3. 当初要請の概要

養殖局からの協力要請は，海産養殖研究所として新設されたパカモンステーションに対するプロジェクト方式技術協力及びアグロアクアカルチャー推進のため，養殖池を建設するのに必要なブルドーザー等の重機器の供与，マス養殖のパイロット施設として建設予定のボルカンステーションの建設及び機材供与の3つであった。以下，参考までに3つの要請の概要を示す。

(1) パカモンテステーションへの機材・化学薬品の供与及び専門家の派遣

パナマシティより30km程離れたプエルトパカモンテにある研究所で，オニテナガエビ，クルマエビ，貝類，ミルクフィッシュ，藻類など汽水，海水の養殖の研究を行なう予定。

① 供与機材

- 顕微鏡からフラスコ等にいたる研究室用の備品　約18.5万ドル
  （金額はパナマ側の見積り額である。）
- 化学薬品類　約 1.8万ドル
- 車・漁網・海水ポンプ等の屋外機材　約 4.3万ドル以上
- マイクロバス・ビデオ等訓練用機材　約 3.8万ドル

計　約28.4万ドル以上

② 専門家

海産魚類養殖，貝類養殖，藻類養殖

なお，パナマ側は，施設とスタッフの人件費等の運営費を5年間約62万ドル負担する。

(2) アグロアクアカルチャー普及のための池づくり重機供与

日本から供与を希望する機材

- ブルドーザー，パワーシャベル，トラック，4WDピークル等　計　約50万ドル

パナマ側負担

- 技術者の人件費，ガス代等（5年分）　計　約16.5万ドル

(3) マス養殖パイロットステーション

ボルカン（Volcan）に建設予定のマス養殖研究所のため。

日本側の協力を要請するもの

- 研究所及び水槽，宿舎等諸施設の建設　約15　万ドル
- 研究用備品　約 8.8万ドル
- 臨時費（当座の運営費，雑費と思われる）　約 3.6万ドル

計　約27.4万ドル

パナマ側負担

• マスの卵，エサ及び人件費，運営費　　計　約34.9万ドル

4. 現地調査，協議結果

昭和59年11月1日は，大使表敬のあと，外務省，経済企画省，農牧省水産養殖局，商工省海洋資源局を表敬した。また，11月2日には農牧省大臣を表敬した。

(1) 商工省海洋資源局の要請

海洋資源局からは，小規模漁業開発のために，小規模漁業者のための漁業訓練学校に対する技術協力，訓練に必要な漁船及び漁具の供与及び水産加工中心のパイロットプラントの建設の3分野からなる要請が出された。内容的に広すぎるが，基本的な考え方としては妥当と思われる。ただし，実際に協力を行なう場所が確保されておらず，まだ机上のプランの段階であった。適当な場所がなく，まず，訓練学校の建設からということになるとプロ協になじまない。従って今回は，先方の話を聞きおくにとどめた。

(2) 農牧省養殖局所属養殖研究所に関する要請

養殖局に所属する養殖研究所の視察結果は次の通り。

① カラスキージャステーション

パナマシティの養殖局事務所に併設されたオニテナガエビの種苗生産センターである。台湾からの技術指導を受け，大学卒レベルの若い生物学者や技術者によるMacrobrachiam rosenbergii の生産技術の研究と，ポストラーバの生産を行なっている。また，他のラテンアメリカ諸国からの研修生が働きながら，その生産技術の研修を受けている。現在は5名の研究者がこれらの仕事にあたっている。

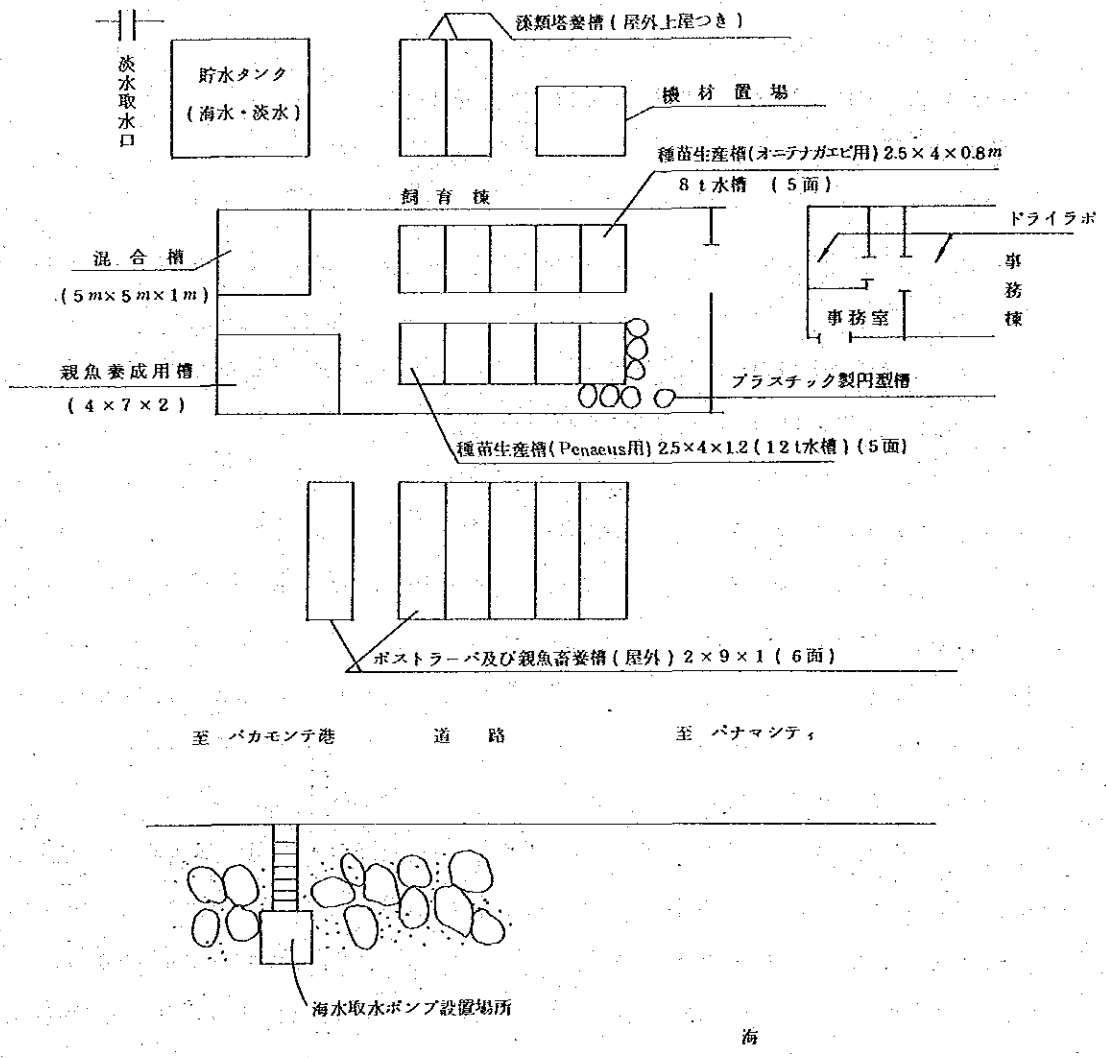
オニテナガエビの場合，ポストラーバ前半までは汽水を用いる。ここでは汲みおきの海水と脱塩素処理を施した水道水を混ぜてつかっている。今のところ，一度使った水は捨ててしまう開放式であるが，これを沪過装置を備えた閉鎖式にする計画である。エサとしては，初期はアルテミア，その後，卵，ミルク，フィッシュミール，シリアル等を混合したエッグフランと呼ばれる人工餌料を用いている。適切な水温調整と，ホルマリンを用いたプロトゾア駆除が生残率向上をもたらしたとのことである。

② バカモンステーション

パナマシティより約30 km離れたプエルトバカモンテの海辺に建設されたばかりの研究所である。パナマシティから車で30分程度で行けるので，職員はパナマシティから通勤可能である。エビの加工場をもつバカモンテ港は研究所から車で数分のところにある。港には，エビトロール船が数多く停泊中であり，養殖局所有のトロール船もあった。親エビ採捕に用いるとのことであった。

バカモンテステーションは，養殖局がはじめて建設した海産魚対象の研究所である。はオニテナガエビのポストラーバ生産と，Penaeus Japonicus，P. monodon といったアジア産エビの養殖研究を目的として建設されたが，Dr．ブレットーの説明では，その他にもミルクフィッシュなどの魚類，ボラ，カキなどの貝類及び藻類などの養殖研究も行ない，海産養殖研究の拠点とする計画である。海産の養殖技術については，パナマは全く経験がないので，ぜひ日本の専門家の協力を期待するとのことであった。

淡水は研究所裏手の水源からひき込み，海水は研究所前の浜（砂地の上に岩が積み重なっている状態）に井戸を掘ってポンプで汲み上げて（砂浜が天然のフィルターとなるとのこと），研究所のタンクに別々に貯水し，混合槽で必要な塩分濃度に混合して用いることになっている。淡水取水予定能力は 15 ton/day，海水取水予定能力は 50 ton/day とのことであった。



（図２） バカモンテステーション略図

この研究所は，すでに上屋，水槽，貯水槽，事務所及びドライラボ棟が完成している。しかし，設備，機材は未整備である。海水汲み上げ用のポンプもまだ設置されていなかった。施設の概要は図2のとおりである。ただし，現場でのメモに基づくものであくまで参考のための略図であることをお断りしておく。

この研究所に隣接し，海洋資源局の水産研究所がある。この研究所はドライラボラトリーを主体としたものであるが，訪問したところ内部の実験，測定用の材料はとぼしかった。Dr．ブレットーの話によれば，資源局との間には良好な関係があり，ドライラボでの実験については，資源局の施設を利用することが出来るとのことであった。

③　ブンタチャメステーション（建設予定）

パナマシティから約100 kmほど離れたブンタチャメに建設予定のクルマエビ類種苗生産センターである。ブンタチャメには，パナマ全土に約3,000 haあるエビ養殖場のうちの600 haがある。土手で囲まれた大規模な池にディーゼルポンプで海水を汲み入れ，天然種苗を用いて無給餌養殖を行なっている。労働者数は，5 haあたり1人の割合とのことであった。池に隣接して，低潮時には土肌が露出し高潮時には水にかくれる程度のエスチュアリー（干潟）があり，そこで天然種苗を採捕するという。Dr.ブレットーは，米州開発銀行（ＩＤＢ）の資金により，" France Aquaculure "の技術協力で，P.vannamei やP.stylirostrisの種苗生産を行ないたいとしている。200万尾のポストラーバ生産をめざし，天然種苗を補って放養密度を高めたいとのことであった。民間の養殖業者の家には，ブルドーザーやパワーシャベルなどの重機が見られた。

④　アクアドルセステーション

アクアドルセとは，スペイン語で淡水を意味するが，ステーション名となっているのは地名であり，ここは，汽水養殖研究所である。

パナマシティより約200 km，養殖局の本部より50 kmの位置にあり，周辺には大規模な民間エビ養殖場がいくつかある。このステーションは，パナマ政府とＩＤＢの資金で建設され，52の池と，貯水池を持ち，池面積は15 haに及ぶ。屋内実験室と事務所もある。

ここでは，小さな池を用いて，P.vannamei とミルクフィッシュ(Chanos Chnos)，P.stylirostris との混養や，池の水に栄養塩やケイ素などを加えた時の成長の違いを調べるPond Dynamics と呼ばれる実験を行ない，それをフェーズ1（Fase 1）と呼んでいる。また，大きな池では，餌料に魚油を加えた場合とそうでない場合とでP.vannamei の生長具合を比べるといった栄養学的実験を行ない，フェーズ2と呼んでいる。また，餌料としてアルテミアの大量培養の研究も行っていた。

室内の実験室を見学させてもらったが，サリノメーター，顕微鏡などは一応そろって

いるものの機材はまだ十分とはいえない印象を受けた。

現在，ここにはスタッフとしてあわせて８人の生物学者と技術者がおり，他に，パナマ大学や米国の大学から，或いはニカラグア，コロンビア，エクアドル等他のラテンアメリカ諸国から研修生が訪れており，民間のエビ養殖業者とも協力している。例えば，エビ養殖をはじめるにあたってのフィージビリティスタディを引き受けたりするとのことであった。将来は，技術者や民間エビ養殖業者向けの研修コースの設置も計画されていいる。

⑤　ディビサステーション

養殖局本部から２５㎞程のところにあるこの淡水養殖ステーションは，パナマで最初につくられた養殖研究所である。パナマ政府とＵＳＡＩＤ（United States Agency for International Development）の資金でつくられたこの施設は，素掘りの池50面，コンクリート製の池20面，計6haの池面積をもち，他に，24の実験槽をもつ研究棟，事務所，建設機械，保蔵庫等の施設をもつ。このステーションの仕事は大きく２つに分けられる。まず，フェーズ１として，親魚養成と種苗生産の基礎的研究を行なっている。現在，27種の淡水魚が飼育されているとのことであったが，我々の見たものは，ティラピア，オニテナガエビ，草魚，コクレン，ハクレン，アマゾン産のコロソマ，ニカラグア湖から持ってきたという肉食性のCichlasoma managense，ナマズの一種，そして，イケチョウガイ等の貝類などであった。それらは，まずここでその再生産についての研究が行なわれ種苗生産技術が開発される。同時に，ティラピアの雄性化（メチルテストステロンを使用するとのこと），混養，餌料研究などが行なわれる。広い養殖池では，草魚などのコイ類とティラピア，オニテナガエビと赤いティラピア，Colossoma macroponumとPiaractus brachyponusといった混養が試みられていた。アマゾン産のコロソマは，ここがはじめてその再生産に成功したとのことであった。

第２フェーズとして，フェーズ１で確立された技術により種苗の量産が行なわれている。ここのもう１つの大きな仕事は，アグロアクアカルチャーのための種苗を供給することである。現在は，ティラピアと草魚などのコイ科魚類の種苗が大量生産されている。

職員は計28名で，うち４人は生物学者である。30名までならば，講義と実技からなるセミナーを開催できるという。

なお，屋外の養殖池のためには，河川水を使用しており，屋内の実験槽のためには，病気の心配のない井戸水を使用しているとのことであった。

⑥　グアラカステーション

パナマシティより450㎞離れたチリキ州のグアラカ（Gualca）にあるこのステーションは，ディビサに次ぐ第２の淡水研究所として建設中である。昨年から屋外の池では

魚を飼いはじめたということであるが，実験棟の方は，ようやく建物だけはできあがったという状態である。池面積は合わせて10haあり，実験棟内には3m×1mの実験水槽が8面，他に講義室，実験室，宿舎などが整備される予定である。ここの特徴は，ティラピア，オニテナガエビ，コロソマなどすでに養殖技術がある程度確立した種を用いて，いかにしたら産業的に成り立つ養殖ができるかを中心テーマにすえる点である。将来は，試験販売も行なって市場も開拓していきたいということである。また，このステーションに隣接する形で，アグロアカルチャー普及のための研修施設をつくることも計画されている。

⑦　ボルカンステーション

亜熱帯性気候であるパナマも標高の高い地方は涼しい。チリキ州の避暑地ボルカンに予定されているこのステーションは，その冷涼な気候のもとでニジマスの養殖を試みるパイロットステーションとして位置付けられている。今のところ全く計画段階にとどまっており，時間の関係もあって建設予定地は視察出来なかった。今回は，バンビートホテル前の民営のニジマス養殖場の見学をした。水源は湧泉で，1分間に約10,000ガロンの採水が可能であり，その養殖場ではそのうちの約28％あまりの水をつかっているとのことであった。水温は14～18℃で，ニジマスの養殖を行なうには十分であろう。なお，サイトとして予定されているところはさらに高いところにあり，ふ化，種苗生産に必要な8～10°Cの水も入手可能とのことであった。

