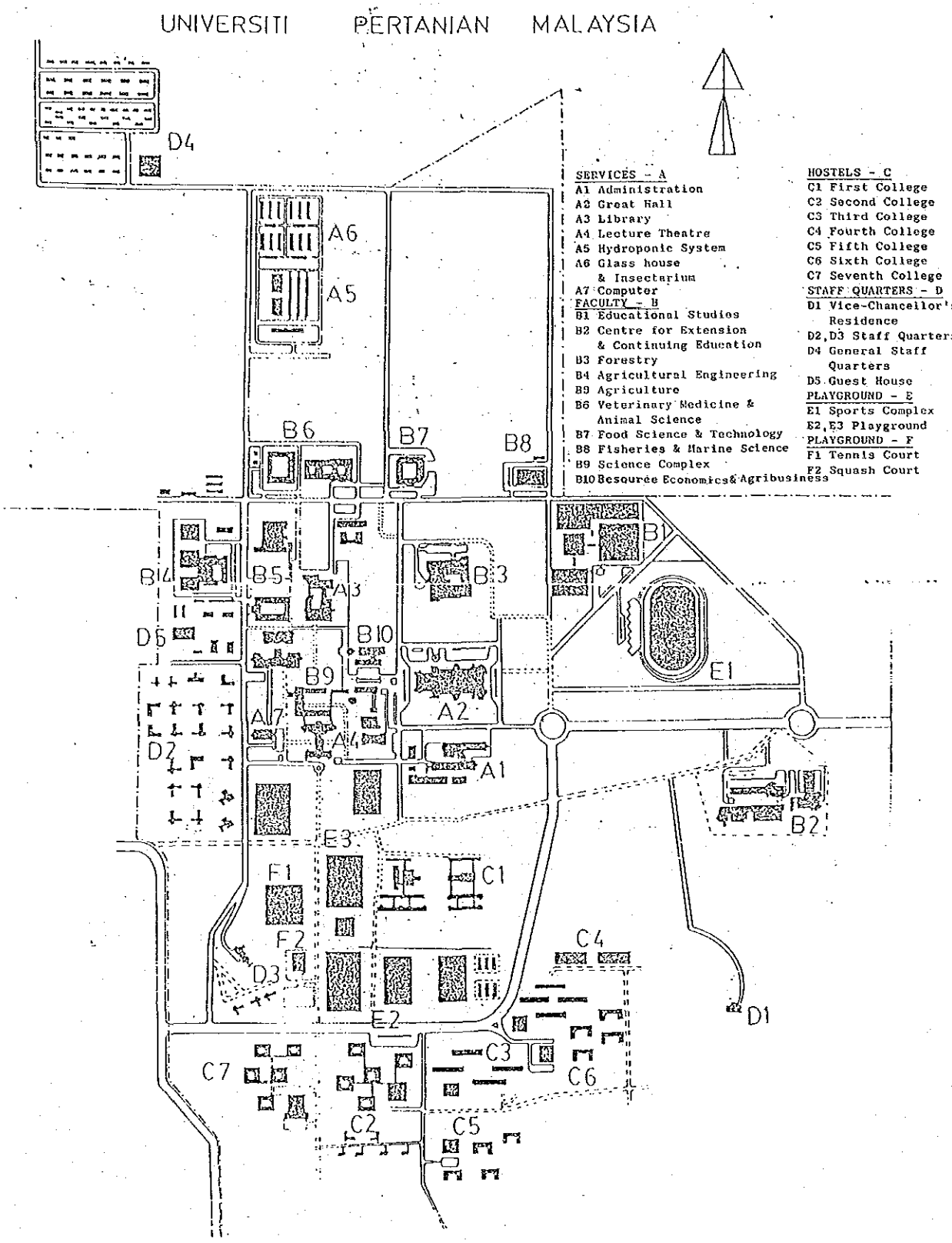
Conclusion

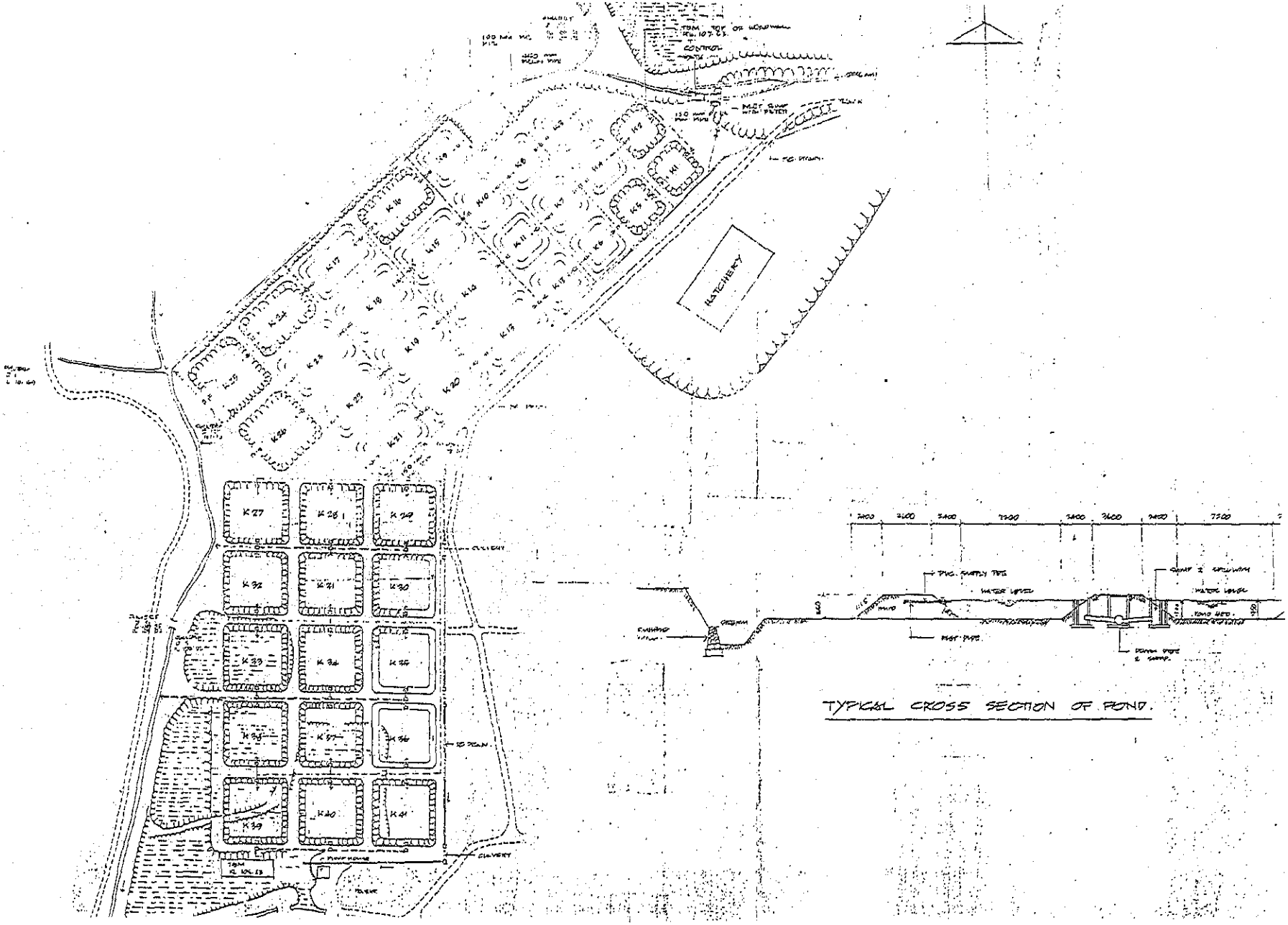
The Universiti Pertanian Malaysia is committed towards the development of aquaculture facilities at the Serdang campus. With the upgrading of staff at all levels and the availability of better equipment from donor agencies as well as the use of the bio-physico-chemical hatchery system, the overall growth and development of aquaculture in Universiti Pertanian Malaysia will be realized. The impact of the hatchery and pond complex at the national level would be that it would serve as a primary source for the latest aquaculture technology and expertise.

CSH/bmy.

7. 関連地図


UNIVERSITI PERTANIAN MALAYSIA
U
JALAN MASUK KE KAMPUS (WAY IN TO CAMPUS)
TAMAN SRI PETALING
KEDAI MINYAK SHELL (GAS STATION)
PEKAN SG. BESI (TOWN)
U.P.M.
SRI KEMBANGAN
BALAKONG
PEKAN SERDANG LAMA (TOWN)
PENTADBIRAN FAKULTI DAN KOLEJ KEDIAMAN
(ADMINISTRATIVE, FACULTIES AND STUDENT RESIDENCE)
TAMAN SRI SERDANG
KULTURA-KEBUNAN (HORTICULTURE UNIT)
JIRAT CINA (CEMETRY)
LADANG UNIVERSITI (FARM)
BENGKEL (WORKSHOP)
PEJABAT LADANG (FARM OFFICE)
PINTU PAGAR
UNIT AYAM (POULTRY UNIT)
UNIT TENUSU (DAIRY UNIT)
LEBUHRAYA KUALA LUMPUR - SEREMBAN (EXPRESSWAY)
KUALA LUMPUR
SERENBAN
KAJANG
PUCHONG
AIR HITAM
ふ化場建設現場


UNIVERSITI PERTANIAN MALAYSIA
SERVICES - A
A1 Administration
A2 Great Hall
A3 Library
A4 Lecture Theatre
A5 Hydroponic System
A6 Glass house & Insectarium
A7 Computer
FACULTY - B
B1 Educational Studies
B2 Centre for Extension & Continuing Education
B3 Forestry
B4 Agricultural Engineering
B5 Agriculture
B6 Veterinary Medicine & Animal Science
B7 Food Science & Technology
B8 Fisheries & Marine Science
B9 Science Complex
B10 Resource Economics & Agribusiness
HOSTELS - C
C1 First College
C2 Second College
C3 Third College
C4 Fourth College
C5 Fifth College
C6 Sixth College
C7 Seventh College
STAFF QUARTERS - D
D1 Vice-Chancellor's Residence
D2,D3 Staff Quarters
D4 General Staff Quarters
D5 Guest House
PLAYGROUND - E
E1 Sports Complex
E2,E3 Playground
PLAYGROUND - F
F1 Tennis Court
F2 Squash Court