⑧　ガツンステーション

このステーションもまだ計画段階のものである。パナマシティから30km程のコロン地区に建設し，淡水魚の種苗を生産しガツン湖に放流し，その地域の漁業生産を向上させることを目的としている。

養殖研究所の他に，アグロアクアカルチャーの実施共同体もいくつか視察したが，その代表的な2つを紹介したい。

⑨　ピノデコブレ共同体（Pino de Cobre）

養殖池は2つあり，1つは若年魚用，もう1つはその養成用となっている。ティラピアと草魚などのコイ類を飼っている。池のそばではブタ，アヒル，ウサギなどを飼育しており，その排泄物は池へ流し込まれる。周辺では，パパイヤ，パイナップル，グラナディアといった果樹やトウモロコシなどの穀物，ニカメとよばれるイモ類が食料として栽培されるとともに，キャッサバやジャイアントイピルイピルが，ブタや草魚のエサ或いはたき木として植えられている。カリビアンパインもたき木用として植林される。また，これらは保水効果も期待されている。植林用の苗木も自分たちでつくる。ここは，

7家族の共同体ということである。

⑩ トーレ共同体（Tole）

ここも，ティラピア，草魚などの養殖，ブタ，ヤギ，ニワトリ，ウサギ，アヒルなどの飼育，穀物，果樹，木材などの栽培を組み合わせたアグロアクアカルチャーの典型的な共同体であった。ここの特徴は，付近に住むインディアンたちの研修所となっている点で，講義用に近くの学校の施設も借りているという。数家族単位で自給的生活を営んでいるインディアンを対象に，2家族ずつ2週間程この共同体に住みこんで研修を行なう。すでに300家族がこの研修を受け，自分たちの村に帰ってから自分たちで池を掘って，アグロアクアカルチャーを実践するとのことであった。

養殖局は過去4年間にわたり，ＵＳＡＩＤより900,000ドルの援助を受け，このようなアグロアクアカルチャーのモデル共同体を30程つくった。測量や設計は養殖局の職員が行ない，養殖池の建設機械は，リースされるものを用いた。しかし，ＵＳＡＩＤの援助は今年で打ち切られるため，今後も池をつくりアグロアクアカルチャーを普及していくために，ぜひ日本の協力がほしいとのことであった。

これら一連の養殖開発は全て，養殖局長，Dr.ブレットー氏の強力な指導のもとに推進されてきたものである。アグロアクアカルチャーは養殖にとどまらず，農・牧・林業にわたる事業であるが，他部局との調整は，Dr.ブレットーの努力により問題なく行われているとのことであった。

(3) 養殖局の実施する事業の今後の見通し

Dr.ブレットーは農牧省において実力を有しており，予算も確保され，必要ならば国際的な機関や他国からの協力を得ることも可能となると見られる。客観的に今の養殖局をみた場合，その組織，施設，職員の数と技術レベルはかなりしっかりしたものとなっており，パナマ国全体の方針が大きく変わらないかぎり，大部分の事業の継続は可能であろうと考えられる。

少なくとも淡水養殖に関する限り，養殖局は彼らなりのポリシーとかなり高度な技術そして自負を持っている。従って，どちらかというと技術協力よりは，資金や機材の供与の要請が多かった。当初要請の3つのうちで，当初最もプライオリティの高かったものはアグロアクアカルチャーのための池づくり重機供与であった。しかし，当方より，今回のミッションの目的は技術協力のプロジェクト案件をさがすのが目的であること，機材の供与や施設の建設などは経済協力であり今回の目的ではない旨伝えたところ，バカモンテステーションにおける海産養殖のプロジェクトタイプ協力にトッププライオリティをつけた。専門家の分野としては，海産魚類養殖（Penaeusについては自分たちでもできるので，必ずしも日本人専門家がカバーする必要はないとのこと）カキ，イガイ，Counchなどの貝

（二枚貝）類養殖，貝類の餌料及び餌料としての藻類養殖（Graceraria 及び微細藻類）の3分野をあげた。なお，熱帯産のKiog Crab（Mitrox Spinossious）の養殖研究も行う予定である。これらについては，当方としても，3つの要請の中ではパカモンテ養殖研究所に対する協力が最も可能性のあるものと考えられる。

(4) 他国からの協力

養殖局に対する各国の協力状況は，Dr. ブレットーからの聞き取りでは以下のとおりである。

① 米　　国

ＵＳＡＩＤによるディビサステーションへの機材供与並びにアグロアクアカルチャーのための4年間の900,000ドルの援助。

② カ　ナ　ダ

ＩＤＲＣ（International Development Research Center）による汽水における混養の研究援助，Pond Dynamics 研究に対する援助。

③ 台　　湾

カラスキージャ研究所でのオニテナガエビ研究に対する技術及び機材の供与。

④ スウェーデン

ＩＦＳ（Internateonal Foundation of Science）によるエビの栄養学研究のための10,000ドルの援助。

⑤ 韓　　国

年4名の3カ月研修コースへの受入れ。

⑥ オ ラ ン ダ

Colossoma macroponus の研究に対する協力。

⑦ Ｆ　Ａ　Ｏ

1985年からＦＡＯの協力により，ディビサステーションにおいて，淡水養殖研修センタープロジェクトを始めたいと思っているが，まだ，何も正式な手続きはとられていないとのことである。

5. 想定される協力の方向

沿岸漁業の発達も十分でないパナマにおいて，なぜ海面を研究開発する必要があるかについての疑問があるが，パナマ側には，養殖分野に対する協力に対し極めて強い要望があり，今回の日程も養殖一辺倒の観があった。また，出された要請を海洋資源局からのものも含めて客観的に見ても，最も実現可能性の高いものは，パカモンテステーションにおける海産養殖のプロジェクトであろう。淡水養殖分野においては，自分たちのポリシーとかなりの技術をもつパナマに対して今のところ協力する必要性はないと考えられる。

しかし，問題もある。Dr. ブレットーのレポートによれば，パカモンテステーションはオニテナガエビとクルマエビ類の種苗生産のための研究所と位置付けられている。ところが，プロジェクトに係る日本人専門家としては，魚類，貝類，海藻類の養殖分野を求めている。パカモンテステーションの位置付けが当初のとおりであれば，せっかく派遣した日本人専門家は施設的にも予算的にも十分な待遇が得られない可能性もある。そうなれば，プロジェクト方式技術協力が機材獲得のための便法化する危険性すら考えられよう。

また，パナマにおける養殖の必要性とともに，養殖適種の選定のためにもさらに詳細な調査が望まれる。特に，南方種の養殖は，日本人専門家の少ない分野でもあり，プロジェクトの成功のためには，リクルートの面も含めた十分な検討が必要と考えられる。

以上のような考えから，今の段階で，いきなり事前調査，そしてプロジェクトの実行とつなぐのは，やや冒険的すぎると思われる。

一方，現在，パナマからは，プロジェクト要請とは別に，個別専門家派遣の要請があがっている。内容は，淡水養殖専門家である。しかし，パナマには，淡水養殖分野での専門家は，もはや必要ではない状況であることはこれまで述べてきたとおりである。そこで，この要請を，何らかの形で，海水養殖専門家のものに変え，これに応える形で優秀な専門家を派遣することを提案したい。その専門家は，個別派遣の専門家として業務にあたるとともに，プロジェクト協力に先立つ長期調査員に準じた立場から，パナマにおける海水養殖プロジェクトの可能性と，その方向性を検討することも可能であろう。その報告に基づき，前向きにプロジェクトの実現を検討するのが良策と考えられる。できれば，その専門家が，プロジェクト開始後も何らかの形で，それに関与していける状況となれば，増々，プロジェクト成功の可能性は高まるであろう。

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参考資料　1

POLICY, PLANNING, AND STRATEGY IN PANAMANIAN AQUACULTURE DEVELOPMENT by Dr Richard Pretto

Why Aquaculture in Panama?

Panama has a surface area of 77 million hectares, and a population of two million inhabitants, half of which live in three cities. The native forests have been devastated (50 % in the last 40 years) by a disorderly, uncontrollable colonization by the other half of the population. The most important sources of income for the rural people are extensive cattle farming and subsistence "slash and burn" agriculture.

Panama's economy is based on international services being provided to the users of their interoceanic canal. Secondary economic activity is based on the production sectors such as agriculture, cattle, fisheries and wildlife.

When observing a map of the Panamanian territory, one can see that only one-third of the country has had an appreciable demographic development and has good roads, administration system, social services, and telecommunications services. The population of Panama lives in three main types of community. Firstly, the massive urban concentrations near the entrances to the canal, forming a consumer society most of whose members have rural origins. Secondly, the sub-urban and rural populations, dispersed among the central and western provinces, away from the coastal zones. Thirdly, the Caribbean provinces, where the most important indigenous concentrations are located.

Panama has a great potential of water resources. Many of the 550 rivers flow out of the mountains through the most densely populated areas. There are also great hydrological resources in the less developed areas. And of course, Panama has access to both the Pacific and Atlantic Oceans, and thus it has tremendous coastal resources. Furthermore, large freshwater reservoirs, located near the most important urban and metropolitan centers, have been constructed to operate the canal locks. These bodies of water are considered appropriate for extensive fish culture. And finally, reservoirs for hydroelectric power production are under construction in remote areas under the national energy production plan.

In view of Panama's eroded and deforested countryside, with extensive rural areas populated only by small, subsistence oriented farm families who are still not receiving appropriate technical assistance but are owners of an almost unspoilt wealth of water resources, AQUACULTURE is projected as a logical and safe way of providing human and social solutions for hundreds of thousands of forgotten Panamanians.

Mother nature has graciously provided the Pacific coasts of Panama with 15 000 hectares of salt flats, perfectly suitable for the cultivation of penaeid shrimp. The development of large-scale aquaculture (mariculture) is a necessary step in the development plans of the Panamanian government. There also exists potential in the Atlantic

Ocean for cage culture of different marine fishes such as corvina, grouper and dolphin; pearl oyster culture; seaweed culture; and shellfish culture (oyster, mussel, conch-Strombus gigas, clams, etc.).

Strategy for introduction of aquaculture in Panama

In most of the world, the most important and urgent objective of aquaculture is to produce food for human consumption, be it with commercial or social motives. In both cases, the countries benefit directly and indirectly. The efficiency and success of an aquaculture program depends on a strategy based on the country's total economic development, and on the knowledge of its socio-economic realities, which determine the government's political approach. Without a well-planned strategy and well-coordinated action to resolve the most important social and commercial obstacles of aquaculture development and to achieve a consistent efficiency level, rapid and orderly progress cannot be expected.

It is known that certain species of fresh and salt water organisms are extraordinary converters of animal and vegetable protein to provide high-quality human food. Fish and other aquatic organisms produced in controlled systems, are three to five times more economical than the traditional crops of rice, corn, beans, vegetables, etc. It is cheaper to produce a ton of protein through fish culture than by raising cattle, chicken, or pigs.

With the purpose of starting a solid aquaculture development plan in Panama, which could ensure success and would be capable of raising the interest in aquaculture of the country's political leaders and national economic planners, we have devised a strategy based on three stages: introduction, consolidation, and massification of aquaculture.

In the initial stage, which took close to 5 years, we were able to demonstrate that integrated agriculture-aquaculture, "could become an effective weapon to fight malnutrition and hunger", and that shrimp and trout culture had tremendous economic possibilities.

Then we entered a second stage: that of technological and operational reinforcement at a more dynamic and efficient rythm.

In developing countries like Panama, social statistics are not abundant nor always correct. Hence, we based our initial strategy in 1976 on the evaluation of the available resources: fiscal, budgetary, human, and technical. A first step was the initiation of a small-scale community and family rural aquaculture. At that time, a similar program was unavailable in the Isthmic region from which we could gain information and experience. Large-scale aquaculture, with agro-industrial benefit goals, was even more scarce. In 1973, the first private investments in shrimp mariculture were used to initiate 5 year pilot studies, even though Panama already had a modern fleet of commercial fishing boats for the capture of marine fishes and shrimp.

Traditionally, aquaculture has been wrongly considered as a sector of the commercial fisheries industries, only because it is closely related with the fisheries industry in its conservation, packing, and marketing phases. But aquaculture is something else: it is culture, not capture. Because of this misconception, in many countries aquaculture does not enjoy the privileges and advantages that are granted to agriculture and livestock raising.

This was another important reason for our decision to start a rural earthen-pond construction program located in regions that presented the following characteristics: marginal but accessible areas, good clay soils, and low soil fertility, but with permanent (dry season) water sources and close to agricultural and livestock facilities.

The first fish seed production station was put into operation in Divisa, which is strategically located in the middle of the country. A National Directorate of Aquaculture (DINAAC) under the Ministry of Agriculture and Livestock Development was established. The objectives of the aquaculture program in Panama were stated in 1976 as follows:

- Provide a source of cheap protein of high quality through fish culture to subsistence farmers and their families. Low-cost fish protein is produced by using fertilizers and rations composed of agricultural by-products that are not used for human consumption.
- Reduce domestic demand of red meat by economically producing aquatic organisms such as fish, shrimp, molluscs, frogs, turtles, and algae using fresh, brackish, and salt waters.
- Increase the yield of edible aquatic organisms in natural and artificial water bodies, such as rivers, lakes, large and small reservoirs, estuaries, and the oceans by means of aquaculture projects together with the appropriate technology to capture, process, preserve and market the product.
- Promote interest in aquaculture within the country by teaching courses in secondary, vocational, and professional schools.
- Establish bilateral aquaculture co-operative projects with other countries and international organizations which will provide economic and technical assistance of benefit to the country, as well as to other countries in Central and South America.
- Utilize impounded water associated with aquaculture activities to irrigate crops to increase agricultural yields in the dry season.
- Supply high-quality aquatic products to Panamanian luxury markets by using more sophisticated aquaculture practices thus reducing imports.

A curriculum for training aquaculture technicians in a 2½ year program was started, using the facilities of the regional University Center. Professors were the staff of DINAAC. The first group of 20 aquaculture extensionist were prepared under Panamanian conditions. All of them were hired upon graduation by the Ministry of Agricultural Development (MIDA) to support the aquaculture extension offices that were opened in 7 Panamanian provinces.

Since the beginning, all farm level results have been carefully documented, and emphasis has been placed on identifying the limiting factors and learning how to cope with them.

Institutional framework

The National Directorate of Aquaculture was officially created on 11 May 1979 by the Executive Body which designed its function to be as follows:

- Formulate and execute projects and experiments with exotic and native species to assure the highest quality life of these species in fresh, brackish, and salt waters.
- Carry out economic feasibility studies and site selection for the repopulation of continental waters.
- Study the native species, selecting those with aquaculture potential and those suitable for the repopulation of continental waters.
- Establish and manage hatcheries to supply the demand for seed to stock into aquaculture installations and continental waters.
- Determine sources and quantities of agricultural and marine products that can be used for the preparation of aquatic organism diets.
- Conduct socio-economic analyses of the different activities in which the National Directorate of Aquaculture is involved.
- Prepare and disseminate, in co-ordination with the National Directorate of Publication and Information of the Ministry of Agricultural Development, informative materials on aquaculture.
- Prepare and implement training programs for Directorate personnel in order to achieve and maintain the highest technical standards.
- Work jointly with the National Directorate of Renewable Resources of the Ministry to manage the different species that are found in continental waters of the country, e.g., streams, rivers, lakes, lagoons, and reservoirs.

Achievements

Obstacles that seemed impossible to overcome were gradually conquered in the following manner:

1. Aquaculture was implemented nation-wide at two levels. As part of the day-to-day tasks of the different agricultural regional extension services available in every province of Panama, ponds were built and stocked through these regional aquaculture departments. Short courses were taught by experienced aquaculture-agriculture extensionists to the pond users, utilizing audio-visual aids.
   As a support for this work, illustrated pamphlets were written for rural distribution. At a national level, efforts were made to obtain funds for pond construction at a pilot station for Macrobrachium rosenbergii post-larvae production, and for scholarships for training staff at the Master's level, and defining aquaculture policy in terms of species to be cultured and technology to be followed, etc.
2. A systematic campaign to inform the public was initiated at the national level, with news based on real and positive information on aquaculture development in Panama. This information was supported with photographs, slides, films, and video tapes in order to reach the public, from the highest authorities, the President of Panama and the head of the defence forces, to the ordinary people in the street.

3. A pilot modular pond construction program was designed and put into practice in poor communities with funds donated by the Agency for International Development of the United States (USAID), which introduced a new technology: that of farm-level seed production of the most important fish of the program: the tilapia.
4. At the same time that the pilot program was being developed, a survey was carried out in 40 communities where modular and traditional ponds were introduced in order to evaluate the nutritional and socio-economic impact of agro-aquaculture upon the rural poor. These rural populations had been ignored by traditional agriculture development projects, because they are subsistence farmers consuming almost 90 % of what they produce. Rural credit and marketing programs have never reached them.
5. Emphasis was given to finding money to supplement the scarce funds provided annually by the government of Panama. Grants were obtained from donor agencies such as USAID, IDRC, FAO, as well as the World Bank and the Interamerican Development Bank.
   Research projects were formulated and submitted to these agencies to obtain not only equipment for field and laboratory operations but also expert technical assistance from many countries, including Taiwan.
6. Constant contact with other Latin American countries was maintained through the Aquaculture and Fisheries Program of the Latin American Economic System (SELA). SELA allowed regional Directors of aquaculture to meet two or three times per year. At these meetings, aquaculture research and culture policy for Latin America was discussed and introduction of new aquatic species, short training programs, and technical assistance arranged.
   Teaching the poor and forgotton people to "plant fish in the earth" of their small plot or on a piece of land belonging to their community, has been an easy task; all their lives, in order to survive, these people had been planting seeds and caring for their domestic animals for home consumption and marketing the surplus to obtain extra income.

This was, in synthesis, the Panama "Aquaculture project" in its initial stage, an activity that opened new ways and hopes for the rural poor, better nutrition for their families, relocation of nomadic populations and a prosperous and orderly colonization, within the framework of the Water and Land Utilization National Plan. Aquaculture has become a priority under the agriculture development plan of the nation.

At this point, an integrated agriculture policy was developed within the Ministry of Agricultural Development, utilizing the professional assistance of different specialists. The National Aquaculture Directorate was reorganized, including the creation of new departments. Multidisciplinary staff was selected and hired to assist the new agro-aquaculture modular pond program and the rapidly expanding private marine shrimp culture activities. To give greater attention and follow-up to the preliminary objectives, the central aquaculture office was transferred to MIDA's central administrative and technical assistance headquarters located in Santiago, Veraguas, 250 kilometers from Panama City.

The following new departments were established:

Planning and Financial Department-where Panamanian and international funds are budgeted and managed.

Training Department-where seminars, short cources and workskops are designed and taught to specialists, field technicians, rural developers and producers.

Associated Projects Department-where the apropriate agro-acuiculture technologies for each region and rural population are designed and put into pract

Engineering Department-design and supervision of pond and small impoundments construction mini-reservoirs Department-promotions and use of small impoundments for the stocking of selected freshwater species to improve nutritional standards of local inhabitants.

Rivers and Lakes Department-research on commercial fisheries of large bodies of water, with special attention given to Lakes Gatun and Alajuela in the Panama and Colon areas.

Human Resources Department-where all the staff's merits and demerits are evaluated and means of stimulus are applied for the improvement of each employee.

Public Information Office-where the different types of news, reports and publications are produced and processed for difusion at regional and national levels for the press, radio and television.

Nutrition and Rural Development Department where surveys on the actual and future nutritional and socio-economic impact of the program are carried out and where basic nutrition education workshops are designed and taught.

Apart from the creation of new Departments, much emphasis has been given to the establishment of aquaculture stations.

Aquaculture stations in Panama

DIVISA FRESHWATER CULTURE EXPERIMENTAL STATION

Located 25 kilometers from the central DINAAC offices the Divisa Station has a battery of 50 earthen ponds and 20 concrete ponds, with a total 6 ha. of surface water. It has a laboratory for soil and water analysis, ichthiopathological studies and handling of fish hormones, 24 concrete holding tanks, offices, mechanical and construction shops, and storage areas. The station was constructed with funds from the Panama National Government and grants from USAID.

This unit is considered the First National Aquaculture Center of Panama. In this station the technologies of fish reproduction and other aquatic organisms have been perfected, also this station supplies fish seed to the modular and traditional ponds.

This station has facilities to host a maximum of 30 people at a time, attending theoritical -practical seminars.

On the basic aspects of rural fish culture many Latin Americans are trained on the job every year especially in the art of fingerling production of tilapia, common carp, chinese carp and Colossoma macropomum.

"ING. ENRIQUE ENSEÑAT" BRACKISH WATER EXPERIMENTAL STATION

This station was constructed with support from the Panama national government and an IDB loan. The station features offices, laboratories, a processing plant, and a meteorological station. The pond water area covers 15 ha with a total of 52 earthen ponds and a small reservoir.

This station is dedicated to research on nutrition, pond dynamics, and management of marine shrimp utilizing monoculture and polyculture technologies with native marine fishes; artemia culture; screening of local marine fish species for culture potential; and water quality analysis for shrimp farmers.

In the near future, the first training seminar on shrimp farm management will be taught to technicians and private enterpreneurs. Private facilities cover 2500 ha in full production, representing more than 4 million dollars in yearly export income. For this purpose,. a manual of peneid shrimp culture has been written covering the Panamanian experience in detail. The station is located on the Pacific Coast, 50 km from the DINAAC main office and 200 km from the capital city, in the center of several large private shrimp farms.

CARRASQUILLA, PANAMA CITY, FRESHWATER SHRIMP LARVAE LABORATORY

With the mission from Taiwan providing technical assistance, the Carrasquilla Laboratory is dedicated to freshwater shrimp, Macrobrachium rosenbergii, reproduction research and the production of post-larvae. Carrasquilla is managed by university-trained young biologists and technicians. Several Latin Americans from other countries have received on-the job training for production of M. rosenbergii post-larvae.

Vacamonte freshwater and marine shrimp larvae laboratory

Located at Puerto Vacamonte, 30 km from Panama City, the laboratory is reaching the final construction phase. Vacamonte will specialize in Macrobrachium rosenbergii post-larvae production and research on the reproduction of Asian shrimp species such as Penaeus japonicus a P. monodon.

Gualaca freshwater experimental station

The second freshwater station has been located in Gualca, Chiriqui Province, 450 km from Panama City where the institute for Agricultural and Livestock research headquarters are located. The earthen ponds cover a total of 10 ha. The station features laboratories, offices, mechanical workshops, storage areas etc. Its main purpose is to realize research activities directed toward the development of commercial culture of freshwater fish, including polyculture with Macrobrachium rosenbergii, using different sources of fertilizer supplemented with commercial diets.

Punta Chame Penaeus post-larvae station

The station is located at Punta Chame, at 100 km from Panama City. "France Aquaculture" has obtained the contract for providing design assistance and technical expertise. The laboratory will have the capacity for producing 200 million Penaeus sp. post-larvae per year.

Gatun freshwater fish seed production station

Located on Colon road, 30 km from Panama City, this hatchery is still in the design stage. Gatun station will be responsible for producing fish juveniles needed for stocking the large freshwater lakes in Colon and Panama Provinces to improve the existing commercial fisheries based on the peacock bass.

In 1982, ten years after the construction of the first experimental ponds at an agricultural education center and only six years after the creation of the National Aquaculture Directorate, the Panama Government was favored with an important loan of 13.2 million dollars from the Interamerican Development Bank including a substantial contribution of 7 million as the government counterpart, which is being used to strengthen and diversify the National Aquaculture plan.

This new investment, dedicated to the development of small and large-scale aquaculture, will allow Panama over a period of five years: to expand the modern Enrique Enseñat Brackish Water Station; to build and equip the larval station of Punta Chame to build and equip two more freshwater stations in two new zones in peak development, for research, training, and production of freshwater seed organisms; to acquire a fleet of light-weight vehicles to be used in the rural areas;

to pay for technical assistance and scholarships for training personnel.

This investment means that Panama will shortly possess the physical infrastructure, the trained personnel, and the services to supply fish and shrimp seed in order to be able to initiate the projected massification in the coming years.

Personnel training

Based on the experience gained during the past five years in the National Aquaculture Program, the needs and cost of training technical and field personnel have been recorded and measured. It has been decided, as part of the national policy, to send a large number of staff abroad for short-term "in-service training" and long-term post-graduate studies. Master's degree scholarships have been awarded to agronomists and biologists who have gained valuable experience within the central and regional aquaculture departments.

Frequently, through monthly work meetings and aquaculture seminars and workshops, the training of technical and other personnel has been improved at the local level. These staff are principally assigned functions of supervision, extension, and technical assistance. Staff with professional (university) degrees work in the different laboratories producing the aquatic seed required by the national aquaculture program or in research under the supervision of international and national experts.

At present, the agro-aquaculture, the commercial mariculture, and the lake artisanal fisheries programs have trained and qualified staff. Even so, the post-graduate scholarship program and on-the-job training programs go on each day with greater impulse.

Research

Since aquaculture is a science that includes many disciplines such as fishery biology, ecology, animal physiology, pathology, animal and human nutrition, feed technology, soil science, aquatic chemistry, agronomy, agricultural economics, rural sociology and pedagogy, it would be practically unfeasible to set up a research and experimentation infrastructure to cover all these scientific specialities. For that reason we have decided to plan our research through a shorter and more economical route which is that of applied research, that is to say; giving scientific backing to the studies of species, to the adapting of appropriate technologies, to the organization of communities, to the technical extension in a strictly regional environment, considering that aquaculture is a science that is in its infancy and that it has been in development over the last one hundred years in spite of its large evolutionary history of more than four thousand years, through the trials route rather than in-depth and complete scientific research.

Neither in Panama nor in the Central American Region are there enough researchers available in each of the mentioned disciplines.

Fortunately, in the case of Panama, and than to the permanent policy of maintaining professional relationships and personal contacts with institutions dedicated to socio-economic development of countries, with USA Universities and centers working in the field of aquaculture, since several years we have counted on grants for the support of important short- and long-term scientific research programs. This research has produced the necessary information to continuously improve our aquaculture technology and the economic information to convince the private sector to enter the aquaculture field, and at the same time to obtain the international funds required for that development.

This year FAO support has been obtained, through their Aquaculture Development and Coordination Programme of the Fisheries Department in Rome, for an agreement that links our network of research stations with the Latin American Regional Center at Pirassununga, which in its first years of existence has achieved notable advances in the area of research and training of Latin American personnel in aquaculture at a master's level.

Since 1976, we have had the permanent and invaluable support and advisory services of the renowned International Center of Aquaculture of Auburn, Alabama. Now we are taking serious steps as a government agency to work with other prestigious USA universities in the area of Marine Biology, in particular South Carolina University.

The 1984 national aquaculture program

General objectives and policies

- To reorient the originally proposed fundamental objectives of aquaculture development in social and commercial terms, based on concrete and positive accomplishments and accumulated experiences during 10 years (1973-1983). They should focus on integrated rural development and on agro-industry development for exportation, which deserve the immediate attention of the international and regional agencies that co-operate in development.

- To designate water as a primary resource to satisfy basic human needs, for domestic use, for irrigation, and for the production of human food of aquatic, agricultural and animal origin.

- To plan adequate strategies for each rural region of the country, taking into account the soil structure, climate, quality and sources of water, demographic growth, accessibility, and the regional customs and traditions, make optimum use of soil and water in direct relation with the rural integrated development programs of the national government.

- To adapt the general strategy to the efficient and sustained use of the existing economic, financial, physical, and technological resources; to promote and obtain financial support from international sources in order to exploit these resources.

- To introduce a new concept of harvest, conservation, management and use of water, through agro-aquaculture, as a short-term answer for the poorest and most isolated communities which are suffering from malnutrition and unemployment, and as a medium and long-term solution at the national level to achieve food security through an agro-aquaculture massification program.

- To detain, as much as possible, the migration of rural families to the intermediate cities and metropolitan nuclei, utilizing family and rural labor to its maximum in all the aquaculture programs of the country; to recruit and train supporting personnel in administrative and operational tasks until a permanent employment eagerness has been created.

Specific objectives and policies

- To concentrate all activities of socio-economic research and transfer of appropriate technology, through ad-hoc agro-aquaculture extension, on those marginal communities where modular projects already exist and there is evident interest and leadership present among the inhabitants; to use these projects as "demonstration plots", and to lower operational costs, facilitate users' training, and reinforce any future agro-aquaculture massification program at the national level.

- To continue expanding the modular ponds associated with small cattle-rearing plots, pig pens, etc.

- To continue the research on fish seed production, and to improve the present technological facilities (stations and laboratories); to intensify at the same time the training of Panamanian technicians at all levels, in the national aquaculture centers and in co-operation with university departments of agronomy, biology and human nutrition in the metropolitan area of Panama.

- To strengthen the activities of the Lake Artisanal Fisheries program, utilizing the new work teams and vehicles assigned to the Rivers and Lakes Department and concentrating the highest possible effort on co-operative groups at rivers and lakes of the Canal Zone, which could motivate new subsistence farmer groups and new artisanal fishermen.

- To elaborate a technical extension plan for fisheries methods utilizing available resources and family labour.

- To promote the interests of public institutions and private enterprises by improving the marketing of the peacock bass and other species in the metropolitan markets of Panama.

- To design printed matter to promote consumption of artisanal fishery products.

- To promote freshwater shrimp culture for commercialization. This line of food production is still in its preliminary phase. Some short and

medium-term goals have already been defined taking into consideration the existing infrastructure, the scientific and technical experience of the staff in charge of the Larval Station at Carrasquilla, and the potential national and international demand for freshwater shrimp.

- To design and teach the First Seminar of Familiarization with the culture of this species to enterpreneurs and other persons interested in developing this activity on a commercial scale.

- To increase the volume of post-larvae production, to improve the current technologies and to improve the professional and technical level of Panamanian staff engaged in this activity.

- To design the promotional material for future publicity campaigns.

In relation to marine shrimp culture:

- To increase at the Ing. Enrique Enseñat Station the training of biologists and technicians who will work at the private shrimp farms, providing short and theoretical-practical seminars, and intensive, short weekend courses.

- To increase research and field studies on species management, nutrition, rearing, polycultures, etc. making optimum use of the advice of experts and the financial contributions of the development and co-operation institutions.

- To create an information system on technical matters through bulletins, manuals, pamphlets, audiovisual packages, to promote and modernize this agro-industrial activity.