HATCHERY
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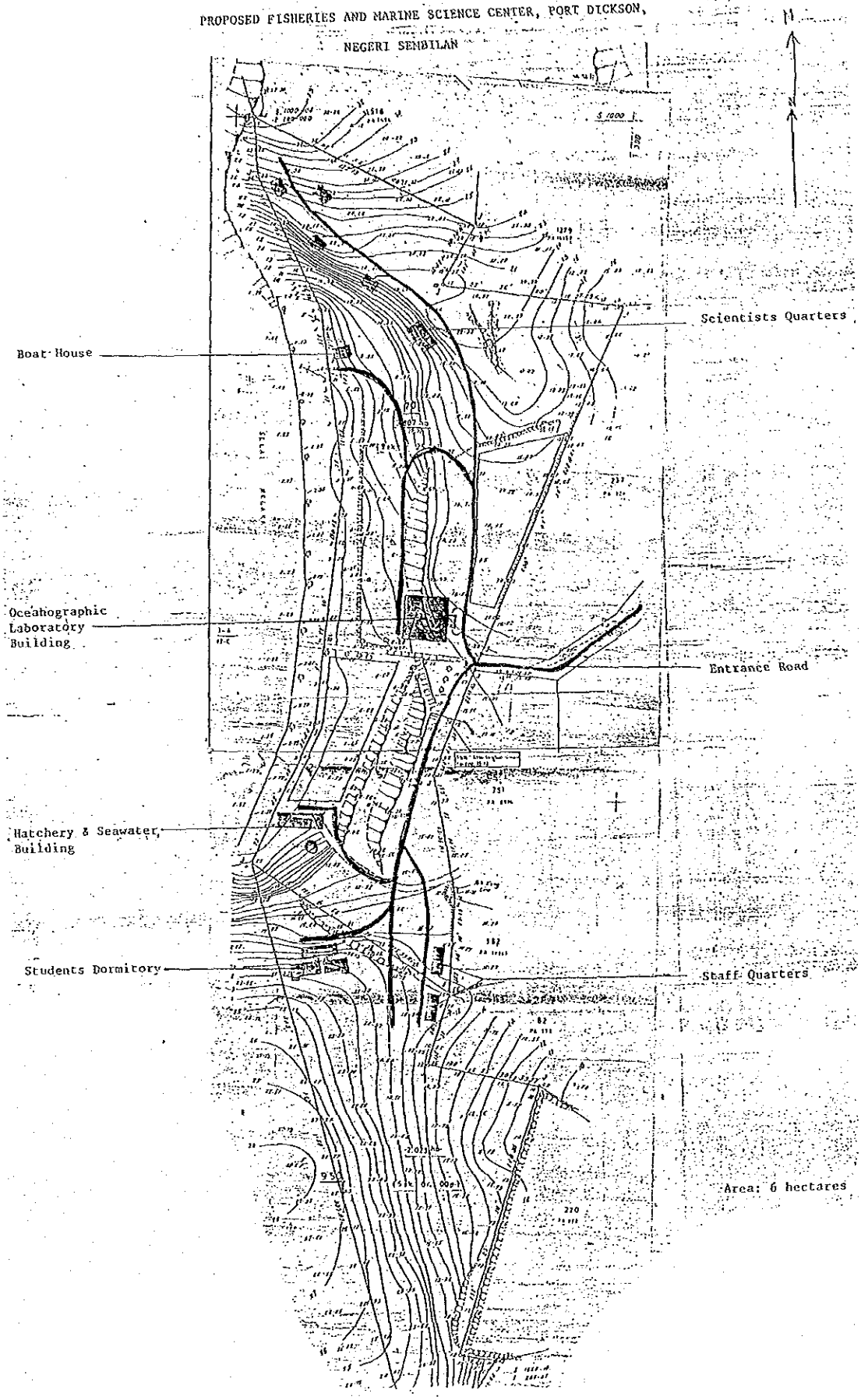
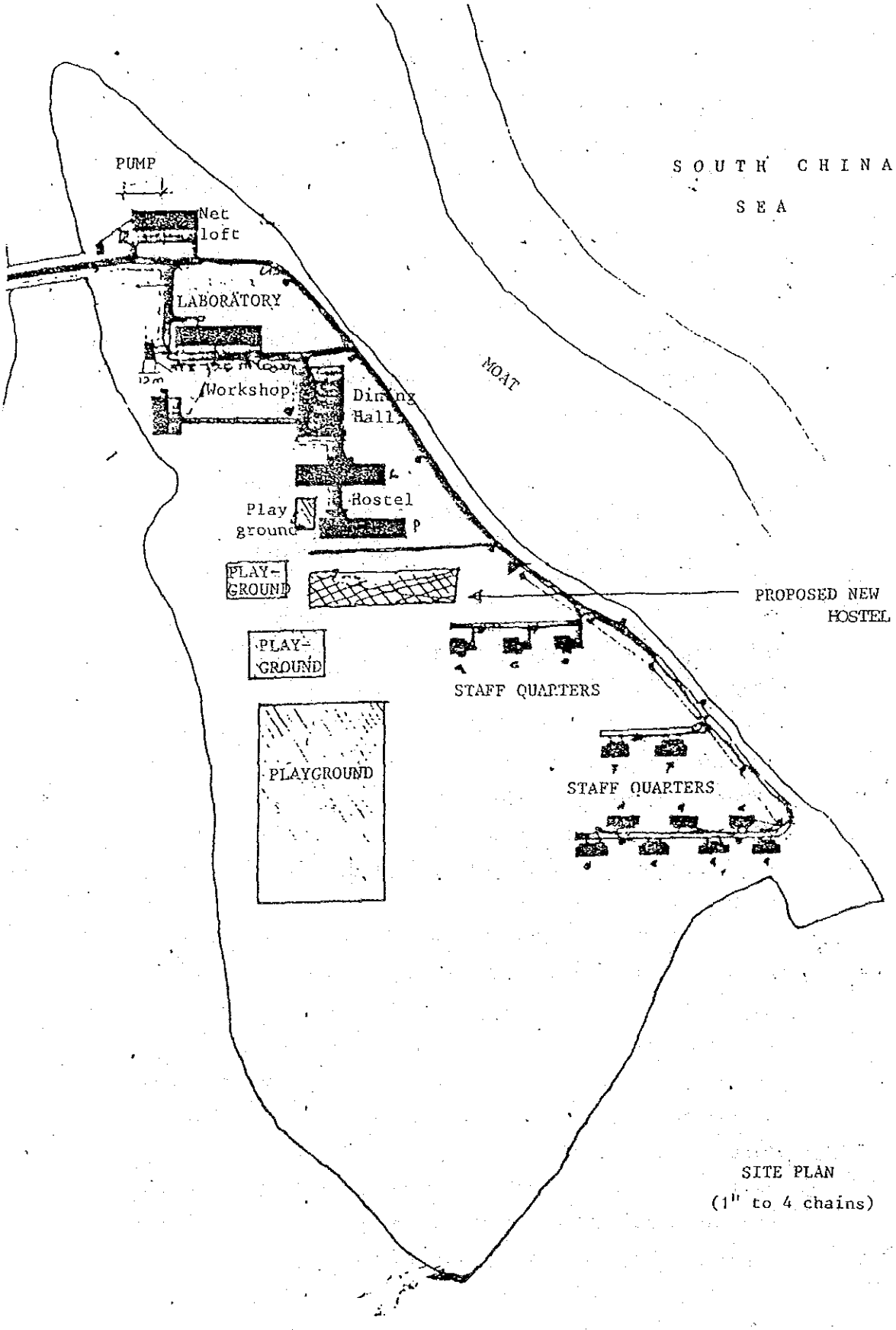
TYPICAL CROSS SECTION OF POND.

PROPOSED FISHERIES AND MARINE SCIENCE CENTER, PORT DICKSON,
NEGERI SEMBILAN





FISHERIES AND MARINE SCIENCE CENTER, KUALA TERENGGANU.

8. マレイシア大学による本プロジェクトの評価

THE STATUS OF THE JICA PROGRAM IN RELATION TO THE FACULTY OF FISHERIES AND MARINE SCIENCE, UNIVERSITI PERTANIAN MALAYSIA

1.0. INTRODUCTION

It is without doubt that the JICA program for the development of the Faculty of Fisheries and Marine Science is regarded by the Universiti as one of the major contributions by an overseas source towards its development. As such it is by no accident that almost every aspect of the activities and aspirations of the JICA program. Universiti Pertanian Malaysia and the Faculty of Fisheries and Marine Science places the JICA program in the highest priority.

2.0. THE JICA PROGRAM WITH RESPECT TO ACADEMIC ACTIVITIES OF THE FACULTY OF FISHERIES AND MARINE SCIENCE

In line with the policy of the University, the areas of research carried out by the Faculty are divided into thrust area groups. These groups include Fish Biology, Fish Disease, Aquaculture, Fishing Technology and Marine Science. In line with the JICA program a major proportion of research carried out by the Faculty is directly related to the fields of long- and short-term experts from the JICA team. The research areas are being carried out and especially those envisaged for the future are centred around equipment provided by JICA. Thus it can be seen that the academic activities of the Faculty is concurrent to that of the technical cooperation project of JICA. This is further emphasized by the desire of the JICA experts to assist local counterparts in undergraduate and postgraduate student supervisions, preparation of teaching aids and carrying out seminars and workshops.

3.0. STATUS OF THE JICA PROGRAM IN RELATION TO ADMINISTRATION OF THE FACULTY

To ensure the success of the JICA project, the University has allocated extra funds for the running of the Faculty. Compared with figures for 1984 an extra 10 per cent has been allocated for this year's budget. The increase is directly related to the needs of the Faculty to support the JICA project, as the increases are seen in budgets allocated for travel by JICA experts and their counterparts and for equipment (provided by JICA) installation and maintenance. Apart from these, the University has committed itself to infrastructure development of the Marine Science Station at Port Dickson by providing two container-type accommodation units in this year's budget as initial steps towards further development. Other committments include development of the new hatchery in the campus grounds and provision of increased funding for maintenance and use of the two training vessels, UNIPERTAMA I and UNIPERTAMA II.

4.0. CONCLUSION

The activities of the Faculty of Fisheries and Marine Science are seen to run concurrently with the technical cooperation project of JICA. The Faculty also regards the JICA program as a major priority and as such devotes a major part of its research and administrative activities towards ensuring that the program becomes a successful one.