- To start training professional and other personnel that will be needed for the appropriate functioning of the new larvae stations and laboratories and for the operation of a boat dedicated to the capture of female stock shrimp at sea.

- To massify the technical publications, utilizing at the lowest possible cost the mass media and other non-traditional methods, in order to increase the awareness of the rural and sub-urban population and thus to facilitate the first stage of the projected aquaculture massification program.

- To export to the rest of the Latin American countries, the achievements and advances in research, technology and social development that evolve from these aquaculture, mariculture and lake artisanal fisheries programs, through the existing bilateral agreements and covenants for mutual assistance and co-operation.

- To promote private investments in the commercial culture of other aquatic organisms, to supply the internal and external markets with high-quality aquatic products and to supply the great demand for trout, fresh and marine warm-water shrimps and fishes, etc., all of which generate new jobs.

参考資料　2

MINISTRY OF AGRICULTURE AND LIVESTOCK DEVELOPMENT

NATIONAL DIRECTORATE OF AQUACULTURE

COOPERATIVE PROJECT BETWEEN THE GOVERMENT OF JAPAN AND PANAMA-A GRANT FOR EQUIPMENT AND CHEMICALS FOR THE VACAMONTE SHRIMP LARVAE LABORATORY.

SANTIAGO OFVERAGUAS, SEPTEMBER 28, 1984

PANAMA

Although Panama is a country with two oceans, there is a short supply of fishes for the poor and the medium class population. On the other hand, a shrimp monoculture industry is expanding rapidly in Panama (2,500 ha in 1983). It has been estimated that in five years 10,000 ha could be under cultivation.

The government of Panama promotes aquaculture activities through the National Directorate of Aquaculture (DINAAC), which was created by a Presidential Decree Nº 16 of 1979 in the Ministry of Agriculture and Livestock Development.

The objectives of the Aquaculture Program in Panama are as follow:

- Provide a source of cheap protein of high quality through fish culture to subsistance farmers and their families.
- Reduce domestic demand of red meat by economically producing aquatic organisms such as fish, shrimp, molluscs, frogs, turtles, and algae using fresh, brackish and salt waters.
- Increase the yield of edible aquatic organisms in natural and artificial water bodies, such as rivers, lakes, large and small reservoirs, estuaries and the oceans by means of aquaculture projects together with the appropiate technology to capture, process and market the product.

-Promote interest in aquaculture within the country by teaching courses in secondary, vocational and professional schools.

- Establish bilateral aquaculture cooperative projects with other countries and international organizations which will provide economic and technical assistance of benefit to the country, as well as to other countries in Central and South America.
- Utilize impounded fresh water associated with aquaculture activities to irrigate crops to increase agricultural yields in the dry season.
- Supply high-quality aquatic products to Panamanian luxury markets by using more sophisticated aquaculture practices thus reducing imports.

The Directorate of Aquaculture has completed at Puerto Vacamonte, 30km from Panamą City a laboratory facility for production and research in Macrobrachium rosenbergii post-larvae; production and research of Asian shrimp species (Penaeus japonicus and P. monodon) post-larvae and the reproduction of the Conch Strombus gigas.

The Vacamonte Marine Station with a contruction cost of US$200,000 has access to both fresh and salt water sources, but it lacks most of the field and laboratory equipment. If well equipped it will have a capacity to conduct sound research projects and the production of a minimum of 5 million aquatic organism larvae per year.

It is proposed trough a bilateral aquaculture cooperative project between the governments of JAPAN and PANAMA to equip the Vacamonte Marine Station and operate the laboratory at full capacity, to convert it in to a production, research and also a trainning center.

National aspects

Total population (1983)	2,057.196
Total marine production	132,152 ton.
Total production of finfish	4,895 ton.
Fish consumption per capita	8.5 kg
Total exportation of marine products (1982)	6,300 Ton.

Laboratory Equipment	US $
1 Microscope Triocular with photographic dispositive	5,300
1 Miscrocope Triocular with viewing screen	5,000
1 Miscrocope Binocular 4x- 10x- 40x- 100x	1,000
1 Stereoscopic microscope	1,800
4 Microscope illuminators	700
10 Cases of microscope slides 3 x 1 inch	720
10 Cases of microscope cover glasses (square 25mm)	360
1 Microtome (rotary, precision)	4,500
1 Analitical balance cap. 0.0001G	4,800
1 Electronic analitical balance	4,850
2 Balances platform, triple beam w/weight set 2,600 g weighing capacity; 0.1 g sensivity	400
1 Top loading balance 20 kg capacity	3,020
1 Cell count camara	100
2 pH meter	2,000
2 Oxygen meter	2,600
1 Conductivity meter	3,500
2 Refractometer-salinometer	1,200
1 Autoclave with temperature control	6,100
1 centrifuge w/head for 50 ml tubes	2,300
1 Spectrophotometer-digital w/test tubes	2,800
1 Oven-vacuum 200ºC	1,473
1 Distilled water center 7.6 l/hour	4,536
1 Bod meter	1,800
1 Incubator Low temperature 0-50ºC 0/44 m^3	1,820
1 Chloridemeter w/chloride electrode	900
1 Orthophosphate analyser	2,800

1	Onzone generator	12,000
1	Ultraviolet water purifier	16,000
1	Water heater	7,800
2	Air compressor 3HP	3,600
1	Hot plate-electric-thermostatic	685
1	Stirring apparatus-magnetic-variable speed	485
3	Dissecting set-advanced medical and physiology	600
5	Thermometer max-min	500
1	Incubator-freezer, upright	7,800
1	Microcomputer w/printer	4,000
10	Pumps, submersibles, corrosion resistant	1,000
1	Electric generator	3,000
5	Airconditioner 400 BTU	3,000
2	mixers, four liters, three speed	1,200
100	Aquaria-rectangular, slate botton 50 gal.	29,500
5	Water bath 20cmx 8cm.	270
5	Sieves-wire cloth- brass frame, full height mesh Nº20	210
5	Sieves-wire cloth-brass frame, full height mesh Nº 40	210
5	Sieves-wire cloth-brass frame, full height mesh Nº 60	210
5	Sieves-wire cloth-brass frame, full height mesh Nº 100	225
1	Enviromental calibrator 25 reactions	3,000
10	Counting apparatus	250

10	Magnetic stirring bar assortment	385
2	Stirring apparatus-test tube	400
10	Support test tubes 12 place	80
6	Burners, high temperature, mixed and natural gas	264
12	Pipets ultramicro 10 ul.	703
24	Pipets serological 1ml.	118
24	Pipets serological 10 ml.	130
12	Pipets serological 25 ml.	180
24	Pipets volumetric 1 ml.	110
24	Pipets volumetric 10 ml.	132
24	Pipets volumetric 20 ml.	158
24	Pipets volumetric short 1 ml.	155
24	Pipets volumetric short 10 ml.	202
12	Pipets volumetric short 25 ml.	137
24	Cylinders graduated 10	144
24	Cylinders graduated 50	192
24	Cylinders graduated 100	216
24	Cylinders graduated 250	345
12	Cylinders graduated 500	228
12	Cylinders graduated 1000	383
144	Dish petri 100 x 10mm	445
144	Dish petri 150 x 20mm	1,301
144	Test tubes culture, with screwtop 13 x 100mm	110
144	Test tubes culture, with screwtop 16 x 125mm	147
144	Test tubes culture, with screwtop 16 x 150mm	151
144	Test tubes culture, with screwtop 25 x 150mm	234
144	Test tubes graduated 10 ml.	864
144	Test tubes graduated 25 ml.	864

3	Buret automatic 25 ml.		168
3	Buret automatic 50 ml.		188
24	Beakers electrolytic, extra high form	180 ml	90
24	Beakers electrolytic, extra high form	250 ml.	100
144	Beakers 50 ml.		290
48	Beakers 100 ml.		315
96	Beakers 250 ml.		315
48	Beakers 600 ml.		430
24	Beakers 1000 ml.		840
24	Beakers berzelius 1000 ml.		145
48	Flask round bottom 500 ml.		320
24	flask round bottom 1000 ml.		400
24	Flask flat bottom 250 ml.		112
24	Flask flat bottom 500 ml.		144
24	Flask flat bottom 1000 ml.		184
12	Flask flat bottom 12,000 ml.		516
24	Flask filtering 1000 ml.		488
48	Flask with stopper, graduated 25 ml.		616
24	Flask with stopper, graduated 125 ml.		320
24	Flask with stopper, graduated 500 ml.		465
48	Flask kjeldahl, londneck 800 ml.		712
24	Flask filtering 500 ml.		240
24	Flask filtering 1000 ml.		488
24	Flask volumetric, unstoppered 25 ml.		184
24	Flask volumetric, unstoppered 100 ml.		215
24	Flask volumetric, unstoppered 500 ml.		388

24	Flask volumetric, unstoppered	1000 ml.	513
48	Flask erlenmeyer, with stopper	250 ml.	768
48	Flask erlenmeyer, with stopper	500 ml.	930
48	Flask erlenmeyer, unstoppered	250 ml.	608
48	Flask erlenmeyer, unstoppered	500 ml.	636
3	Mortars, porcelain 400 ml.		50
3	Pestle, porcelain		36
24	Funnels 50 ml.		534
12	Funnels 100 ml.		135
6	Funnels separatory 250 ml.		392
6	Funnels buchner 15 ml.		163
6	Funnels buchner 40 ml.		203
	filter paper for funnerls		70
2	Desiccators bowl form large 200 mm coor porcelain		305
2	Dessicators plates fruehling form coor porcelain		57
	Total Laboratory equipment.....		184,775

30L	Ethyl alcohol, technical, 95%	290
500G	Ethylendiamine tetraacetic acid (edta), powder ACS,(HOCOCH2) 2NCH2CH2N (CH2COOH)2	94
500G	Ferrous ammonium sulfate, crystal, certified ACS, Fe (NH4) 2(SO4)2 6H2O	54
1L	Hydrogen peroxide, 30%, certified ACS H2O2	104
40L	Hydrochloric acid, reagent ACS HCL	300
500G	Hydroxylamine hydrochloride, crystal, ACS NH2OH.HCL	122
1.5KG	Magnesium carbonate, basic powder, certifiedacs MgCO3	640
1.5KG	Magnesium chloride hexahydrate, crystal, certified MgSO2	120
1.5 KG	Magnesium sulfate, anhydrous, crystal, certified ACS MgSO4	126
1KG	Mangandus sulfate monohydrate, fine crystal ACS, MnSO4.H2O	68
50G	Methyl orange, sodium salt certified ACS	40
100G	N-(1-Naphthyl)-ethylenediamine dihydrochloride, C10H7NHCH2CH2NH2.2HCL	380
1G	Oxilic acid, certified ACS,(COOH) 2.2H2O	120
500G	METHYLAMINOPHENOL sulfate, practical, (CH NHC H OH).HSO	54
500G	P-Nitrophenol, crystal, ACS NO2C H OH	64
2L	Perchloric acid, 70-72%, reagent ACS HCLO4	124
200G	Potassium chrimate, granular, certified ACS, K2CrO4	60
1KG	Potassium chloride, crystal, certified ACS,KCL	48

500G	Potassium dihydrogen phosphate,powder,dibasic anhydrous, ACS, KH2PO4	34
1K	Potassium hydrogen phtalate primary standard, certified ACS, HOOCC6H4COOK	88
500G	Potassium iodate, powder purified, KIO3	130
500G	Potassium iodide, granular, certified ACS, KI	100
1.5KG	Potassium nitrate, crystal, certified ACS,KNO3	92
1.5KG	Potassium nitrite, certified ACS, KNO2	504
100G	Rose bengal, certified biological stain color,	44
250G	Silver nitrate, crystal, certified ACS,AgNO3	426
2KG	Sodium bicarbonate, powder, certified ACS, NaHCO3	56
1.5KG	Sodium carbonate anhydrous, ACS Na2CO3	60
15	Sodium citrate, granular, certified ACS NA2C6H5O7.2H2O	260
100G	Sodium nitroprusside, certified ACS NaCL	46
1KG	Sodium chloride, crystal, certified ACS NaCL	28
10KG	Sodium hydroxide, pellets, certified ACS,NaOH	400
20L	Sodium hypochlorite, 4-6%, ACS NaOCL	140
500G	Sodium nitrate, crystal, certified ACS, NaNO3	54
500G	Sodium nitrite, crystal, certified ACS NaNO2	48
4G	2-HOC6H4COONa	404
500G	Sodium silicofluoride, powder, cert ified, Na2SIF6	60
1KG	Sodium sulfate, anhydrous, granular, certified ACS, Na 2SO4	36
1KG	Sodium sulfite, anhydrous crystal ACS, Na2SO3	36

1KG	Sodium thiosulfate, crystal, certified, ACS $Na_2S_2O_3.5H_2O$	46
1KG	Starch, soluble powder, for idiometry, certified ACS	88
1KG	Sulfanilamide, certified, $4\text{-}NH_2C_6H_4SO_2NH_2$	116
50L	Sulfuric acid, concentrated (95-98%), reagent ACS, H_2SO_4	620
100KG	Potassium permanganate, powder	684
100LB	Copper sulfate, snow	128
50KG	Dipterex, powder	800
25LB	Victoria green (malachite), crystal	900
1KG	Acriflavine neutral, powder	740
5Gls.	Paraquat, liquid	500
200LB	Rotenone, 5%, powder	960
20 Gls.	Roccal sanitizing agent, 10%, liquid	380
200LB	HTH (Calciunhypochlorite) grandar	600
100LB	Karmex	800
2KG	Tannin	60
	Total Laboratory chemicals.....	17,604

Field Equipment

2	4H pick-up	26,000
1	Light boat (fiberglass)	4,000
1	Boat carrier	
1	Outboard motor 20HP	4,000
2	Transportation tanks (fiberglass) 200 gal capacity	3,200
2	Ice chest (durable high density)	72
4	Zooplancton net (cone shaped)	240
30	Phytoplancton net	2,880
1	Bottom dredge	259
4	Fish seine 125'x6'x1/2 SQ. mesh	2,140
8	Fry dipnet 18" square	192
1	Water sampler kemmerer style	350
2	Pumps 3 inches diameter (salt water)	
5	Biologist scale (Hanging Pan) 15 kgx10g	400
	Total Field Equipment.....	43,773

Training Equipment

1 Mini-bus (16 passengers)	16,000
1 Photographic camera w/accesories	1,000
2 Slide projectors	1,800
2 Overhead projectors	1,300
1 Portable video cassette recorder w/camera and display unit	8,000
1 Editing unit for betamax, VHS	10,000
Total Training equipment.....	38,100

Contribution Goverment of Japan

Equipment and chemicals

Laboratory equipment	184,775	
Chemicals Laboratory	17,604	
Field Equipment	43,733	
Training Equipment	38,100	
Total		284,212

Contribution Goverment of Panama (In five years)

Vacamonte Laboratory		
Facilities	200,000	
Operational expenses (fuel,		
lubricants & maintenance)	68,564	
Salaries and allowances	351,000	
3 Biologist	117,000	
1 Administrator	32,500	
1 Secretary	22,750	
6 Manual labor	107,250	
2 watchman	35,750	
2 Janitors	35,750	
Total		619,564

MINISTRY OF AGRICULTURE AND LIVESTOCK DEVELOPMENT

NATIONAL DIRECTORATE OF AQUACULTURE

COOPERATIVE PROJECT BETWEEN THE GOVERMENT OF JAPAN AND THE GOVERMENT OF PANAMA - A GRANT FOR EQUIPMENTS TO MASSIFY AGRO-AQUACULTURE IN PANAMA.