* * * EQUIPMENT LIST * * *

ITEM	NAME	ARR.	UPM	PRIC	BUDGET	PLACE
LABORATORY EQUIPMENT	MULTI TESTER YX 360 TR	84/12/20	84/12/20	M$ 68	現地業務費	TRENGGANU
OFFICE EQUIPMENT	CALCULATOR FR-101	84/12/20	84/12/20	M$ 139	現地業務費	SERDANG
OFFICE EQUIPMENT	MICROCOMPUTER PC-9801 F2	84/12/21	84/12/25	M$ 10,000	携行機材	SERDANG
OFFICE EQUIPMENT	COPIER NP-155	85/03/01	85/03/01	M$ 6,200	供与機材59、現地調達	SERDANG
OFFICE EQUIPMENT	COPIER NP-155	85/03/01	85/03/01	M$ 6,200	供与機材59、現地調達	TRENGGANU
HATCHERY EQUIPMENT	HATCHERY MATERIALS	85/03/04	85/03/04	M$ 4,044	供与機材59、現地調達	SERDANG
HATCHERY EQUIPMENT	PVC WELDING MACHINE	85/03/04	85/03/04	M$ 950	供与機材59、現地調達	SERDANG
TRAINING VESSEL EQUIPMENT	PORTABLE FISH FINDER SB-60	85/03/05	85/03/28	M$ 913	携行機材59	TRENGGANU
TRAINING VESSEL EQUIPMENT	PANTAGRAPH "BLACK 40"	85/03/05	85/03/28	M$ 493	携行機材59	TRENGGANU
HATCHERY EQUIPMENT	ELECTRIC ZIGZAG HAND SAW S	85/03/12	85/03/12	M$ 380	供与機材59、現地調達	SERDANG
OFFICE EQUIPMENT	CASH BOX	85/03/22	85/03/22	M$ 450	現地業務費	SERDANG
VEHICLE	MORTOR CYCLE "PASSOLA"	85/03/23	85/03/23	M$ 1,469	現地業務費	SERDANG
HATCHERY EQUIPMENT	POLYCARBONATE TANK ROUND T	85/04/24	85/05/16	M$ 1,255	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	POLYCARBONATE TANK ROUND T	85/04/24	85/05/16	M$ 1,255	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	POLYCARBONATE TANK ROUND T	85/04/24	85/05/16	M$ 1,255	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	POLYCARBONATE TANK ROUND T	85/04/24	85/05/16	M$ 640	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	POLYCARBONATE TANK ROUND T	85/04/24	85/05/16	M$ 640	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	POLYCARBONATE TANK ROUND T	85/04/24	85/05/16	M$ 640	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	POLYCARBONATE TANK ROUND T	85/04/24	85/05/16	M$ 440	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	POLYCARBONATE TANK ROUND T	85/04/24	85/05/16	M$ 440	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	POLYCARBONATE TANK ROUND T	85/04/24	85/05/16	M$ 440	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	LIVE FISH TRANSPORTATION T	85/04/24	85/05/16	M$ 830	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	LIVE FISH TRANSPORTATION T	85/04/24	85/05/16	M$ 830	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	UV-OZONE HYBRID WARTER STE	85/04/24	85/05/16	M$ 16,320	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	POLYETHYLENE WATER TANK RO	85/04/24	85/05/16	M$ 5,640	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	ACRYLIC TANK 100 L	85/04/24	85/05/16	M$ 238	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	ACRYLIC TANK 100 L	85/04/24	85/05/16	M$ 238	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	ACRYLIC TANK 100 L	85/04/24	85/05/16	M$ 238	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	FISH POOL ROUND TYPE E-20B	85/04/24	85/05/16	M$ 520	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	FISH POOL ROUND TYPE E-20B	85/04/24	85/05/16	M$ 520	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	FISH POOL ROUND TYPE E-20B	85/04/24	85/05/16	M$ 520	供与機材59	SERDANG HA

*** EQUIPMENT LIST ***

ITEM	NAME	ARR.	UPM	PRIC		BUDGET	PLACE
HATCHERY EQUIPMENT	FISH POOL ROUND TYPE E-20B	85/04/24	85/05/16	M$	520	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	FISH POOL ROUND TYPE E-20B	85/04/24	85/05/16	M$	520	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	FISH POOL ROUND TYPE E-20B	85/04/24	85/05/16	M$	520	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	FISH POOL ROUND TYPE E-20B	85/04/24	85/05/16	M$	520	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	FISH POOL ROUND TYPE E-20B	85/04/24	85/05/16	M$	520	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	FISH POOL ROUND TYPE E-20B	85/04/24	85/05/16	M$	520	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	FISH POOL ROUND TYPE E-20B	85/04/24	85/05/16	M$	520	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	FISH POOL RECTANGULAR TYPE	85/04/24	85/05/16	M$	1,870	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	FISH POOL RECTANGULAR TYPE	85/04/24	85/05/16	M$	1,870	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	SHADING MESH	85/04/24	85/05/16	M$	230	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	POLYETHYLENE MESH 200 mesh	85/04/24	85/05/16	M$	920	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	POLYETHYLENE MESH 150 mesh	85/04/24	85/05/16	M$	870	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	POLYETHYLENE MESH 100 mesh	85/04/24	85/05/16	M$	390	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	POLYETHYLENE MESH 50 mesh	85/04/24	85/05/16	M$	536	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	POLYETHYLENE MESH 18 mesh	85/04/24	85/05/16	M$	470	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	MAGNETIC DRIVE PUMP MD-30R	85/04/24	85/05/16	M$	400	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	MAGNETIC DRIVE PUMP MD-30R	85/04/24	85/05/16	M$	400	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	MAGNETIC DRIVE PUMP MD-30R	85/04/24	85/05/16	M$	400	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	DIRECT CURRENT PUMP	85/04/24	85/05/16	M$	14	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	DIRECT CURRENT PUMP	85/04/24	85/05/16	M$	14	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	DIRECT CURRENT PUMP	85/04/24	85/05/16	M$	14	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	DIRECT CURRENT PUMP	85/04/24	85/05/16	M$	14	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	DIRECT CURRENT PUMP	85/04/24	85/05/16	M$	14	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	DIRECT CURRENT PUMP	85/04/24	85/05/16	M$	14	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	DIRECT CURRENT PUMP	85/04/24	85/05/16	M$	14	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	DIRECT CURRENT PUMP	85/04/24	85/05/16	M$	14	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	DIRECT CURRENT PUMP	85/04/24	85/05/16	M$	14	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	DIRECT CURRENT PUMP	85/04/24	85/05/16	M$	14	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	ULTRAVIOLET RAYS HYBRID WA	85/04/24	85/05/16	M$	2,040	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	AIR OXGEN DIFFUSER	85/04/24	85/05/16	M$	175	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	AIR OXGEN DIFFUSER	85/04/24	85/05/16	M$	175	供与機材59	SERDANG HA

*** EQUIPMENT LIST ***

ITEM	NAME	ARR.	UPM	PRIC		BUDGET	PLACE
HATCHERY EQUIPMENT	AIR OXGEN DIFFUSER	85/04/24	85/05/16	M$	175	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	AIR OXGEN DIFFUSER	85/04/24	85/05/16	M$	175	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	AIR OXGEN DIFFUSER	85/04/24	85/05/16	M$	175	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	AIR OXGEN DIFFUSER	85/04/24	85/05/16	M$	175	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	AIR OXGEN DIFFUSER	85/04/24	85/05/16	M$	175	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	SOLAR CELL NT-111	85/04/24	85/05/16	M$	1,140	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	SOLAR CELL NT-111	85/04/24	85/05/16	M$	1,140	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	SOLAR CELL NT-111	85/04/24	85/05/16	M$	1,140	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	SOLAR CELL NT-111	85/04/24	85/05/16	M$	1,140	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	CHARGE CONTROLLER FOR SOLA	85/04/24	85/05/16	M$	280	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	CHARGE CONTROLLER FOR SOLA	85/04/24	85/05/16	M$	280	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	AUTOMATIC REGULATOR FOR SO	85/04/24	85/05/16	M$	2,400	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	CARTRIDGE FILTER	85/04/24	85/05/16	M$	1,530	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	PORTABLE COMPRESSOR T.F.12	85/04/24	85/05/16	M$	800	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	PORTABLE COMPRESSOR TF.12V	85/04/24	85/05/16	M$	800	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	SEA WATER THERMOMETER ET-5	85/04/24	85/05/16	M$	2,320	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	SEA WATER THERMOMETER ET-5	85/04/24	85/05/16	M$	2,320	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	BLOWER HITACHI BABY COMPRE	85/04/24	85/05/16	M$	665	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	BLOWER HITACHI OIL BABY CO	85/04/24	85/05/16	M$	2,250	供与機材59	SERDANG HA
HATCHERY EQUIPMENT	RING BLOWER MH 710	85/04/24	85/05/16	M$		供与機材59	SERDANG HA
LABORATORY EQUIPMENT	INCUBATOR MIR 251	85/04/24	85/05/16	M$	5,000	供与機材59	SERDANG HA
LABORATORY EQUIPMENT	INCUBATOR MIR 251	85/04/24	85/05/16	M$	5,000	供与機材59	SERDANG HA
LABORATORY EQUIPMENT	BLENDER 7012 S	85/04/24	85/05/16	M$	1,650	供与機材59	SERDANG
LABORATORY EQUIPMENT	LUX METER 1M2D	85/04/24	85/05/16	M$	450	供与機材59	SERDANG
LABORATORY EQUIPMENT	LUX METER 1M2D	85/04/24	85/05/16	M$	450	供与機材59	SERDANG
LABORATORY EQUIPMENT	PORTABLE DIGITAL CONDUCTIV	85/04/24	85/05/16	M$	2,250	供与機材59	SERDANG
LABORATORY EQUIPMENT	PORTABLE DIGITAL CONDUCTIV	85/04/24	85/05/16	M$	2,250	供与機材59	SERDANG
LABORATORY EQUIPMENT	PORTABLE DIGITAL CONDUCTIV	85/04/24	85/05/16	M$	2,250	供与機材59	SERDANG
LABORATORY EQUIPMENT	PORTABLE DIGITAL PH/ORP ME	85/04/24	85/05/16	M$	1,700	供与機材59	SERDANG
LABORATORY EQUIPMENT	PORTABLE DIGITAL PH/ORP ME	85/04/24	85/05/16	M$	1,700	供与機材59	SERDANG
LABORATORY EQUIPMENT	PORTABLE DIGITAL PH/ORP ME	85/04/24	85/05/16	M$	1,700	供与機材59	SERDANG