SANTIAGO OF VERAGUAS, OCTUBER 1, 1984.

PANAMA

Panama has a surface area of 77 million hectares, and a population of two million inhabitants. The native forest has been desvastated (50% in the last 40 years) by a disordely, uncontrollable colonization. The most important sources of income for the rural people are extensive cattle farming and subsistance "slash and burn" agriculture.

Panama's economy is based on international service being provided to the users of their interoceanic canal. Secondary economic activity is based on the production sectors such as agriculture, cattle, fisheries and wildlife.

Panama has a great potential of water resources. Many of its 550 rivers flow from the mountains through the most densely populated areas. There are also great hydrological resources in the less developed areas. Large freshwater reservoirs, located near the most important urban and metropolitan centers, have been constructed to operate the canal locks and for hydroelectric power production.

In view of Panama's eroded and deforested countryside, with extensive rural areas populated only by small, subsistance oriented farm families who are still not receiving appropriate technical assistance, but are owners of an almost unspoilt wealth of water resources, Agroaquaculture is projected as a logical and safe way of providing human and social solutions for hundreds of thousands of forgotten Panamanians.

In Agroaquaculture water is designated as a primary source to satisfy basic human needs for domestic use, for irrigation and for the production of human food of aquatic, agricultural and animal origin, focussing on integrated rural development. Agroaqualture is a short-term answer for the poorest and most isolated communities which are suffering from malnutrition and unemployment, and a medium and long term solution at the

national level to achieve food security through and Agro-aquaculture massification program.

Agroaquaculture is a practical concept of harvest, preser-, vation management and use of water. It is a system of low maintenance cost that teaches the rural poor to make better use of land, water and sun resources in the food production process. Forest is preserved; farm animals (chickens, hogs, cattle, duck, etc.) surround the ponds for the production of fish, snails and shrimp; harvested water, fertilized with the organic waste of the farm animals is also used for irrigating vegetable plots; the watersheed is reforested with fire wood, fruit and forest trees.

In 1976, a first step toward Agroaquaculture development in Panama was taken with the initiation of small-scale community and family projects. The first fish seed production station was put into operation in Divisa, which is strategically located in the middle of the country. A National Directorate of Aquaculture (DINAAC) under the Ministry of Agriculture and Livestock Development was established with the following objectives:

- Provide a source of cheap protein of high quality through fish culture for subssitance farmers and their families.
- Reduce the domestic demand of red meat by producing economically aquatic organisms such as fish, shrimp molluscs, frogs, turtles and algae using fresh, brackish and salt waters.
- Increase the yield of edible aquatic organisms in natural and artificial water bodies such as rivers, lakes, large and small reservoirs, estuaries and the ocean by means of aquaculture projects together with the apropriate technology to capture, process, preserve and market the product.

- Promote interest in aquaculture within the country by teaching courses in secondary, vocational and professional schools.

- Establish bilateral aquaculture cooperative projects with other countries and international organizations which will provide economic and technical assistance of benefit to the country, as well as to other countries in Central and South America.

- Utilize impounded waters associated with aquaculture activities to irrigate crops to increase agricultural yields in the dry season.

- Supply high-quality aquatic products to Panamanian luxury markets by using more sophisticated aquaculture practices thus reducing imports.

The National Directorate of Aquaculture was offialy created on May 11, 1979 by the Executive Body which designated its functions to be as follows:

- Formulate and execute projects and experiments with exotic and native species to assure the highest quality life of these species in fresh, brackish and salt waters.

- Carry out economic feasibility studies and site selection for the repopulation of continental waters.

- Establish and manage hatcheries to supply the demand for seed to stock the aquaculture facilities and continental waters.

- Determine sources and quantities of agricultural and marine products that can be used for the preparation of aquatic organism diets.

- Conduct socio-economic analyses of the different activities in which the National Directorateof Aquacul-

ture is involved.

- Prepare and disseminate, informative materials on aquaculture.

- Prepare and implement trainning programs for the aquaculture staff in order to achieve and maintain the highest technical standards.

- Work jointly with the National Directorate of Renewable Resources to manage the different species that are found in continental waters of the country.

In 1984 there now exist more than 500 ponds built in 8 of the 9 provinces of Panama dedicated to fishculture with excellent results. Fishculture technology and infraestructure for fish fingerling production is very well consolidated:

- Divisa freshwater culture experimental station Located 25 km from the central dinaac offices, the Divisa Station has a battery of 50 earthen ponds and 20 concrete ponds, for a total 6 ha. of surface water. It has a laboratory for soil and water analysis, ichthiopathological studies and handling of fish hormones, 24 concrete holding tanks, offices, mechanical and construction shops, and storage area. 26 different warm water aquatic species including tilapia and carp species are presently under study and many are reproduced for supplying the demand for fingerlings.

- Gualaca freshwater experimental station A second freshwater station has been located in Gualaca, Chiriqui province, 450 km from Panama City where the Institute for Agricultural and Livestock research headquarters are located. The earthen

ponds cover a total of 10 ha. The station feature laboratories, offices, mechanical workshop storage area etc. Its main purpose is to carry out research activities directed toward the development of commercial culture of freshwater fish including polyculture with Macrobrachium rosenbergii.

- Gatun freshwater fish seed production station Located on Colon road 30 km from Panama City, this hatchery is still in the design stage. Gatun station will be responsible for producing fish juveniles needed for stocking the large frshwater lakes to improve the existing commercial, and subsistance fisheries.

A large number of staff has been sent abroad for short term "in service trainning" and long term post-graduate studies. Master's degree scholarships have been awarded to agronomists and biologists who have gained valuable experience. 20 aquaculture extensionist were prepared under Panamanian conditions as aquaculture technicians in a 2½ year university program. At present the Agroaquaculture, the commercial mari-culture and the lake artisinal fisheries program have trained and qualified staff. Even so, the post-graduate sch larship program and on the job training programs go on each day with greater impulse.

Integrated agriculture-aquaculture could become an effective weapon to fight malnutrition and hunger in Panama. There is an urgent need to massify the Agroaquaculture activities in Panama with the construction of more than 5,000 new ponds in the following 10 years in order to raise the availability of fish in the rural area in 7 million kg.

A cooperative bilateral project is proposed between the Goverment of Japan and Panama to achieve this goal by obtaining a grant in Equipment from the goverment of Japan that will put the Goverment of Panama through the National Directorate of

of Aquacultura in a capacity of building 500 earthen new ponds per year during the following ten years, that will be integrated with agriculture, forestry, irrigation and Livestock activities.

Contribution of the Goverment of Japan

1	Swamp bulldozer with flight wéel 220 H.P Operative weight with dozer 25.7 ton., ground pressure 0.41 kg/cm²	135,000
2	Swamp bulldozer with flight wheel 118 H.P Operative weight with dozer 13.62.ton., ground pressure 0.27 kg/cm²	70,000
1	Back hoe with triangular shoe 910 mm wide. Operative weigh 18.5 ton., ground pressure 0.31 kg/cm² 1 cubic earth capacity	70,000
1	Truck with table 30 ton. capacity	40,000
10	4 wheel drive farm tractors 16 H.P.	50,000
15	4 wheel drive pick-up vehicles,1/2 ton.	135,000
	TOTAL----------	500,000

Contribution of the Goverment of Panama (five years)

Salaries of 18 aquaculture technicians	468,000
Fuel and lubricants	
Heavy equipment	135,000
Light equipment	225,000
Maintenance of equipment	165,000
TOTAL	993,000

MINISTERIO DE DESARROLLO AGROPECUARIO

DIRECCION NACIONAL DE ACUICULTURA

PROYECTO DE ACUICULTURA ENTRE LOS GOBIERNOS DE:

JAPON Y PANAMA

TITULO DEL PROYECTO: ESTACION PILOTO DE TRUCHAS

APORTE DEL GOBIERNO DE JAPON:	$ 274,222.00
APORTE DEL GOBIERNO DE PANAMA:	$ 349,995.00

Santiago de Veraguas, 29 de Agosto de 1984.

ESTACION PILOTO DE TRUCHAS

La Estación de Truchas persigue como objetivo fundamental, dotar a la Dirección Nacional de Acuicultura de instalaciones apropiadas aunque modestas para incentivar la explotación del potencial del país a través de:

A- Reunir la tecnología disponibles en el cultivo de truchas y adaptarlas a las condiciones particulares de Panamá, de tal manera que a través de la experiencia surja un paquete tecnológico en materia de alevinaje y engorde, que pueda ser transferido a la población que demanda del Gobierno información actualizada en este rubro.

B- Un centro de entrenamiento y de demostración de la tecnología del cultivo de truchas.

C- Un centro productor en pequeña escala de alevines de truchas de manera de poder suplir la demanda nacional y promover la industria con fines de exportación.

APORTE DEL GOBIERNO DEL JAPON: $274,222.00

1. Construcciones:

Edificio e instalaciones	$90,000.00	
Estanques de alevinaje	20,000.00	
Casa dormitorio para técnicos	20,000.00	
Habilitación de carretera y toma de agua	20,000.00	
		150,000.00

2. Equipo de laboratorio de incubación

	Cantidad	Costo
Tanques de larvas	24	10,248.00
Cajas de incubación	96	12,387.00
Separadores de larvas	24	1,968.00
Estanques de alevines	20	39,380.00
Medidores de oxígeno con aditamentos	2	1,828.00
Balanzas biológicas	2	287.00
Balanzas granatarias	2	102.00
Equipo waders	6	447.00
Equipo de limpieza	4	576.00
Material vexar	var.	534.00
Redes de mano	2	53.00
Reactivos químicos	var.	644.00
Pick-up diesel 1/2 tonelada	1	20,000.00
		88,454.00
3. Imprevistos		35,768.00
		274,222.00

APORTE DEL GOBIERNO DE PANAMA EN 5 AÑOS $349,995.00

4. Materiales e insumos

Huevos de trucha	30,000.00	
Aliemnto para truchas	15,000.00	
		45,000.00

5. Combustible y lubricante		23,310.00	
6. Mantenimiento y reparación		23,310.00	
7. Personal			
Biólogos	2	78,000.00	
Administrador	1	32,500.00	
Secretaria	1	22,750.00	
Trabajadores manuales	4	71,500.00	
Celadores	2	35,750.00	
Aseador	1	17,875.00	
			$ 258,375.00
			$ 349.995.00

参考資料 3

/ de Panamá

Ministerio de Comercio e Industrias

NUMERO S/N

Promoción y Tecnología de

DEPARTAMENTO DE Productos Pesqueros

PANAMA, 30 de octubre, 1984

The Panamenian Government fully realizes the need to increase the National effort leading to improve fish production and an effective distribution and marketing net work.

As results of resent advances in the industrial section of shrimp catch, processing and marketing, the Panamenian fish industry arrived to its limits in shrimps exploitation, so it is vital a redistribution of efforts in diversifying its activity.

Many attempts have been made to assist the development of small scale fisheries. They have suffered, however, from a non coordinated and fragmented approach which addressed itself to one or a few of the development needs, such as boats, marketing, or cooperatives without training or education.

These projects have often been designed on the basis of needs as percieved by planners.

Strategy for the development of small scale fisheries promote more support for practical action-oriented projects that are broad-based and coordinated. The proposed beneficiaries of

this program, are all the small-scale operators in village level fisheries, endeavour, including fish capture, processing, marketing, vessel and gear construction, repair and related auxiliary activities.

The main thrust of this project's activities will be related to fishing operations (training in craft gear and fishing methods); improvement of fish handling and preservation techniques, processing of new products, etc).-

1- Fisheries Training School for Small-Scale Fishermen

The first development objectives of the project may be the increased fish production by helping the fishermen to make better use of the catches. This will involve to improve existing technology, introduce new technology, and also, if necessary, reorganize existing systems of processing, distribution, etc.

This part of the project will therefore include the following inputs:

1.1 Fisheries training school in fishing vessel technology; fishing gear and methods; fishing cooperatives training; fish finder and radio communication training, etc.

2- Small-Scale Fisheires Development - PART II

Includes the following inputs:

Suitable fishing boats and fishing gears in accordance with the training, in the fisheries training school.

3- Pilot Plant for Marine Products

This is a very important part with the following activities:

3.1 Better methods of fish preservation and development of new products.

3.2 Inspection and quality control operation of plants and marine products

3.3 Training and extension.

This will help to promote the establishment of new small scale industries and also more vigorous with a nucleus of technical personnel.

FISHERIES TRAINING SCHOOL FOR SMALL-SCALE FISHERMEN

Objectives:

To improve fishing methods, gear technology, boat building and maintenance, storing raw material, to strengthen the efficiency of isolated fishermen in the complex field of the fisheries activities and also to open new horizons for un or under utilized youths to be trained for new jobs created on the basis of the national development plans.

The establishment of a training school, proposed with technical and managerial support, would provide the opportunity to demonstrate through the country an efficient way of getting fish (proteins) to the people who require it.

Function:

Organize small workshops in fishing gear and methods technology, repair and maintenance of boats, machineries, etc.

Work Plan:

Training courses for Panamenian fishermen personnel by:

a) Fishing gear and methods specialists

b) Technical maintenance and repair specialists

c) Fish finder and radio communications specialists

d) Fisheries cooperative specialist

We consider that specialists should be form JICA, because some of our staff have already received training in Japan, in JICA.

Work Plan Support:

The training system should be operated by Marine Resources Directorate - Ministry of Commerce and Industry - MICI

Infrastructure:

Building: Including the following facilities:

a-	Marine motors repairing shop	1	
b-	Fishing gear practice room	1	
c-	Classroom	3	
d-	Auditorium	1	
e-	Office	1	
f-	Dinning hall	1	
g-	Lodging accomodations for	20	
h-	Fishing gear warehouse	1	
i-	Lounge	1	
j-	Radio and fish finder practice room	1	
k-	Hull maintenance and repair shop	1	US$500,000.00

Equipment: All the necessary equipment for the school including furniture and material for fishing gears US$125,000.00

Sub-Total US$625,000.00

Training Vessel:

A) F.R.P. Fishing vessel Model DD-40 YAMAHA

Arranged as Fill-netting, long-line and line fishing

Hull

length overall	12.08 mts
breadth oversall	3.76 mts
depth	2.03 mts
displacement tonnage	9.5 tons

Engine:

Main Engine	YAMAHA marine diesel engine ME590
Main Engine H.P.	90 H.P. at 2,450 rpm
Cruising range	approx. 550 n/miles

Other:

Fish Finder

Radio Telephone

Magnetic compass

Hydraulic hauler for Gill netting and long line fishing, etc.

Estimated Cost: US$180,000.00

B) F.R.P. Fishing Boat Model DD-30-OA YAMAHA

Hull

length overall	9.07 mts
breadth overall	2.79 mts
depth	1.53 mts
gross tonnage	4.70 tons

Engine:

Marine motor diesel YAMAHA ME300

H.P. 52. H.P. at 2,650 rpm

Others:

Fish Finder

Radio Telephone

Magnetic Compass

Hydraulic hauler for Gill netting and long line fishing

Estimated Cost: US$85,000.00

C) F.R.P. Fishing Boat Model SPD-27 YAMAHA

Hull

length overall	8.15 mts
breadth overall	2.30 mts
depth	1.15 mts

Engine Motor Model ME180

H.P. 36 H.P. at 2,600 rpm

Others:

Fish holds

Bait holds

Magnetic compass

Fish finder

Estimated cost per unit US$35,000.00

3 units (3 x 35,000.00) US$105,000.00

TOTAL COST OF THE PROJECT US$995,000.00

SMALL SCALE FISHERIES DEVELOPMENT PART II

Indroduction:

About 10,000 small scale fishermen, living in villages and camps are scattered along the almost 700 km of the coast of Panama. Living conditions in the villages have changed very little in the last 20 years.

It is necessary to promote the progressive use of small mechanized boats with inboard motor to give the fishermen more power for this operation, better working conveniences, greater fishing range and longer endurance. It has been realized that between the canoe fishermen and the industrial fishing trowlers of 20 mts and above, there is a vast technological gap, and this gap should be usefully filled by a new generation of small and medium boats of 8-13m, operating form the navigable river mouths and creeks and sheltered bay in the country.

Program's Objectives:

To help the small scale fishermen to develop a better way of life by the utilization of better fishing boats with modern gears.

Work Plan:

To increase the supply of the marine products to the consumers, processing and marketing industries.

Work Plan Support:

This will be operated by the Marine Resources Directorate and in accordance with the Fisheries Training School.

Fishing Boats:

Characteristics:

Model SPD-27-OF YAMAHA

1) Principal particulars:

length overall 8.08 mts

breadth overall 2.24 mts

depth 1.17 mts

Capacity:

Icehold 0.74 m3

Fishhold 1.51 m3

F.Q.V. 80 liters

Main Engine: YAMAHA ME180 EA 36 HP at 2,600 rpm

Speed: 10.0 knots

Fuel Consumption 6.3 liters

Cruising range 120 N/miles

Radio telephone and nautical instruments

Radio telephone UHF 25W Model Furomo FM250m

Fish Finder Model Furomo FE606

Life Saving Equipment

Emergency signal kit

Anchor 15 kg

Anchor rope 18 Ø 50 mts

Mooring rope 10 Ø 20 mts

Fire extinguisher

Electric plant

Alternator, Battery

Navigation lights, etc.

Tools and Spare Parts:

Cost per unit of fishing boats US$35,000.00 each

(30 units x 35,000.00) Sub-Total US$1,050,000.00

2) Fishing Gears:

Gill Nets:

Monofilament, white color

length: 180 mts

depth: 100 mesh

Mesh size: 3 1/2 inches

with sinkers, floats, ropeds, etc

Estimated cost per unit US$250.00 each

(100 units x 250.00) Sub-Total US$25,000.00

3) Hard lines and long lines:

Estimate costs US$15,000.00

TOTAL COST OF THE PROJECT US$1,090,000.00

PROCESSING PILOT PLANT FOR MARINE PRODUCTS

Objectives:

To study and develop new quality products, both, for the domestic and foreign market processing marine species not actually utilized. This will motivate-promote new investments in the private sector, and will present to the consumer a good variety of products with quality , and cheaper than other imports.

Work Plan:

Realize experimental work with different marine species to determine which is the best for a particular marine product. This results would be presented later on to the private sector, and if necessary, with trained personnel for the processing plants.

Work Plan Support:

The Pilot Plant should be operated by Marine Resources Directorate
Ministry of Commerce and Industry - MICI
One quality control and processing expert - JICA (2 years)

Processing Pilot Plant for Marine Products - P.P.P.M.P.

Estimated Costs for P.P.P.M.P.

Building	425 m2 x US$250.00	US$106,250.00
Equipment:		
1 ton Flake ice maker	26,000.00	
1 storage bin 2 ton capacity	20,000.00	

1 cold storage	18,800.00
1 blast freezer	21,300.00
1 grinder	1,000.00
1 silent cutter	2,300.00
1 slicer	2,000.00
1 mixer	1,900.00
1 vacumn sealer	1,100.00
1 sausage filler	1,150.00
1 smoking oven	4,500.00
Equipment for Surimi processing (washing machine, meat reparator, fishwater, meat chopper)	244,870.00
Equipment for Kamaboko processing	195,670.00
Steam Equipment	128,000.00
Canning Equipment	105,000.00
200 plastic transport boxes	3,000.00
2 balance each for 10 kg	235.00
1 sclae for 10 kg	300.00
1 scale for 250 kg	425.00
1 electric saw	700.00
Workshop equipment	2,500.00
1 truck (refrigerated)	19,000.00
2 metal tables	1,200.00
10 waste trays	300.00
1 smoke oven	3,000.00

2 brine tanks	1,500.00
	US$805,750.00

TOTAL COST OF THE PROJECT	US$912,000.00

参考資料　4

Cuadro No. 1A

República de Panamá
Ministerio de Comercio e Industrias
Dirección General de Recursos Marinos

Producción Nacional de las Pesquerías Marinas, por Actividad y Grupos de Especies(1)
Años 1982-1983

(en toneladas métricas)

Detalle	1982	1983
Total	88,094	149,443
I. Pesca Industrial:	84,904	145,763
1. Peces:	77,972	139,014
Anchovetas	57,446	127,172
Arenques	19,011	11,775
Otros	1,515	67
2. Crustáceos:	6,932	6,749
Camarones:(2)	6,932	6,749
Blanco	1,670	1,775
Rojo	1,112	781
Titi	2,829	3,314
Carabalí	187	187
Cabezón	644	617
Fidel	490	75
II. Pesca Artesanal:	1,697	2,157
1. Peces	1,235	1,627
2. Crustáceos:	248	267
Camarones: (2)	204	152
Blanco	134	91
Titi	67	54
Carabalí	3	7
Langostas (2)	44	115
3. Moluscos:	213	261
Almejas negras	177	252
Conchuelas	24	-
Conchas	11	9
Pulpo	1	-
4. Quelonios (4)	1	2
III. Pesca Incidental:(3)	928	975
1. Peces	835	877
2. Langostas	19	20
3. Moluscos	74	78
4. Quelonios (4)	0	0
IV. Cultivo:	565	548
1. Camarones:(2)	565	548
Blanco	565	548

(1) Se refiere a información registrada estadísticamente.
(2) Se refiere al peso de las colas.
(3) Estimado de la pesca procedente de la flota camaronera.
(4) Se refiere al peso de la carne solamente.
(-) No hay cifras disponibles.
(0) El valor es mayor que 0, pero menor que 0.6 ton.

REPUBLICA DE PANAMA
MINISTERIO DE COMERCIO E INDUSTRIA
DIRECCION GENERAL DE RECURSOS MARINOS

PRODUCCION NACIONAL DE ESPECIES MARINAS
POR
ACTIVIDAD Y GRUPO DE ESPECIES (1)
ENERO-SEPTIEMBRE: 1983-1984

(en toneladas métricas)

DETALLE	1983	1984
TOTAL	144,204	110,890
I. Pesca Industrial	142,228	107,674
1- Peces	137,585	103,545
Anchovetas	127,078	89,439
Arenques	10,440	13,897
Otros	67	209
2- Crustáceos:	4,643	4,129
Camarones:(2)	4,643	4,129
Blanco	1,329	1,318
Rojo	591	1,195
Titi	2,129	1,386
Carabalí	129	99
Fidel	56	86
Cabezón	409	45
II. Pesca Artesanal	1,099	1,874
1- Peces	757	1,500
2- Crustáceos	182	190
Camarones (2)	118	135
Blanco	83	104
Titi	33	30
Carabalí	2	1
Langostas (2)	64	55
3- Moluscos	160	183
Almejas	160	183
4- Quelonios (4)	0	1
III. Pesca Incidental	604	617
1- Peces	545	548
2- Langostas	12	14
3- Moluscos	47	51
4- Quelonios	0	4
IV. Cultivo	273	725
1- Camarones: (2)	273	725
Blanco	273	725

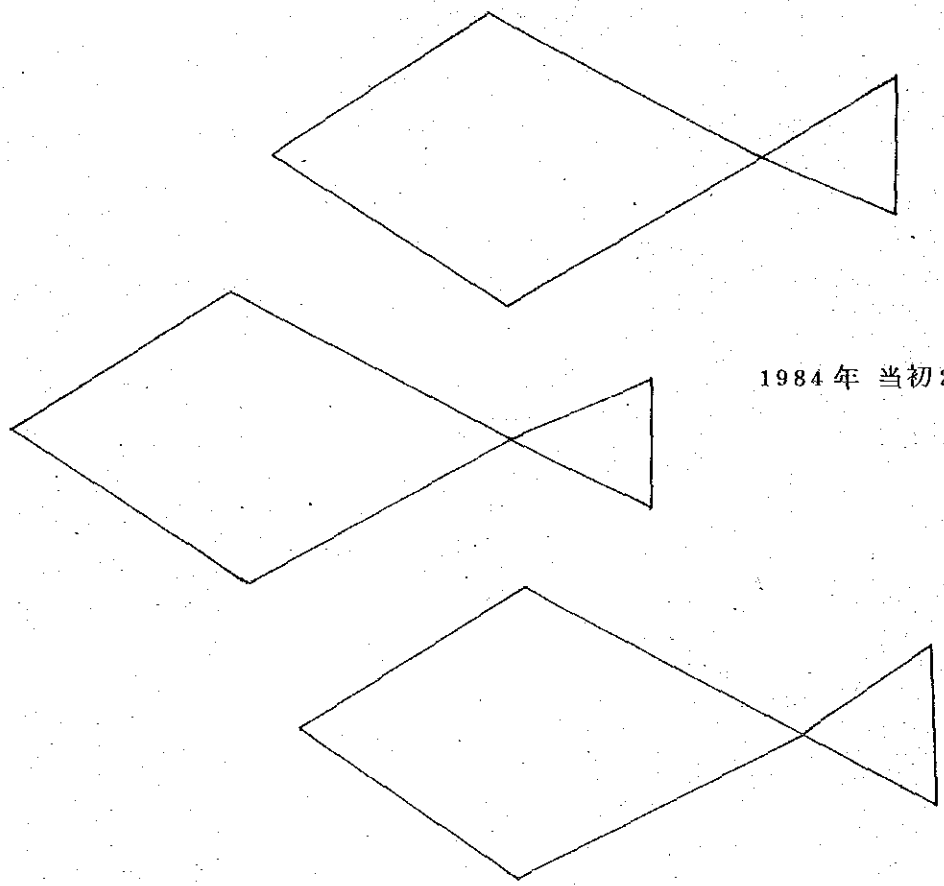
(1) Se refiere a información registrada estadísticamente.
(2) Con excepción del cabezón, se refiere al peso de las colas.
(3) Estimado de la pesca desembarcada por la flota camaronera.
(4) Se refiere al peso de la carne solamente.
(0) El valor es menor de 0.6 ton.

参考資料　5

農　牧　省

水産資源，養殖総局

漁　業，漁　撈　部



1984年 当初2ケ月の統計表

サン　ホセ　コスタリカ

1984年4月

第１表　１９８４年１月，２月の水産物水高量（キログラム）

CONCEPTO	１　月	２　月	合　計
1. DESEMBARQUES 国内船 NACIONALES 水　揚			
PESCADOS 魚　類	603.647	646.739	1.250.386
MARISCOS その他の海産物	142.554	122.976	265.530
2. DESEMBARQUE 外国漁船の水揚 FLOTA EXTRANJERA	326,990	1.067.922	1.394.912
GRAN TOTAL 総　水　揚 DESEMBARCADO	1.073.191	1.837.637	2.910.828

* Resumen

第２表　魚種別水揚量１９８４年１月，２月

CONCEPTO	１　月	２　月	合　計
A. TOTAL NACIONAL 国内合計	746.201	769.715	1.515.916
1. Pescado 魚　類	603.647	646.739	1.250.386
1.1- De Escame	458.925	385.623	844.548
Primera Grande	50.919	31.997	82.916
Primera Pequeña	51.887	59.195	111.082
Clasificado	48.602	50.876	99.478
Segunda	110.196	118.739	228.935
Agria-Cola	75.181	64.022	139.203
Cabrilla	92.100	47.420	139.520
Pargo Seda	30.040	13.374	43.414
1.2- Buche		270	270
1.3- Sardina いわし類	76.693	138.913	215.606
1.4- Atún まぐろ類	10.749	71.696	82.445
1.5- Tiburón さめ類	57.280	50.237	107.517
Cazón	36.405	16.132	52.537
Posta	20.692	33.900	54.592
Aleta	183	205	388
2. Mariscos その他海産物	142.554	122.976	265.530
2.1- Camarones えび	137.886	115.996	253.882
Blanco	15.093	17.324	32.417
Cafe	5.072	5.890	10.962
Rosado	53.177	56.007	109.184
Solenocera	5.959	14.569	20.528
Pequeño	55.905	22.188	78.093
Camello	2.680	18	2.698
2.2- Langosta いせえび類	284	446	730
Corriente	284	446	730
2.3- Moluscos 軟体類	4.384	6.534	10.918
Calamar いか	1.367	2.189	3.556
Pulpo たこ	200	540	740
Bivalvos 二枚貝	2.817	3.750	6.567
Cambute		55	55
B: TOTAL EXTRANJERA 外国漁船水揚合計	326.990	1.067.922	1.394.912
GRAN TOTAL 総　計	1.073.191	1.837.637	2.910.828

第３表　商業漁船団別水揚量1984年１月，２月分（キログラム）

CONCEPTO	企業船団 FLOTA INDUSTRIAL		沿岸漁船団 FLOTA ARTESANAL		TOTAL	
	ENERO 1月	FEBRERO 2月	ENERO 1月	FEBRERO 2月	ENERO 1月	FEBRERO 2月
TOTAL NACION 全国	313.870	408.011	432.331	361.704	746.201	769.715
A. LITORAL PACIFICO 太平洋岸	313.870	408.011	431.035	355.844	744.905	763.855
1. Pescado 漁類	174.697	290.420	427.792	351.404	602.489	641.824
1.1. De Escama うろこ魚	93.162	80.677	364.706	302.021	457.868	382.698
Primera Grande	16.759	70	33.939	31.361	50.698	31.431
Primera Pequeña	4.214	12.050	47.414	46.527	51.628	58.577
Clasificado	13.912	14.305	34.164	35.833	48.076	50.138
Segunda	48.750	47.054	61.404	70.682	110.154	117.736
Agria-Cola	7.963	6.425	67.218	57.597	75.181	64.022
Cabrilla	1.564	773	90.527	46.647	92.091	47.420
Pargo Seda			30.040	13.374	30.040	13.374
1.2. Buche				270		270
1.3. Sardina いわし類	76.654	138.808	39	105	76.693	138.913
1.4. Atún まぐろ類	3.841	69.355	6.908	2.341	10.749	71.696
1.5. Tiburón さめ類	1.040	1.580	56.139	46.667	57.179	48.247
Cazón	1.040	1.180	35.264	14.937	36.304	16.117
Posta		394	20.692	31.531	20.692	31.925
Aleta		6	183	199	183	205
2. MARISCOS その他海産物	139.173	117.591	3.243	4.440	142.416	122.031
2.1. Camarones えび類	137.806	115.402	80	-	137.886	115.402
Blanco	15.088	17.278	5	-	15.093	17.278
Café	5.072	5.890	-	-	5.072	5.890
Rosado	53.177	55.909	-	-	53.177	55.909
Solenocera	5.959	14.569	-	-	5.959	14.569
Pequeño	55.830	21.738	75	-	55.905	21.738
Camello	2.680	18	-	-	2.680	18