*** EQUIPMENT LIST ***

ITEM	NAME	ARR.	UPM	PRIC		BUDGET	PLACE
LABORATORY EQUIPMENT	PORTABLE DIGITAL DO/02 TEM	85/04/24	85/05/16	M$	2,400	供与機材59	SERDANG
LABORATORY EQUIPMENT	PORTABLE DIGITAL DO/02 TEM	85/04/24	85/05/16	M$	2,400	供与機材59	SERDANG
LABORATORY EQUIPMENT	PORTABLE DIGITAL DO/02 TEM	85/04/24	85/05/16	M$	2,400	供与機材59	SERDANG
LABORATORY EQUIPMENT	CIRCUIT TESTER YEW 2414	85/04/24	85/05/16	M$	64	供与機材59	SERDANG
LABORATORY EQUIPMENT	CIRCUIT TESTER YEW 2414	85/04/24	85/05/16	M$	64	供与機材59	SERDANG
OFFICE EQUIPMENT	TYPEWRITER ELECTRA 60	85/04/24	85/05/16	M$	1,730	供与機材59	SERDANG
OFFICE EQUIPMENT	TYPEWRITER ELECTRA 60	85/04/24	85/05/16	M$	1,730	供与機材59	TRENGGANU
OCEANOGRAPHY EQUIPMENT	VAN DORN WATER SAMPLER 6L	85/04/24	85/05/16	M$	1,133	供与機材59	TRENGGANU
OCEANOGRAPHY EQUIPMENT	VAN DORN WATER SAMPLER 6L	85/04/24	85/05/16	M$	1,133	供与機材59	TRENGGANU
OCEANOGRAPHY EQUIPMENT	VAN DORN WATER SAMPLER 6L	85/04/24	85/05/16	M$	1,133	供与機材59	SERDANG
OCEANOGRAPHY EQUIPMENT	VAN DORN WATER SAMPLER 20	85/04/24	85/05/16	M$	2,600	供与機材59	TRENGGANU
OCEANOGRAPHY EQUIPMENT	VAN DORN WATER SAMPLER 20	85/04/24	85/05/16	M$	2,600	供与機材59	SERDANG
OCEANOGRAPHY EQUIPMENT	NANSEN REVERSING WATER BOT	85/04/24	85/05/16	M$	1,400	供与機材59	TRENGGANU
OCEANOGRAPHY EQUIPMENT	NANSEN REVERSING WATER BOT	85/04/24	85/05/16	M$	1,400	供与機材59	TRENGGANU
OCEANOGRAPHY EQUIPMENT	NANSEN REVERSING WATER BOT	85/04/24	85/05/16	M$	1,400	供与機材59	TRENGGANU
OCEANOGRAPHY EQUIPMENT	NANSEN REVERSING WATER BOT	85/04/24	85/05/16	M$	1,400	供与機材59	TRENGGANU
OCEANOGRAPHY EQUIPMENT	NANSEN REVERSING WATER BOT	85/04/24	85/05/16	M$	1,400	供与機材59	SERDANG
OCEANOGRAPHY EQUIPMENT	TEMPERATURE MEASURING APAR	85/04/24	85/05/16	M$	950	供与機材59	TRENGGANU
OCEANOGRAPHY EQUIPMENT	TEMPERATURE MEASURING APAR	85/04/24	85/05/16	M$	950	供与機材59	TRENGGANU
OCEANOGRAPHY EQUIPMENT	TEMPERATURE MEASURING APAR	85/04/24	85/05/16	M$	950	供与機材59	TRENGGANU
OCEANOGRAPHY EQUIPMENT	TEMPERATURE MEASURING APAR	85/04/24	85/05/16	M$	950	供与機材59	TRENGGANU
OCEANOGRAPHY EQUIPMENT	TEMPERATURE MEASURING APAR	85/04/24	85/05/16	M$	950	供与機材59	TRENGGANU
OCEANOGRAPHY EQUIPMENT	TEMPERATURE MEASURING APAR	85/04/24	85/05/16	M$	950	供与機材59	TRENGGANU
OCEANOGRAPHY EQUIPMENT	TEMPERATURE MEASURING APAR	85/04/24	85/05/16	M$	950	供与機材59	TRENGGANU
OCEANOGRAPHY EQUIPMENT	TEMPERATURE MEASURING APAR	85/04/24	85/05/16	M$	950	供与機材59	SERDANG
OCEANOGRAPHY EQUIPMENT	TEMPERATURE MEASURING APAR	85/04/24	85/05/16	M$	750	供与機材59	TRENGGANU
OCEANOGRAPHY EQUIPMENT	TEMPERATURE MEASURING APAR	85/04/24	85/05/16	M$	750	供与機材59	TRENGGANU
OCEANOGRAPHY EQUIPMENT	TEMPERATURE MEASURING APAR	85/04/24	85/05/16	M$	750	供与機材59	TRENGGANU
OCEANOGRAPHY EQUIPMENT	TEMPERATURE MEASURING APAR	85/04/24	85/05/16	M$	750	供与機材59	TRENGGANU
OCEANOGRAPHY EQUIPMENT	TEMPERATURE MEASURING APAR	85/04/24	85/05/16	M$	750	供与機材59	TRENGGANU
OCEANOGRAPHY EQUIPMENT	TEMPERATURE MEASURING APAR	85/04/24	85/05/16	M$	750	供与機材59	TRENGGANU

*** EQUIPMENT LIST ***

ITEM	NAME	ARR.	UPM	PRIC		BUDGET	PLACE
OCEANOGRAPHY EQUIPMENT	TEMPERATURE MEASURING APAR	85/04/24	85/05/16	M$	750	供与機材59	TRENGGANU
OCEANOGRAPHY EQUIPMENT	TEMPERATURE MEASURING APAR	85/04/24	85/05/16	M$	750	供与機材59	SERDANG
OCEANOGRAPHY EQUIPMENT	BOTTOM SAMPLER TYPE B	85/04/24	85/05/16	M$	2,170	供与機材59	TRENGGANU
OCEANOGRAPHY EQUIPMENT	BATHYTHERMOGRAPH 2045 A	85/04/24	85/05/16	M$	8,755	供与機材59	TRENGGANU
OCEANOGRAPHY EQUIPMENT	BATHYTHERMOGRAPH 2045 A	85/04/24	85/05/16	M$	8,755	供与機材59	TRENGGANU
OCEANOGRAPHY EQUIPMENT	THERMOMETER READER	85/04/24	85/05/16	M$	90	供与機材59	TRENGGANU
OCEANOGRAPHY EQUIPMENT	THERMOMETER READER	85/04/24	85/05/16	M$	90	供与機材59	TRENGGANU
OCEANOGRAPHY EQUIPMENT	THERMOMETER READER	85/04/24	85/05/16	M$	90	供与機材59	TRENGGANU
OCEANOGRAPHY EQUIPMENT	THERMOMETER READER	85/04/24	85/05/16	M$	90	供与機材59	TRENGGANU
OCEANOGRAPHY EQUIPMENT	THERMOMETER READER	85/04/24	85/05/16	M$	90	供与機材59	TRENGGANU
OCEANOGRAPHY EQUIPMENT	THERMOMETER READER	85/04/24	85/05/16	M$	90	供与機材59	TRENGGANU
OCEANOGRAPHY EQUIPMENT	THERMOMETER READER	85/04/24	85/05/16	M$	90	供与機材59	TRENGGANU
OCEANOGRAPHY EQUIPMENT	THERMOMETER READER	85/04/24	85/05/16	M$	90	供与機材59	TRENGGANU
OCEANOGRAPHY EQUIPMENT	THERMOMETER READER	85/04/24	85/05/16	M$	90	供与機材59	TRENGGANU
OCEANOGRAPHY EQUIPMENT	THERMOMETER READER	85/04/24	85/05/16	M$	90	供与機材59	SERDANG
PHOTOGRAPHIC EQUIPMENT	UNDERWATER STROBO SB-101	85/04/24	85/05/16	M$	721	供与機材59	SERDANG
PHOTOGRAPHIC EQUIPMENT	UNDERWATER STROBO SB-101	85/04/24	85/05/16	M$	721	供与機材59	SERDANG
PHOTOGRAPHIC EQUIPMENT	MICRO METER	85/04/24	85/05/16	M$	56,010	供与機材59	SERDANG
SCUBA DIVING EQUIPMEMT	UNDERWATER WIRE COMUNICATI	85/04/24	85/05/16	M$	1,550	供与機材59	SERDANG
SCUBA DIVING EQUIPMEMT	UNDERWATER WIRE COMUNICATI	85/04/24	85/05/16	M$	1,550	供与機材59	SERDANG
TRAINING VESSEL EQUIMENT	SATELLITE NAVIGATIOR SAN-1	85/04/24	85/05/16	M$	18,100	供与機材59	TRENGGANU
TRAINING VESSEL EQUIMENT	TRANSIT G-60	85/04/24	85/05/16	M$	3,190	供与機材59	TRENGGANU
TRAINING VESSEL EQUIMENT	TRANSIT G-60	85/04/24	85/05/16	M$	3,190	供与機材59	TRENGGANU
TRAINING VESSEL EQUIMENT	TRANSIT G-60	85/04/24	85/05/16	M$	3,190	供与機材59	SERDANG
TRAINING VESSEL EQUIMENT	PROTRACTARS NO. 1724	85/04/24	85/05/16	M$	1,240	供与機材59	TRENGGANU
TRAINING VESSEL EQUIMENT	PROTRACTARS NO. 1724	85/04/24	85/05/16	M$	1,240	供与機材59	TRENGGANU
TRAINING VESSEL EQUIMENT	TRANSCEIVER RJ-450	85/04/24	85/05/16	M$	1,740	供与機材59	TRENGGANU
TRAINING VESSEL EQUIMENT	TRANSCEIVER RJ-450	85/04/24	85/05/16	M$	1,740	供与機材59	TRENGGANU
TRAINING VESSEL EQUIMENT	TRANSCEIVER RJ-450	85/04/24	85/05/16	M$	1,740	供与機材59	TRENGGANU
TRAINING VESSEL EQUIMENT	TRANSCEIVER RJ-450	85/04/24	85/05/16	M$	1,740	供与機材59	SERDANG
TRAINING VESSEL EQUIMENT	TRANSCEIVER RJ-450	85/04/24	85/05/16	M$	1,740	供与機材59	SERDANG

* * * EQUIPMENT LIST * * *

ITEM	NAME	ARR.	UPM	PRIC	BUDGET	PLACE
TRAINING VESSEL EQUIMENT	PORTABLE COMPUTER FOR NAVI	85/04/24	85/05/16	M$ 620	供与機材59	TRENGGANU
TRAINING VESSEL EQUIMENT	PORTABLE COMPUTER FOR NAVI	85/04/24	85/05/16	M$ 620	供与機材59	TRENGGANU
TRAINING VESSEL EQUIMENT	PORTABLE COMPUTER FOR NAVI	85/04/24	85/05/16	M$ 1,200	供与機材59	TRENGGANU
TRAINING VESSEL EQUIMENT	PORTABLE COMPUTER FOR NAVI	85/04/24	85/05/16	M$ 690	供与機材59	TRENGGANU
VEHICLES	ISUZU FARGO 4WD WAGON	85/04/24	85/05/16	M$ 18,350	供与機材59	SERDANG
PHOTOGRAPHIC EQUIPMENT	INSTANT CAMERA POLAROID 65	85/06/10	85/06/10	M$ 230	現地業務費	SERDANG
合 計				303,890		

* * * EQUIPMENT LIST ;STORE * * *

NUMBER	NAME	UPM	PLACE	INCHARGE
LB/001/00	MULTI TESTER YX 360 TR	84/12/20	TRENGGANU	T. KAWAKAMI
OF/004/00	CALCULATOR FR-101	84/12/20	SERDANG	K. UDAGAWA
OF/001/00	MICROCOMPUTER PC-9801 F2	84/12/25	SERDANG	K. UDAGAWA
OF/002/00	COPIER NP-155	85/03/01	SERDANG	
OF/003/00	COPIER NP-155	85/03/01	TRENGGANU	
HN/000/01	HATCHERY MATERIALS	85/03/04	SERDANG	CHEA SIN HOCK
HN/001/00	PVC WELDING MACHINE	85/03/04	SERDANG	CHEA SIN HOCK
HN/002/00	ELECTRIC ZIGZAG HAND SAW SET	85/03/12	SERDANG	CHEA SIN HOCK
OF/005/00	CASH BOX	85/03/22	SERDANG	K. UDAGAWA
VH/001/00	MORTOR CYCLE "PASSOLA"	85/03/23	SERDANG	
TV/001/00	PORTABLE FISH FINDER SB-6000	85/03/28	TRENGGANU	T. KAWAKAMI
TV/002/00	PANTAGRAPH "BLACK 40"	85/03/28	TRENGGANU	T. KAWAKAMI
HN/003/01	POLYCARBONATE TANK ROUND TYPE SPS-2000	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/003/02	POLYCARBONATE TANK ROUND TYPE SPS-2000	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/003/03	POLYCARBONATE TANK ROUND TYPE SPS-2000	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/004/01	POLYCARBONATE TANK ROUND TYPE SPS-1000	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/004/02	POLYCARBONATE TANK ROUND TYPE SPS-1000	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK

* * * EQUIPMENT LIST ;STORE * * *

NUMBER	NAME	UPM	PLACE	INCHARGE
HN/004/03	POLYCARBONATE TANK ROUND TYPE SPS-1000	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/005/01	POLYCARBONATE TANK ROUND TYPE SPS-500	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/005/02	POLYCARBONATE TANK ROUND TYPE SPS-500	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/005/03	POLYCARBONATE TANK ROUND TYPE SPS-500	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/006/01	LIVE FISH TRANSPORTATION TANK	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/006/02	LIVE FISH TRANSPORTATION TANK	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/007/00	UV-OZONE HYBRID WARTER STERLIZER UZ-110MR	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/008/60	POLYETHYLENE WATER TANK ROUND TYPE	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/009/01	ACRYLIC TANK 100 L	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/009/02	ACRYLIC TANK 100 L	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/009/03	ACRYLIC TANK 100 L	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/010/01	FISH POOL ROUND TYPE E-20B	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/010/02	FISH POOL ROUND TYPE E-20B	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/010/03	FISH POOL ROUND TYPE E-20B	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/010/04	FISH POOL ROUND TYPE E-20B	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/010/05	FISH POOL ROUND TYPE E-20B	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/010/06	FISH POOL ROUND TYPE E-20B	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK

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NUMBER	NAME	UPM	PLACE	INCHARGE
HN/010/07	FISH POOL ROUND TYPE E-20B	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/010/08	FISH POOL ROUND TYPE E-20B	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/010/09	FISH POOL ROUND TYPE E-20B	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/010/10	FISH POOL ROUND TYPE E-20B	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/011/01	FISH POOL RECTANGULAR TYPE K-3	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/011/02	FISH POOL RECTANGULAR TYPE K-3	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/012/00	SHADING MESH	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/013/01	POLYETHYLENE MESH 200 mesh	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/013/02	POLYETHYLENE MESH 150 mesh	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/013/03	POLYETHYLENE MESH 100 mesh	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/013/04	POLYETHYLENE MESH 50 mesh	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/013/05	POLYETHYLENE MESH 18 mesh	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/014/01	MAGNETIC DRIVE PUMP MD-30R	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/014/02	MAGNETIC DRIVE PUMP MD-30R	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/014/03	MAGNETIC DRIVE PUMP MD-30R	85/05/16	SERDANG HATCHERY	CHEA SIN HOCK
HN/015/01	DIRECT CURRENT PUMP	85/05/16	SERDANG HATCHERY	SHEA SIN HOCK
HN/015/02	DIRECT CURRENT PUMP	85/05/16	SERDANG HATCHERY	SHEA SIN HOCK

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NUMBER	NAME	UPM	PLACE	INCHARGE
HN/015/03	DIRECT CURRENT PUMP	85/05/16	SERDANG HATCHERY	SHEA SIN HOCK
HN/015/04	DIRECT CURRENT PUMP	85/05/16	SERDANG HATCHERY	SHEA SIN HOCK
HN/015/05	DIRECT CURRENT PUMP	85/05/16	SERDANG HATCHERY	SHEA SIN HOCK
HN/015/06	DIRECT CURRENT PUMP	85/05/16	SERDANG HATCHERY	SHEA SIN HOCK
HN/015/07	DIRECT CURRENT PUMP	85/05/16	SERDANG HATCHERY	SHEA SIN HOCK
HN/015/08	DIRECT CURRENT PUMP	85/05/16	SERDANG HATCHERY	SHEA SIN HOCK
HN/015/09	DIRECT CURRENT PUMP	85/05/16	SERDANG HATCHERY	SHEA SIN HOCK
HN/015/10	DIRECT CURRENT PUMP	85/05/16	SERDANG HATCHERY	SHEA SIN HOCK
HN/016/00	ULTRAVIOLET RAYS HYBRID WATER STERLIZER SS-10G	85/05/16	SERDANG HATCHERY	SHEA SIN HOCK
HN/017/01	AIR OXGEN DIFFUSER	85/05/16	SERDANG HATCHERY	SHEA SIN HOCK
HN/017/02	AIR OXGEN DIFFUSER	85/05/16	SERDANG HATCHERY	SHEA SIN HOCK
HN/017/03	AIR OXGEN DIFFUSER	85/05/16	SERDANG HATCHERY	SHEA SIN HOCK
HN/017/04	AIR OXGEN DIFFUSER	85/05/16	SERDANG HATCHERY	SHEA SIN HOCK
HN/017/05	AIR OXGEN DIFFUSER	85/05/16	SERDANG HATCHERY	SHEA SIN HOCK
HN/017/06	AIR OXGEN DIFFUSER	85/05/16	SERDANG HATCHERY	SHEA SIN HOCK
HN/017/07	AIR OXGEN DIFFUSER	85/05/16	SERDANG HATCHERY	SHEA SIN HOCK
HN/018/01	SOLAR CELL NT-111	85/05/16	SERDANG HATCHERY	SHEA SIN HOCK

* * * EQUIPMENT LIST ;STORE * * *

NUMBER	NAME	UPM	PLACE	INCHARGE
HN/018/02	SOLAR CELL NT-111	85/05/16	SERDANG HATCHERY	SHEA SIN HOCK
HN/018/03	SOLAR CELL NT-111	85/05/16	SERDANG HATCHERY	SHEA SIN HOCK
HN/018/04	SOLAR CELL NT-111	85/05/16	SERDANG HATCHERY	SHEA SIN HOCK
HN/019/01	CHARGE CONTROLLER FOR SOLAR CELL	85/05/16	SERDANG HATCHERY	SHEA SIN HOCK
HN/019/02	CHARGE CONTROLLER FOR SOLAR CELL	85/05/16	SERDANG HATCHERY	SHEA SIN HOCK
HN/020/00	AUTOMATIC REGULATOR FOR SOLAR CELL	85/05/16	SERDANG HATCHERY	SHEA SIN HOCK
HN/021/00	CARTRIDGE FILTER	85/05/16	SERDANG HATCHERY	CHEAH SIN HOCK
HN/022/01	PORTABLE COMPRESSOR T.F. 12V	85/05/16	SERDANG HATCHERY	CHEAH SIN HOCK
HN/022/02	PORTABLE COMPRESSOR TF. 12V	85/05/16	SERDANG HATCHERY	CHEAH SIN HOCK
HN/023/01	SEA WATER THERMOMETER ET-5	85/05/16	SERDANG HATCHERY	CHEAH SIN HOCK
HN/023/02	SEA WATER THERMOMETER ET-5	85/05/16	SERDANG HATCHERY	CHEAH SIN HOCK
HN/024/00	BLOWER HITACHI BABY COMPRESSOR RC-20S	85/05/16	SERDANG HATCHERY	CHEAH SIN HOCK
HN/025/00	BLOWER HITACHI OIL BABY COMPRESSOR 0.75KW	85/05/16	SERDANG HATCHERY	CHEAH SIN HOCK
HN/026/00	RING BLOWER MH 710	85/05/16	SERDANG HATCHERY	CHEAH SIN HOCK
LB/002/01	INCUBATOR MIR 251	85/05/16	SERDANG HATCHERY	CHEAH SIN HOCK
LB/002/02	INCUBATOR MIR 251	85/05/16	SERDANG HATCHERY	CHEAH SIN HOCK
LB/003/00	BLENDER 7012 S	85/05/16	SERDANG	

FAKULTI PERIKANAN DAN SAINS SAMUDERA

JICA

ITEM:

NAME OF EQUIPMENT: DATE

NAME OF MAKER: NUMBER:

ACCESSORIES: PLACE OF INSTALLATION:

PERSON(S) IN CHARGE:

PRICE: SUPPLIER:

FAKULTI PERIKANAN DAN SAINS SAMUDERA

JICA

ITEM:

NAME OF EQUIPMENT: DATE:

NAME OF MAKER: NUMBER:

ACCESSORIES: PLACE OF INSTALLATION:

PERSON(S) IN CHARGE*

PRICE: SUPPLIER:

New Straits Times 5月3日 1985年 PAGE 3

Mr Flint presenting a cheque for $12,000 to Encik Azmi Ambak of the UPM.