第3表 （つづき）

CONCEPTO	企業船団 FLOTA INDUSTRIAL		沿岸漁船団 FLOTA ARTESANAL		TOTAL	
	ENERO 1月	FEBRERO 2月	ENERO 1月	FEBRERO 2月	ENERO 1月	FEBRERO 2月
2.2. Langosta いせえび類	-	-	146	95	146	95
Corriente	-	-	146	95	146	95
2.3. Moluscos 軟体類	1.367	2.189	3.017	4.345	4.384	6.534
Calamar いか	1.367	2.189	-	-	1.367	2.189
Pulpo たこ	-	-	200	540	200	540
Bivalvos 二枚貝	-	-	2.817	3.750	2.817	3.750
Cambute	-	-	-	55	-	55
B. LITORAL ATLANTICO 大西洋岸			1.296	5.860	1.296	5.860
1. Pescado 魚類			1.158	4.915	1.158	4.915
1.1. De Escama うろこ魚			1.057	2.925	1.057	2.925
Primera Grande			221	566	221	566
Primera Pequeña			259	618	259	618
Clasificado			526	738	526	738
Segunda			42	1.003	42	1.003
Cabrilla			9		9	
1.2. Tiburón さめ類			101	1.990	101	1.990
Cazón			101	15	101	15
Posta			-	1.975	-	1.975
2. Mariscos その他海産物			138	945	138	945
2.1. Camarones えび類				594		594
Blanco				46		46
Rosado				98		98
Titi				450		450
2.2. Langosta いせえび類			138	351	138	351

第4表　海面漁業活動による推定総収入及び平均魚価 1984年1月

CONCEPTO	水揚量 DESEMBARQUE (T.M.)	平均魚価 PRECIO PROMEDIO (¢/KG)	推定収入 INGRESO ESTIMADO (¢)
TOTAL NACIONAL	746.20		42.428.860.25
A: LITORAL PACIFIC 太平洋岸	744.90		42.307.370.82
1. Pescado 魚類	602.48		22.561.682.62
1.1. De Escama うろこ魚類	457.86		20.351.731.67
Primera Grande	50.69	56.30	2.854.297.40
Primera Pequeña	51.62	63.09	3.257.210.52
Clasificado	48.07	28.54	1.372.089.04
Segunda	110.15	17.83	1.964.045.82
Agria-Cola	75.18	27.65	2.078.754.65
Cabriila	92.09	72.64	6.689.490.24
Pargo Seda	30.04	71.10	2.135.844.00
1.3. Sardina いわし類	76.69	12.19	934.887.67
1.4. Atún まぐろ類	10.74	19.16	205.950.84
1.5. Tiburón さめ類	57.17		1.069.112.44
Cazón	36.30	19.56	710.106.24
Posta	20.69	17.35	359.006.20
Aleta	0.18	N.D.	
2. MARISCOS その他海産物	142.41		19.745.688.20
2.1. Comarones えび類	137.88		19.333.313.22
Blanco	15.09	374.94	5.658.969.42
Café	5.07	297.90	1.510.948.80
Rosado	53.17	165.2	8.784.840.40
Solenocera	5.95	74.4	443.349.60
Pequeño	55.90	50.2	2.806.431.00
Camello	2.68	48.5	128.774.00
2.2. Langosta いせえび類	0.14		70.501.94
Corriente	0.14	482.89	70.501.94
2.3. Moluscos 軟体類	4.38		341.873.04
Calamar いか	1.36	N.D.	
Pulpo たこ	0.20	144.24	28.848.00
Bivalvos 二枚貝	2.81	111.12	313.025.04
B. LITORAL ATLANTICO 大西洋岸	1.29		121.489.45
1. Pescado 魚類	1.15		66.289.45
1.1. De Escama うろこ魚	1.05		65.026.95
Primera Grande	0.22	52.53	11.609.13
Primera Pequeña	0.25	75.00	19.425.00
Clasificado	0.52	60.00	39.560.00
Segunda	0.04	47.21	1.982.82
Cabrilla	0.01	50.00	450.00
1.2. Tiburón さめ類	0.10		1.262.50
Cazón	0.10	12.50	1.262.50
2. Mariscos その他海産物	9.13		55.200.00
2.2. Langosta いせえび類	0.13	400.00	55.200.00

第5表　海面漁業活動による推定総収入及び平均魚価1984年2月

CONCEPTO	水揚量 DESEMBARQUE (T.M.)	平均魚価 PRECIO PROMEDIO (¢/KG)	推定収入 INGRESO ESTIMADO (¢)
TOTAL NACIONAL	769,7		40.729.214.53
A. LITORAL PACIFICO 太平洋岸	763,9		40.337.799.58
1. Pescado 魚類	641,8		21.775.991.58
1.1. De Escama うろこ魚	382,7		16.786.080.12
Primera Grande	31,4	61,04	1.918.548.24
Primera Pequeña	58,6	71,30	4.176.540.10
Clasificado	50,1	29,03	1 455.506.14
Segunda	117,7	19,50	2.295.852.00
Agria-Cola	64,0	32,13	2.057.026.86
Cabrilla	47,4	75,56	3.583.055.20
Pargo Seda	13,4	97,17	1.299.551.58
1.2. Buche	0,3	50,00	13.500
1.3. Sardina いわし	138,9	15,09	2.096.197.17
1.4. Atún まぐろ	71,7	21,56	1.545.765.76
1.5. Tiburón さめ	48,2		1.334.448.53
Cazón	16,1	33,39	538.146.63
Posta	31,9	22,85	729.486.25
Aleta	0,2	325,93	66.815.65
2. Mariscos その他海産物	123,0		18.561.808.00
2.1. Camarones えび	116,0		17.935.724.90
Blanco	17,3	355,15	6.136.281.70
Café	5,9	316,19	1.862.359.10
Rosado	56,0	144,94	8.103.450.46
Solenocera	14,5	50,14	730.489.66
Pequeño	22,2	50,71	1.102.333.98
Camello	0,1	45,00	810.00
2.2. Langosta いせえび	0,1		34.208.55
Corriente	0,1	360,09	34.208.55
2.3. Moluscos 軟体類	6,5		591.874.55
Calamar いか	2,2	80,00	175.120.00
Pulpo たこ	0,5	163,62	88.354.80
Bivalvos 二枚貝	3,7	86,32	323.700.00
Cambute	0,06	85,45	4.699.75
B. LITORAL ATLANTICO 大西洋岸	5,9		391.414.95
1. Pescado 魚類	5,0		168.756,45
1.1. De Escama うろこ魚	2,9		125.197.95
Primera Grande	0,6	29,13	16.487.58
Primera Pequeña	0,6	71,06	43.915.08
Clasificado	0,7	57,26	42.257.88
Segunda	1,0	22,47	22 537.41
1.2. Tiburón さめ	2,1		43.558.50
Cazón	0,1	12,50	187.50
Posta	2,0	21,96	43.371.00

第5表 （つづき）

CONCEPTO	水揚量 DESEMBARQUE (T.M.)	平均魚価 PRECIO PROMEDIO (¢/KG)	推定収入 INGRESO ESTIMADO (¢)
2. Maricos その他海産物	0,9		222.657.80
2.1. Camarones えび	0,6		82.257.80
Blanco	0,1	494,30	22.737.80
Rosado	0,1	240,00	23.520.00
Titi	0,4	80,00	36.000.00
2.2. Langosta いせえび	0,3	400.00	140.400.00

参考資料 6

農　牧　省

プンタレナス地方漁業事務所

プンタレーナス地方漁業事務所　1984年年間報告書

目　　次

1　概　　設

この報告書はプンタレーナス地方事務所が1984年1月から10月迄の期間中行った調査業務をまとめたものである。

漁業統計の詳細が月間報告によって提供されているので，本報告書に於ても一般形態に於るニコヤ湾の漁業統計が主に紹介される。データーに真実の姿を反映させ，誤解して受けとられることのないように，ここで紹介するデーターに若干のコメントを付記した。

また，現在問題をひき起している経営管理上の本質についてのいくつかの見地を，より簡潔に総括的に修正してゆく必要を見い出していただけるようにと示した。この方法によってのみ解決されると考える故である。

2　漁　業　統　計

昨年と異り漁業調査報告は今年，地方事務所に派遣された漁業・狩猟省の役人らによって手づくり形態で処理された。

情報が示された表は，かつては容易に把握できなかった漁業活動の展望をこの年間，我々に示すという重要な変化をもたらした。

統計は昨年に比して良くなったとはいうものの手工業的に情報処理されたため，漁村(民)調査に大きな害をもたらした。つまり水揚げの統計的標本抽出法を中止しなければならず，したがって我々の漁業を形成する異る種類のものの大きさ，重さについてのデータが得られなかった。

さらに，来年も何らかの方法で解決に努めるべき重要な古くからの問題もひきつづいて残っている。以下に簡潔に私の所見を述べてみた。

a．情報処理は，コンピューター使用で近代化されるべきである。これによって何度も見られる計算ミスを避けられる上，職員が他の業務，例えば水揚の＂統計的標本抽出法＂のような仕事に従事する機会が得られるだろう。

b．不法操業船団の漁獲高数値が情報に入っておらず漏れがある。従ってこれらの船団の活動についても何も報告されていない。

c．情報採集のための適当な輸送手段がない。又，採集データの信憑性を確認できるコントロールシステムがない。

d．紙，その他材料が不充分でそのため，作業が停滞することのないよう，しばしば私企業への請願へ行かねばならなかった。

2.1. 沿岸小型漁船統計

ニコヤ湾ではこの9月10日期，主要漁業（地域）に分散する平均666船舶が操業した（表1参照）。このうち323がランチ，286がボート，57がバンガである。これらのデーターは各月ごとに集計された6,000枚の調査表に由来する。従って前述の数字は近似値である。

沿岸小型漁船団は湾内の漁獲物集荷場へ総量2,945.2トン中2,147.2トン，つまり漁獲高の72.9％を湾内の地でおろし，残り27.1％を湾外の地で水揚げする。これらのデーターから月平均水揚高は295トンになることが得られた（表2参照）。

同じく表2は，漁獲物の相当部分が両端の地域，つまり湾の最も内側の（201地帯）で664.643 kg，最も外側の（206地帯）で766.332 kgが水揚されていることを示している。しかしながら表3で表示されているように，内部海域ではコルビーナのような非常に高価格の魚類の漁獲高が優位を占めているのに対して，他方外部方面の海域では，＂コラ＂や＂さば＂，＂チャタラ＂のような価格的に低い魚群が優勢である。

表4では1ケ月当りのべ日数が示されている。同様に日産平均捕獲高も示されており，湾の海域では3タイプの沿岸用小型船が漁を行っている。こうして，例えばランチでは最高の漁獲高を得ているのは，"204"地帯で刺網を使っているもので，この"204"地帯ではこの同じ方法で78日間にわたって漁がされている。反対に"205"地帯でランチでの釣糸及びはえなわ漁では最低の漁獲高しか得られておらず，その地帯ではこういった漁の仕方は余り用いられていない事が再確認された。

この表と将来に於て作成される同じ性質の表を比較することは非常に有用であろう。なぜならばこの比較は漁師達の行動形態と漁区域についてのよりよい理解を得る為の，重要な判断要素をうかび上らせてくれるであろう。

経済的データーに関しては表5で純操業利益，キログラム当りコスト及びキログラム当り純操業収入高を見ることができる。又，月当りの操業船舶数及び操業のべ日数が提示さ

れている。これらのデーターから，船舶数で利潤額を割ってみると一船当り平均純操業利益はランチで₡ 20.931，ボートで₡ 4.735，バンガで₡ 7.500となる。又，本表からランチが1ケ月当り約13日間，ボートが7日間，バンカが9日間操業している事が推定される。

常識及びいろいろな漁師達とかわされた情報に従えば，前記のデーターは真実を反映していないように思われるのは最もだ。というのは，ランチが1月当り₡ 21,000の漁獲金額でこれを船主と3人の乗組員とで分配するとなると，ランチは長時間操業が不可能ということになる。

ランチの漁獲する平均利潤を見積ることは非常に難しいが，慣例となっている分配方法に従えば，利潤は₡ 50,000前後あって，これを船主₡ 25,000，3人の乗組員の所得として₡ 8,300とみることもできる。

ボートの場合に於てもデータは実収入と出漁日数を過少評価しているように見うけられる。ボートの船頭達の大半が週に5，6日働いているのは世に知られた事である。彼の漁の成果として日額₡ 250という量を割り当てれば，総計は最低で1ケ月当り₡ 5,000の所得となり，データーが示す平均値の₡ 4,735とはならない。

表5ではまた，55のバンガの1ケ月当り操業のべ日数を498.7日としており，純操業利益₡ 412,537をあげているが，これによれば月₡ 7,500の所得が得られ，納得のゆく数字であると思われる。しかしながらこのデーターは，又，バンガは月に約9日間しか操業しないと述べており（498/55），この数値は，バンガの月間操業日数は最低15日以上あるだろうとみる我々の考えからすると余りにも少ないものである。

こうした事から明らかなように経済データは非常に矛盾をはらんでおり，漁業状況についての正確なビジョンを得るには，かなり注意深く見ていかなければならない。又前述したように，収集された情報の真実性を確認できる何らかのシステムが早急に設置される必要がある。

2.2. 工業船団統計

2.2.1. エビ漁船団

69隻からなるが1月～10月期の1ケ月当りの操業船は62となり，月間操業のべ日数は1,324日となっている。つまり月21日間の操業となる。これらの船舶の水揚高は，10月迄でえび1,753.6トンとなり，月当り₡ 2,302万相当である（表6，7）。

表8ではこの船団による魚その他の漁獲物の水揚高が示されている。これらの10月迄の総計は778.7トンに達し，ブンタナーレス沿岸漁船捕獲高の26.4％に相当する。

2.2.2. マグロ漁船団

これは"マリーア・アントニエータ"号1船からなり，1月～10迄総計478.05トン

のマグロの水揚があった（表9参照）。

2.2.3. いわし漁船団

2船舶からなり，10月迄で1,207トンのいわしの他，表10に示されたその他漁獲物を得た。明らかに見られるように，この船団は月平均わずか18.3日の操業である。

3. ディーゼルとPreferencial価格

本事務所の職務のひとつとして，漁業に於けるディーゼルの使用推奨があげられる。我々の調査によれば，沿岸漁船団は1月から10月の間，漁獲高179万kg，漁獲金額7,818万コロンを漁獲するため113万リットルの“exonerado”を使用している。“exonerado”ディーゼルを使用するランチの数はニコヤ湾をベースとする全ランチ数の半数にも満たない。このことは湾内の船団がディーゼルをとってプンタレーナスに来られない事の可能性を表している。

工業船団は全体的に“exonerado”ディーゼルを使っており，10月迄に4,286トンの魚貝類，25,600万コロンを漁獲し，これに対し904万リットルを消費している。

表1　漁業地域別平均操業漁船数

（1984年9月～10月）

漁業地域 COMUNIDAD PESQUEARA	船内機漁船 LANCHAS	船外機漁船 BOTE	無動力船 PANGA	備考
プンターレナス PUNTARENAS	194	102	46	
コスタ パハロス COSUTA PAJAROS	46	38	5	
マンサニージョ MANSANLLO	38	45		
プエルト モレーノ PTO MORENO	21	15		
ニースペロ NISPERO	14	5		
チョメス CHOMES	2	33		
ヒカラル及びアルレデードレス JICARAL Y ALREDEDORES	8	22	2	
パケーラ及びアルレデドーレス PAQURA Y ALREDEDORES	0	25	4	
合計	323	286	57	