UPM to take part in expedition

KUALA LUMPUR, Thurs. — For the first time in history, a Malaysian university will be embarking upon a major oceanic research expedition in Malaysian waters.

The 10-day *Matahari Expedition 1985*, a combined effort of Universiti Pertanian's Faculty of Fisheries and Marine Science and Japan's Kagoshima University, will be launched next week, aboard the Japanese university's research vessel *Kagoshima Maru*.

Experts from the Japan International Cooperation Agency (JICA) will be assisting a team of 30 scientists and students from UPM in conducting a total of 18 research projects into the physical, chemical and biological oceanography of an extensive area of the South China Sea within Malaysia's Exclusive Economic Zone.

The RV *Kagoshima Maru* is a 1,300-ton vessel, equipped with modern scientific equipment and laboratory facilities.

The expedition is jointly sponsored by UPM, Kagoshima University and Esso Production Malaysia Incorporated.

At today's presentation of the Esso donation of $12,000, EPMI Production Manager E M Flint affirmed his corporation's commitment to the project.

"We have an interest in the sea," he said, "and we share common objectives with Malaysian marine scientists, particularly with respect to maintaining the marine environment in pristine condition."

Expedition leader Kapt. Ibrahim Haji Mohamed recorded UPM's gratitude to Esso for the financial support, and expressed the hope that this will be the first of a series of such expeditions.

"The experience accumulated during the expedition will greatly contribute towards marine science and fisheries development in this country."

It is expected that the results of the research activites conducted during the expedition will be compiled and published by the end of this year.

OF DISCOVERY

Scientific expedition discovers 15 species of unidentified fishes

comprised biologists, chemical and physical oceanographers, marine pollution and fishery scientists.

Assisting the team, were four fishery and marine science experts from Japan who were attached to the faculty under the Japanese International Cooperation Agency (JICA) programme.

There were also the ship's officers and crew of 45 and 13 students from the Kagoshima University.

Analysis

The expedition was the first of its kind undertaken in Malaysia, the outcome of several meetings between Universiti Pertanian And Kagoshima University since 1983.

Sponsorship was jointly undertaken by the two universities and Esso Production Malaysia which contributed $42,000 to the $90,000 expedition.

Fine weather accompanied the expedition which covered an area of 6,215 sq km within the Malaysian Exclusive Economic Zone (EEZ) between 90 and 220km off the Malaysian coast.

The depth of the study area ranged from 50 to 80 metres.

Though sunburned and tired, the faculty members and students returned last Friday, elated over the success of the expedition. All the 15 research projects were performed as scheduled.

These projects included the determination of physical and chemical parameters, distribution of petroleum hydrocarbon, primary productivity, organic and inorganic nutrients in the water column, benthic studies, stock assessment and population dynamics of selected species of fish, zooplankton, ichthyoplankton, sedimentology and fisheries resources.

Samples were collected for analysis in the Faculty's laboratories.

Expedition leader Associate Prof Capt. Muhamed Ibrahim Haji Mohamed said much had been discussed about Malaysia's exclusive economic zone but no comprehensive study of the biological, physical and chemical processes within the zone had been carried out before.

"Research has so far been confined to the coastal waters but what we did was a totally different scope," he added.

He said he was satisfied with the expedition and called for more studies covering other areas of the economic zone.

"Through such studies, a thorough understanding of the oceanic processes and its resources can be achieved," he said.

Opportunity

"This is essential to the planning, development and management of our seas."

For Universiti Pertanian tutor Mohamed Kamil Abdul Rashid, 25, the expedition will be a boon to his plans to study for a Master's degree in chemical oceanography at the University of Liverpool.

He will be leaving in September.

During the expedition, he was involved in the study of nutrients in the water.

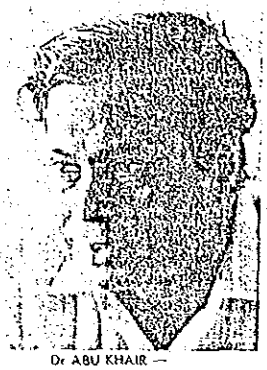
Another tutor, Rosnan Yaacub, 25, said he made some interesting discoveries during the expedition. He will analysing samples of the seabed sediments.

After obtaining a diploma from UPM, he did a degree course in oceanography at the Florida Institute of Technology.

Third-year student Mohamed Saleh Mohamed Taha, 22, said he enjoyed the expedition.

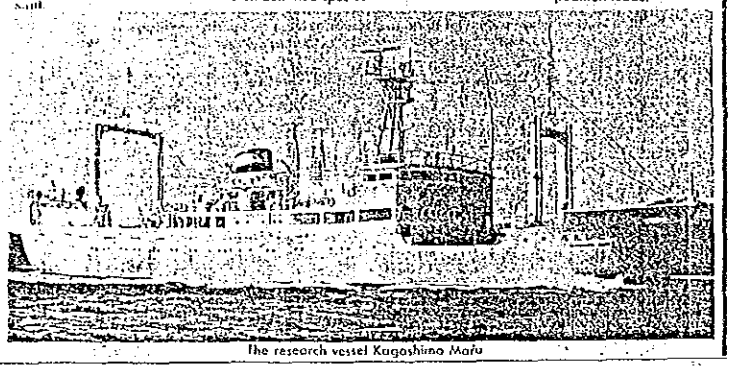
He was involved in the study of the stomach content of selected fish species.

"The study will help me in my final-year project," Mohamed Saleh said.



Dr ABU KHAIR — 15 unidentified species

Prof Capt IBRAHIM — expedition leader



The research vessel Kagoshima Maru

Tutors KAMIL and ROSNAN — 'interesting finds'

VOYAGE

By MUHARYANI OTHMAN

A UNIVERSITI Pertanian scientific expedition has found species of fish in the South China Sea which have not been recorded in Malaysian books.

Ichthyologist Dr Abu Khair Mohammad Mohsin, a member of the Matahari Expedition 1985 which ended last Friday, said not much research has been carried out in this area, that is why some species of fish have not been documented.

"The expedition's fish resource research group managed collected 117 species representing 66 families," he said.

Biologists

"Some 45 per cent of them are commercially important in Malaysia.

"The gut and gill samples collected were to test for food, feeding habit and parasitic studies of the fishes."

Dr Abu Khair said among their 'catch', 15 species have yet to be identified.

The dominant species however is *Ikan Kerisi* (Nemipteridae). Some of the edible fishes identified were *Ikan Merah, Anjang Laut* or *Jebong, Gah, Sebelah, Aji-Aji, Belang, Selayang, Cencaru, Senangin, Selar Kuning, Parang-Parang, Pari Lalat, Bilis* and *Lolong Batu*.

The non-edible ones included *Buntal Pisang, Sebekah, Daun Lebar, Sebekah, Belukan Batu, Jebong-Jebong* and *Kapas-Kapas*.

The expedition on board the Kagoshima University research vessel *R.V. Kagoshima Maru* set sail from Port Klang on May 7.

On board were nine academic staff, eight students and three technicians from Universiti Pertanian's Faculty of Fisheries and Marine Science.

The academic staff

Research results to be compiled in book

THE results of the research activities of the Matahari Expedition 1985 will be compiled and published as *Memoirs Matahari Expedition 1985*, says Associate Prof Capt Mohamed Ibrahim.

"We hope to carry out more studies on every aspect of the sea and determine how these are related to the fisheries and marine resources."

He attributed the efficient operation of the expedition to the close co-operation among officers, crew and students of the Kagoshima Maru and the research team.

"We had planned to set up 21 oceanographic stations for the research but instead we managed to set up three more," he said.

One of the Japanese International Co-operation Agency (JICA) experts, Dr Gunzo Kawamura, said Malaysian-Japanese co-operation in this area of study will contribute towards the development of marine science and fisheries in the region.

He was happy to see that the students were very keen to learn from the expedition.

Dr Kawamura, who is here on a two-year contract, has been with Universiti Pertanian for the last six months.

The ship's captain Seiji Higashikawa also said he was happy to have been able to assist the university in the expedition.

He said it was also a good opportunity for students of Universiti Pertanian and Kagoshima University to learn from one another.

He said some years ago, the ship was involved in research expeditions conducted by the University of Philippines and University of Hawaii.

Dr KAWAMURA — marine expert

According to Capt. Higashikawa, the Kagoshima University, set up 55 years ago, has more than 8,000 students.

Besides its well-established Faculty of Fisheries and Marine Science, it has eight other faculties including law, medicine and dentistry, science, education, economics and agriculture.

The university has two other research vessels, the *Keiteen Maru* and *Nansei Maru*.

The *Kagoshima Maru*, the biggest of the three, is 1,292.5 tons. It is equipped with modern scientific equipment and several laboratory facilities.

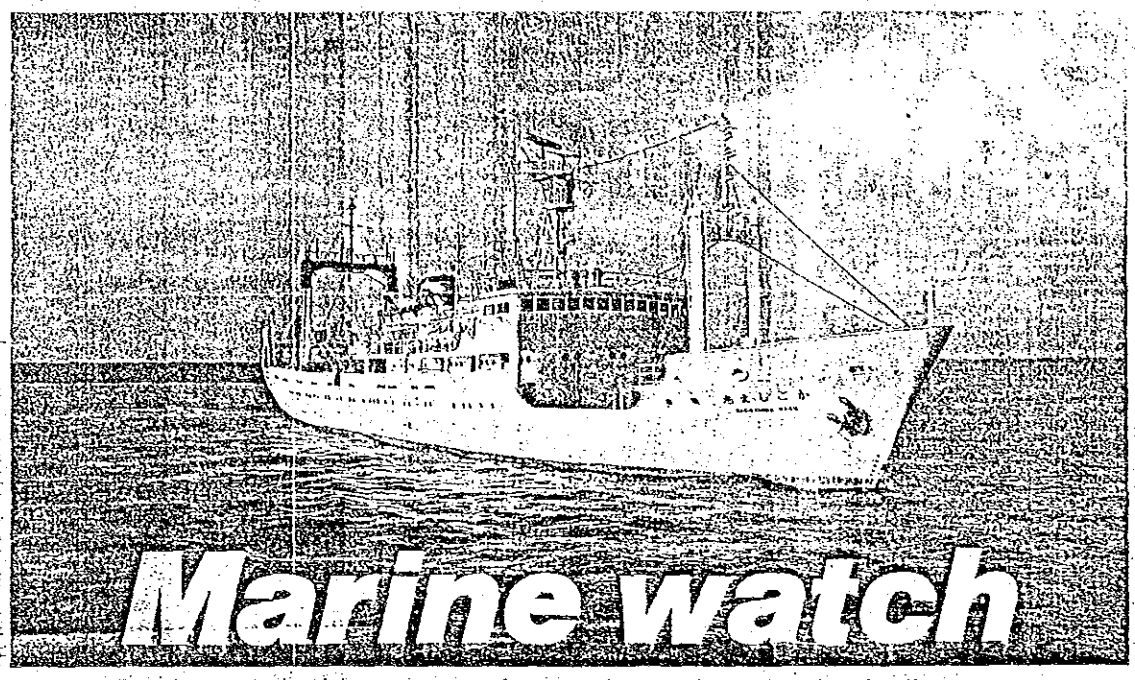
The training provided by the ship includes fishing technology, seamanship, navigation and marine science. The students are normally away for up to six months for each training session.

The ship leaves for the Indian Ocean tomorrow.

Sundate

New Sunday Times, June 2, 1985

INSIDE TheViewer
TV3: The First Year
A special review



Marine watch

The Research Vessel Kagoshima Maru

The haul of a single trawl — including an entire shoal of ikan merah

Story and pictures by REHMAN RASHID who spent five days with the Matahari Expedition team

IN THE blue depths 60 metres below the surface of the South China Sea, a battery of electronic sensors hung suspended at the end of a slender steel cable.

They attuned themselves to the pocket of ocean surrounding them; sensing the pressure, feeling the temperature, measuring the infinitely minute electrical fields of the ions in the seawater around them.

Above, the research vessel *Kagoshima Maru* lay drifting gently on the breeze-ruffled surface of the sea; dazzling white beneath a perfect blue early-morning sky.

In the *Kagoshima's* No.3 Laboratory, Universiti Pertanian oceanographer Lokman Hussin keyed instructions into a bank of computers, and the electronic information from the sensors far below spun forth in a neat printout of numbers, figures and graphs — conductivity, salinity, temperature, depth, dissolved oxygen.

In the space of a few nanoseconds, Lokman learned more about this particular piece of the South China Sea than anyone had ever known before.

Just outside No.3 Lab, the *Kagoshima's* Second Officer Seito Kawamoto started up a winch, slowly raising the $70,000 array of electronic circuitry back up to the ship. On the bridge, Captain Seiji Higashikawa gave a quiet order, and the *Kagoshima Maru's* engines throbbed in resonance as the ship moved gently onward.

In Nos.1 and 2 Laboratories, UPM students commenced their sequence of chemical tests of the samples they had just obtained; analysing the water for plankton and hydrocarbons, preparing the seabed sediment for grading.

On the aft deck, the ship's crew began preparing the nets for the morning trawl. Graduate Student Rosnan Yaacob, doing a Master's programme in marine sedimentology, scooped a hand into the grab which had retrieved a chunk of the seabed, tested the slimy ooze in his fingers, sniffed it, and said: "It's all mud down there; don't expect a lot of fish from this trawl."

Two hours later, he was proven right. The trawl hauled in a meagre load of fish; few of any commercial value.

That did not, however, mean any less work for the Fisheries students on board. With measuring-boards and balance-scales they set to work, meticulously detailing each specimen of fish, squid and shrimp caught.

The purpose of the Matahari Expedition, a collaborative effort between Universiti Pertanian's Faculty of Fisheries and Marine Science and Japan's Kagoshima University, was neither to harvest massive catches of fish nor bring forth any stunning new discovery, but to perform a task fundamentally more valuable.

This was Malaysia's first-ever attempt to discern the essential, primary nature of the South China Sea.

For 10 days last month, the *RV Kagoshima Maru* criss-crossed an area of 2,400 square nautical miles within Malaysia's Exclusive Economic Zone; sampling the water, testing the

● TURN TO BACK PAGE

Testing the potential of the EEZ

● FROM PAGE ONE

currents, examining the seabed, investigating fish-stocks through daily and nightly trawls.

Although it would be several weeks before the mass of new information could be fully analysed, cruise leader Capt. Ibrahim Haji Mohamed placed the expedition in its true perspective:

"We're coming up with basic data that's never been obtained before. The last time anyone had a look at the oceanography of the South China Sea was back in 1932. The EEZ gives Malaysia a sea area four times as vast as the land area, and we know next to nothing about it. With this expedition, this area will never have been tested so thoroughly."

On an expedition such as this, every last bit of data is significant; even a fistful of mud from the bottom of the sea, even a trawl-haul of nothing but trash fish and sea-snakes.

UPM Fisheries biologist Dr A.K.M. Mohsin remained undaunted by such apparently disappointing hauls:

"We have to know what species are here," he said. "How many are commercially important; what fishermen can expect to find in their catches.

"In other words: Is this a viable area for fishermen? We're always telling them to go offshore, but what is there here for them? What would be the best time for trawling? All this we will find out.

"I think this sort of survey is a must. Always has been a must; always will be a must."

The problem, however, has always been the fact that oceanic surveys are fabulously expensive to mount. The Matahari Expedition cost approximately $10,000 a day.

The total bill of over $100,000 was borne largely by the Japanese Government; with UPM coming in with $12,000. That sum was matched by an equal donation from Esso Production Malaysia Incorporated.

For the price, UPM's 25-man expedition team enjoyed the facilities of an oceanographic research vessel the like of which our marine scientists wistfully fantasise about before they go to sleep at night.

The *Kagoshima Maru* is a 70-metre-long, 1,300-ton, $30 million oceanographer's dream come true. The vessel bristled with some of the most sophisticated oceanographic and electronic technology to be found on any university ship in the world.

In addition to three onboard research computers, the ship also carried satellite navigation, three radar systems, worldwide VHF radio communications — and a facsimile machine which reproduced Japanese newspapers every morning. The wheelhouse roof — "monkey's island" in nautical jargon — was a high-tech forest of twirling radars and antennas aimed at communications and weather satellites.

And yet, in the deepening twilight of late evening, the *Kagoshima*'s navigation cadets would climb up to the monkey's island and point sextants at Sirius and Betelgeuse, learning how to steer by the stars.

By day, they operated state-of-the-art electronics; at night, they emulated that most elegant art of the ancient mariner: celestial navigation.

Although star-gazing was not on the Matahari Expedition's list of 18 research projects, each sunset usually glowed on a few off-duty UPM students helping out their new-found Japanese friends up on the monkey's island.

At the end of each day of burning sun, calm seas and hard work, with an indigo twilight ushering in the night's symphony of stars, the *Kagoshima*'s monkey's island was a perfect platform for international understanding.

"We've had a remarkable level of cooperation with the Japanese crew," said Capt. Ibrahim. "They've worked hand-in-hand with us all the way down the line."

This despite an all-but-insurmountable language barrier, much exacerbated by an awesome cross-cultural collision during mealtimes. UPM oceanographer Dr Noor Azhar Shazili mused unhappily on the matter: "Everything is going so well," he said, "but I can never get used to Japanese food."

The problem was resolutely attacked through the quintessentially Malaysian culinary technique of drowning everything in chilli sauce, but there remained little doubt of what the 30 Malaysians on board were missing most during their 10 day voyage.

But all agreed that the immensurable scientific value of the Matahari Expedition far outweighed the dietary consternation experienced by the Malaysians. Chemical oceanographer Dr Law Ah Theem shed his characteristic understatedness to express what everyone obviously felt:

"You have to remember that with this expedition we're entering a new era of Malaysian marine science. After this cruise, we'll have a comprehensive set of baseline data: we'll know the water, currents, sediment, bottom topography and fisheries of this part of the South China Sea. We can finally start to assemble an idea of what this sea is like. I would consider this an historic event."

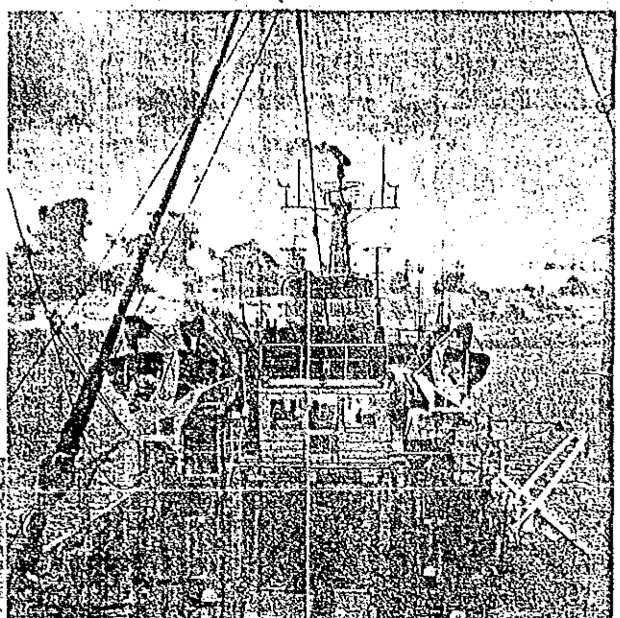
And Capt. Ibrahim, for whom the Matahari Expedition was clearly an affair of the heart and soul, summed it up in words formed of the stuff of dreams: "The sea is so important. We depend on it for resources, for our weather, as a dumping ground for our waste. And yet we know so little about it.

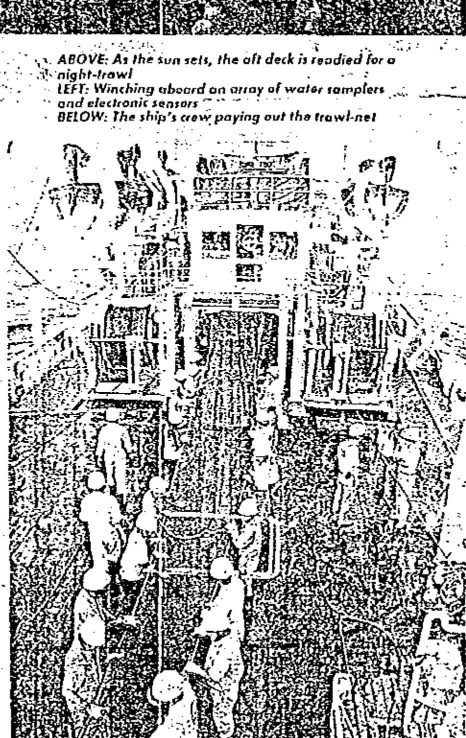
"Now, we've taken the first step. We're on the threshold of something new and exciting in marine science, technology and research. This trip has given us tremendous experience, in terms of organisation and what we can expect from our students and ourselves.

"And I think next year will be even better."

'The sea is so important. We depend on it for resources, for our weather, as a dumping ground for our waste. And yet we know so little about it...'

— cruise leader Capt Ibrahim





ABOVE: As the sun sets, the aft deck is readied for a night-trawl
LEFT: Winching aboard an array of water samplers and electronic sensors
BELOW: The ship's crew paying out the trawl-net

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11. 海洋水産学部教官リスト、研究分野等

(I) Areas of Specialization of Academic Staff

(A) Department of Fisheries Biology and Aquaculture.

Name	Designation	Specialization
Mohd. Azmi b. Ambak	Lecturer & Head of Department	Fishery Management
Dr. A.K.M. Mohsin	Associate Professor	Taxonomy
Dr. Ang Kok Jee	Associate Professor	Aquaculture
Dr. Mohd. Shariff b. Mohd. Din	Lecturer	Fish Diseases
Dr. Chan Hooi Har	Lecturer	Fish and Invertebrate Physiology
Che Roos b. Saad	Lecturer	Nutrition
Fatimah bte Md. Yusoff	Lecturer	Limnology
Sharr Azni b. Harmin	Lecturer	Inland Aquaculture
Siti Khalijah bte Daud	Lecturer	Fisheries Biology
Aizam b. Zainal Abidin	Lecturer	Aquaculture
Chan Eng Heng	Lecturer	Fisheries Biology
Cheah Sin Hock	Lecturer	Hatchery and Nursery Techniques
Siti Shapor bte Hj. Siraj	Lecturer	Fish Genetics
Mustaffa Kamal b. Abd. Satar	Lecturer	Inland Fisheries
Phillip Arumugam	Lecturer	Aquatic Ecology
Faizah bte Mohd. Shaharom	Tutor	Fish Parasitology
Aziz b. Arshad	Tutor	Invertebrate Biology
Abdullah Zaini b. Alias	Tutor	Invertebrate Culture

(B) Department of Fishing Technology and Marine Science.

Name	Designation	Specialization
Capt. Mohd. Ibrahim b. Hj. Mohamed	Dean, Associate Professor	Fishing Gear Technology/ Marine Policy
Ridzwan b. Abd. Rahman	Lecturer & Head of Department	Marine Biology/Ecology
Dr. M.W.R.N. De Silva	Associate Professor	Marine Ecology
Dr. Law Ah Theem	Associate Professor	Marine Chemistry/ Pollution
Juhari b. Husin	Lecturer	Naval Architecture/ Marine Engineering
Liew Hock Chark	Lecturer	Marine Zooplankton/ Ecology
Abd. Rahim b. Ibrahim	Lecturer	Fishing Port and Vessel Management
Haji Umar b. Salleh	Head of Marine Station, Lecturer	Mariculture
Khalid b. Samo	Lecturer	Fishing Vessel Technology
Mohd. Zaki Mohd. Said	Lecturer	Marine Biology
Lokman b. Shamsuddin	Lecturer	Biological Oceanography
Mohd. Isa b. Mansor	Lecturer	Marine Electronics
Zainal Ashirin b. Shahardin	Lecturer	Fish Gear Technology
Mohd. Maidin b. Hamid	Lecturer	Fishing Techniques
Mohd. Nasir b. Saadon	Tutor	Nautical Science

(II) Research Interests of Academic Staff

(A) Department of Fisheries Biology and Aquaculture.

Dr. A.K.M. Mohsin/Mohd. Azmi b. Ambak
Culture of catfish, *Mystus spp.*

Mohd. Azmi b. Ambak
Management of inland waters.

Dr. Ang Kok Jee
(i) Cage culture of Kalui (*Osphronemus gouramy*).
(ii) Larval rearing and nutrition of *Macrobrachium rosenbergii* juvenile.

Mustaffa Kamal b. Abd. Satar
Inland water management (lakes, reservoirs, rivers etc.).

Fatimah bt. Md. Yusoff
(i) Water quality and nutrient cycling.
(ii) Aquatic productivity (primary, zooplankton and benthos productivities).

Siti Khalijah bt. Daud
(i) Biology and taxonomy of fishes.
(ii) Stomach content of fishes.

Siti Shapor bt. Hj. siraj
Fish Breeding.

Cheah Sin Hock
(i) Larval rearing of *Macrobrachium rosenbergii*.
(ii) Rearing of live food for larval fish.

Sharr Azni b. Harmin
(i) Induced breeding of catfishes.
(ii) Morpho-histological studies of freshwater fishes.

Aizam b. Zainal Abidin
Breeding, Biological and Nutritional Studies of Ikan Patin (Pangasius sutchi).

Dr. Mohd. Shariff b. Mohd. Din
(i) Host-parasite relationship.
(ii) Study of Lernaeosis in Malaysia.

Faizah bt. Mohd. Shaharom
Taxonomy and Biology of monogenetic trematodes on freshwater cultured fish in Malaysia.

Dr. Chan Hooi Har
Fish and invertebrate reproductive physiology in particular, endocrinology.

Chan Eng Heng
Trophic positions of demersal fishes.

Che Roos b. Saad
Aquaculture with emphasis on nutrition.

(B) Department of Fishing Technology and Marine Science.

Capt. Mohd. Ibrahim b. Hj. Mohamed
(i) Effects of trawl cod-end mesh size on catch.
(ii) Malaysian fishing gears.

Ridzwan b. Abd. Rahman
(i) Coral reef conservation and management.
(ii) Coastal water ecology.

Dr. M.W.R.N. De Silva

(i) Ecology, utilization and conservation of coral reefs.

(ii) Effect of oil pollution on marine organisms.

(iii) Ecology and taxonomy of marine algae.

Dr. Law Ah Theem

Marine chemistry and oil pollution.

Mohd. Zaki b. Mohd. Said

Trawl fisheries and biology of the commercially important species.

Liew Hock Chark

(i) Ichthyoplankton of the South China Sea.

(ii) Fish recruitment on artificial type reefs.

Mohd. Isa b. Mansor

Design of echo-sounder simulator for fishing.

Haji Umar b. Saleh

(i) Breeding of marine and brackish water fish.

(ii) Laboratory culturing of zooplankton.

Juhari b. Husin

Floating breakwaters from scrapped automobile tyres.

Lokman b. Hj. Shamsudin

(i) Nutrient studies, both inorganic and organic in an aquatic system.

(ii) Primary studies in relation to inorganic or organic pollution of aquatic system.

Zainal Ashirin/Juhari Husin/Maidin Hamid

(i) Catch efficiency of local longlines.

(ii) Optimum hang in coefficient for gill net.

(iii) Socio-Economic Status, Living condition and Income condition of a typical fishing village.

(III) On-going Research

(A) Department of Fisheries Biology and Aquaculture.

1. Estimation of population size, growth, mortality and distribution of fish in Paya Bungor:
   Mohd. Azmi b. Ambak

2. Effects of neuroendocrine factors on prawn reproduction:
   Dr. Chan Hooi Har

3. Larval rearing and nutrition studies of udang galah (M. rosenbergii):
   Dr. Ang Kok Jee
   and Cheah Sin Hock.

4. Nutrition studies of grass carp (Ctenophyaryngodon idella) on pellet feed:
   Dr. Law Ah Theem

5. Culture of Ikan Baung (Mystus spp.):
   Dr. A.K.M. Mohsin,
   Mohd. Azmi b. Ambak,
   Sharr Azni b. Harmin and
   Mustaffa Kamal b. Abd. Satar.

6. Cage culture of Ikan Kalui (Osphronenus gouramy):
   Dr. Ang Kok Jee,
   Cheah Sin Hock and
   Sharr Azni b. Harmin.

7. Immune response of big head carp (Aristichthys nobilis) to Lernaeosis:
   Dr. Mohd. Shariff b. Mohd. Din

8. Biology of Dactylogyrus nobilis from Aristichthys nobilis and Quadricanthus batrachus from Malaysia:
Faizah bt. Mohd. Shaharom

(B) Department of Fishing Technology and Marine Science.

1. Marine growth on metal coupons placed at different depths in the Tapis oil field, Trengganu:
Dr. M.W.R.N. De Silva
and Ridzwan b. Abd. Rahman.

2. Selectivity studies on Malaysian Trawls:
Capt. Mohd. Ibrahim b. Hj. Mohamad

3. The biology and population dynamics of Nemipterus tolu:
Mohd. Zaki b. Mohd. Said

4. Acoustic equipments on Fishing and Research Vessel:
Mohd. Isa b. Mansor

5. Design and construction of fishing vessel:
Juhari b. Husin

6. Primary productivity of waters along East Coast of Peninsula Malaysia:
Lokman b. Shamsudin

7. Status of the coral reefs in Malaysia:
Dr. M.W.R.N. De Silva
and Ridzwan Abd. Rahman.