註　LA＝LANCHA　ランチ

BO＝BOTES　ボート

PA＝PANGAS　パンガ

第 2 表

ニコヤ湾の集荷場における沿岸漁業船団の総水揚量

表　2

CUADRO Nº 2

DESEMBARQUES TOTALES DE LA FLOTA ARTESANAL EN LOS PUESTOS DE ACOPIO DEL GOLFO DE NICOYA ENERO-OCTUB. 84

1984 年 1 月～10 月

月 MES / 地区 ZONA	201	202	203	204	205	206	地区不特定 S. Zona DEF:	ニコヤ湾 計 TOTAL G. NIC.	他地区 OTRA ZONA*	ココス島 I. COCO	計 TOTAL
1 月 Enero	46.207	21.937	10.84	8.229	1.998	73.182	1920	163.818	104.403		268.221
2 月 Febrero	56.956	19.850	11.072	7.708	21.689	80.350	3235	200.860	75.448	10.579	28.687
3 月 Marzo	75.158	32.890	16.121	7.925	11.820	84.390	1203	229.507	84.222	8.753	322.482
4 月 Abril	75.780	36.580	22.278	13.908	11.481	81.490		241.521			241.521
5 月 Mayo	65.054	41.784	21.214	17.561	5.925	64.582	185	216.315	77.217	6.522	300.054
6 月 Junio	83.317	52.785	18.785	15.916	12.941	101.621		285.365	76.683	1.991	364.039
7 月 Julio	69.257	43.698	15.671	12.525	7.747	76.934		225.832	78.724	1.300	306.356
8 月 Agosto	67.215	38.052	13.307	13.569	9.858	79.090	798	221.889	88.132	5.109	315.130
9 月 Set.	54.719	25.489	11.627	11.744	11.601	62.018		177.198	86.740	391	264.329
10 月 Oct.	70.970	24.454	10.753	11.575	4.508	62.675		184.935	86.760	4.519	276.214
計 TOTAL	664.643	337.023	151.673	120.660	99.568	766.332	7341	2.147.240	758.329	39.664	2.945.233

RGV/smla

* Incluye captura realizada en la zona norte y sur desembarcadas en Puntarenas

プンタレーナスで水揚された南・北両域での捕獲高を含む

表　3

ニコヤ湾及びココス島における地区別，魚種別，
漁獲量及び魚種別構成比率　1984年1月～10月

CUADRO Nº 3
ABUNDANCIA RELATIVA (%) Y BIOMASA DE LAS CAPTURAS (Kg)
OBTENIDAS EN EL GOLFO DE NICOYA Y LA I. DEL COCO
ENERO-OCTOBURE 1984

	Sera Cat. comerc 地区	201	202	203	204	205	206	SIN ZONA DEFINIDA 地区不定	I. DEL COCO ココス島
	比率 (%)	%	%	%	%	%	%	%	%
	重量 (kg)	Kg	Kg	Kg	Kg	Kg	Kg	Kg	Kg
ブリメラ グランデ ※	Primera Grande	26,52 176243,00	22,09 74449,00	16,71 25342,00	3,63 4376,00	0,65 648,00	3,15 24179,00	15,86 1165,00	
ブリメラ ペケーニョ ※	Primera Pequeña	28,75 191101,00	20,96 70645,00	31,55 47846,00	13,00 15683,00	6,68 6651,00	6,58 50446,00	15,28 1122,00	
コーラ及びアグリア ※	Cola y agria	24,32 161651,00	22,44 75622,00	21,59 32743,00	19,09 2303,00	11,75 16698,00	30,62 234631,00	11,58 850,00	
チャタラ ※	Chatarra	14,47 96148,00	15,16 51082,00	17,80 26996,00	19,96 24088,00	12,64 15290,00	11,35 87005,00	16,89 1240,00	
ポスタネグラ 黒ポスタ ※	Posta negra	0,30 2010,00	0,37 1248,00	0,48 724,00	2,77 3343,00	0,04 44,00	2,80 21441,00		
サバ類	Macarala	0,38 2539,00	1,13 3807,00	1,46 2212,00	16,06 19377,00	0,57 570,00	12,72 97468,00	5,91 434,00	
サメ類	Cazón	0,76 5073,00	0,99 33,52	1,95 2955	5,68 6855,00	2,08 2073,00	6,62 47652,00	11,59 851,00	
ポスタブランカ 白ポスタ ※	Posta blanca	0,49 3237,00	0,19 655,00	0,05 78,00	1,34 1618,00	0,08 84,00	1,75 13390,00	2,23 164,00	45,67 18113,00
エイ類	Raya	0,63 4167,00					0,37 2826,00		
カマス	Barracuda					60,90 60637,00			
ススキの一種 ?	Cabrilla	0	0	0	0,44 526,00	0,13 133,00	3,09 23683,00	-	51,55 20448,00
二枚貝	Almeja pelada Almeja	1,70 11314,00	0 0	1,37 2082,00					
ピアンガ ペラーダ ※	Piangua pelada	0,37 2432,00							
パルゴムンチャ (フエダイの一種?)	Pargo mancha				5,2 6275,00		7,77 59521,00		
その他	OTROS	1,30 8723,00	16,30 56163,00	7,05 10695,00	12,83 15489,00	4,46 4440,00	13,58 104090,00	20,63 1515,00	2,78 1103,00

※　魚種不明

RCV/smla
* No se tiene informes del mes de enero y abril　　1月と4月の報告は入っていない。

CUADRO NO.4
DIAS ACUMULADOS PROMEDIO POR MES Y
CAPTURA DIARIA PROMEDIO (Kg) MARZO-OCTUBRE 1984

第4表　漁船規模別，漁業種類別，地域別月間平均出漁日のべ日数及び
1日当り平均捕獲高　（kg）　　1984年3月～10月

ZONA 地域		201				202				203			
		201				202				203			
漁　法	ARTE	T	C	L	O	T	C	L	O	T	C	L	O
LAN-ランチ	DXxM	1050	143	13,00	199	240	152	31	132	214	38	24	53
CHA	CX=D	40	36	32,00	36	39	34	31	28	42	36	26	38
BO-ボート	DXxM	217	216	15,00	78	30	213	395	61	33	26	6	25
TE	CXxD	31	18	22,00	38	25	18	28	26	21	22	24	58
PAN-パンガ	DXxM	4	0,50	0,50	4	7	2	2	4	0.25			0.25
GA	CXxD	38	8	4	10	21	11	20	14	6			6

ZONA 地域		204				205				206			
漁　法	ARTE	T	C	L	O	T	C	L	O	T	C	L	O
LAN-ランチ	DXxM	84	2	16	27	2	3	2	3	665	12	150	165
CHA	CX=D	78	27	57	60	7	4	4	19	63	48	51	53
BO-ボート	DXxM	0	9	56	5	5	382	14	61	29	19	31	28
TE	CXxD	0	10	26	13	6	19	17	21	19	20	25	30
PAN-パンガ	DXxM	2		70	5	0.25	0.75	3	0.75	22	2	350	15
GA	CXxD	39		34	32	5	4	15	6	36	21	41	31

RGV/smla

T = Trasmallo　さしあみ漁船
C = Cuerda　釣漁船
L = Linea　はえなわ漁船
C = Embarcaciones que operaron con artes 種々様々な漁獲方法をもつ漁船
DXxM = Dia promedio acumulados por mes 月間平均のべ日数
CXxD = Captura promedio por dia 1日当り平均捕獲高

表　5

沿岸漁業用小型船団の経済データー

CUADRO Nº 5

DATOS ECONOMICOS DE LA FLOTA ARTESANAL

船種	T. de emb.	MES	月	船舶数 Nº de emb.	月間のべ出漁日数 Nº días/mes	キログラム当り純コスト Costo neto/Kg	純産出高 / kg Rend. neto/Kg	純利益 Ganan. op. neta
ランチ	LANCHAS	Marzo	3	346	4448	17,13	37,35	9.481.612
	"	Mayo	5	372	4128	19,01	27,35	6.647.902
	"	Junio	6	345	5258	15,11	37,78	6.577.737
	"	Julio	7	350	4591	14,97	25,16	6.089.208
	"	Agosto	8	332	5078	17,53	29,56	7.477.743
	"	Set.	9	331	3948	19,07	48,78	6.065.014
	"	Oct.	10	314	4397	15,91	35,49	7.624.423
	"	Promedios	平均	341	4549	16,96	34,43	7.137.663
ボート	BOTES	Marzo	3	209	1531	1,92	30,62	1.323,122
	"	Mayo	5	315	1705	1,26	27,21	1.152.490
	"	Junio	6	286	2177	0,73	29,06	1.620.147
	"	Julio	7	316	2108	1,03	24,28	1.176.209
	"	Agosto	8	261	2008	0,79	33,24	1.409.994
	"	Set.	9	276	2047	2,23	35,19	1.444.412
	"	Oct.	10	330	2346	1,31	29,68	1.321.480
	"	Promedios	平均	285	1989	1,32	29,89	1.349,693
パンガ	PANGAS	Marzo	3	63	531	16,53	50,27	*1.272.280
	"	Mayo	5	55	408	20,75	12,28	129.726
	"	Junio	6	57	579	14,24	13,22	238,870
	"	Julio	7	50	467	16,49	12,85	204.322
	"	Agosto	8	47	533	17,26	17,04	336,140
	"	Set.	9	58	462	16.75	17,74	319,633
	"	Oct.	10	56	511	17,52	21,76	336.792
	"	Promedios	平均	55	499	17,07	20,73	412.537

RGV/smla

* Ganancia tan alta debido a la captura de pargo mancha equivalente a 8.2 ton.

◦ 高利潤は，8.2トン相当のPargo mancha（鯛）捕獲によるもの

CUADRO Nº 6
DESEMBARQUES MENSUALES DE COLAS DE CAMARON
ENERO-OCTUBRE 1984
(Kg)

表6　COLAS DE CAMARONの月間水揚量　1984年1月～10月

Especie 種類 / Mes 月	白 Blanco	コーヒー色 Cafe	ピンク Rosado	フイデル Fidel	ティティ Ti Ti
1月 Enero	15.089	5.071	53.176	5.958	55.829
2月 Febrero	17.278	5.891	55.902	14.572	21.735
3月 Marzo	18.184	3.512	84.553	2.013	23.271
4月 Abril	11.161	3.935	119.130	6.636	21.789
5月 Mayo	15.404	3.495	82.775	69.373	15.691
6月 Junio	8.134	2.594	53.654	57.571	14.212
7月 Julio	10.230	3.399	75.348	98.089	21.301
8月 Agosto	16.332	3.345	50.678	78.741	68.262
9月 Set.	22.889	2.292	20.488	130.909	43.363
10月 Oct.	20.122	1.151	16.838	148.336	53.921
計 TOTAL	154.823	34.685	612.542	612.198	339.374

RGV/smla

Gran total　1.753.622 Kg
総　合　計

CUANDRO Nº. 7

FLOTA CAMARONERA DE PESCA Y VALOR
DE LOS CAMAR CAMARONES DESEM BARCADOS ENERO - OCT 1984

表7　えび漁船団の漁獲努力とえびの水揚価格　1984年1月～10月

MES　月	出漁のべ日数 DIAS DE AUSENCIA	操業船舶 DARCOS EN OPERACION	えびの水揚価格 VALOR DESEMBARQUES CAMARONES
1月 Enero	1404	68	?
2月 Febrero	1326	65	17.507.883
3月 Marzo	1273	60	20.651.260
4月 Abril	1291	59	25.125.529
5月 Mayo	1460	65	24.140.850
6月 Junio	910	51	17.212.739
7月 Julio	1319	65	22.139.230
8月 Agosto	1514	62	26.880.077
9月 Set.	1297	63	25.571.119
10月 Oct.	1444	60	27.963.818
計 Promedio	1324	62	23.021.389

RGV/smla

CUADRO Nº 8
DESEMBARQUE DE PESCADO ESCAMA Y OTROS FLOTA CAMAPONERA
ENERO-OCT. 1984

第8表　うろこ魚及びその他えび漁船団の水揚高　1984年1月～10月

	月 / Cat. com.		1月 Enero	2月 Febrero	3月 Marzo	4月 Abril	5月 Mayo	6月 Junio	7月 Julio	8月 Agosto	9月 Setiembro	10月 Octubre
※	プリメラグランデ（大型プリメラ）	Primera Grande	74	70	560	4.748	1.234	123	99	87	73	15
※	プリメラナーニョ（小型プリメラ）	Primera Pequeña	17.151	10.246	11.513	16.482	16.077	5.491	12.237	10.823	6.480	7.389
※	アカメ？	Rõbalo	146	81	87	471	288	148	210	101	224	38
※	パルゴセーダ（絹皮パルゴ）	Pargo seda					507					
※	パルゴマンチャ（　パルゴ）	Pargo Mancha			1.935		166		2.718		196	78
※	フエダイ？（鯛のような魚）	Pargo	4.237	1.630	15.634	1.383	1.717	680	2.309	2.158	1.646	3.426
※	クラシフ	Clasif	12.775	14.231	28.687	14.323	21.508	10.659	14.110	13.635	12.902	12.101
?	スズキ目	Cabrilla	1.563	773	8.339	4.866	3.330	1.502	2.282	1.779	410	1.922
	コングリ，本キングリング	Congrio	14	74	5.439	2.366	5.538	1.062	1.970	572	917	245
※	セグンダ	Segunda	47.912	2.184	59.223	25.576	32.908	15.614	21.528	23.730	17.883	18.183
※	ラグリア	Agria	9.008	6.425	20.319	5.478	5.992	2.251	3.862	2.224	4.404	
	サメ類	Cazõn	1.060	1.180	3.509	1.368	2.607	1.562	2.085	1.383	416	366
※	ボスタ	Posta	330	584	596	49	243		93		256	2.073
	マグロ類	Atún	611				440			2.554	774	
	イカ類	Calamar	1.534	2.189	664	2.135	3.499	2.279	1.111	1.972	786	459
	ハタ類	Mero		93			68					103
	セイヨウマアジ	Jurel										50
※	アレエタ	Aleta	8	6								44
	ヒラメ	Lenguado	272	188	3.508							
	カンブーテ（ガザミ？）	Cambute					4	24				
	タコ類	Pulpo						45				
※	L.アレネラ	L. arenera						40				
	ウナギ類	Anguila		4.492	786	465						
		TOTAL	96.687	84.446	160.809	79.704	96.120	41.480	64.604	61.018	47.375	46.500

RGV/smla　　Total　778.756 Kg

※ 魚種（属・目）不明
？ 他魚種の可能性大

CUADRO Nº 9

表9　月別マグロ漁業水揚高

MES	月	漁獲量 (Kg)
Enero	1月	3.230
Febrero	2月	69.355
Marzo	3月	35.377
Abril	4月	102.783
Mayo	5月	46.466
Junio	6月	74.742
Julio	7月	54.335
Arosto	8月	*
Set.	9月	*
Oct.	10月	91.762
TOTAL	計	478.050

RSV"sm1e

* Hubo captura pero los reportes furron entrog dos en el mes de octubre.

* 漁獲はあったが，10月分に組み入れられた。

表 10
いわし船団の月別，地区別漁獲量
1984年1月～10月

CUADRO Nº 10
DESEMBARQUES DE LA FLOTA SARDINERA
ENERO-OCT. 1984

	月 Zona		1月 Enero	2月 Feb.	3月 Marzo		4月 Abril	5月 Mayo	6月 Junio	7月 Julio	8月 Agosto		9月 Set.	10月 Oct.	計 TOTAL
		Cat. com.	206	206	206	その他地区 Otra Zona	206	206	206	206	206	205	206	206	
	いわし	Sandina	26.916	89.502	219.229	76.680	140.531	46.593	151.073	28.485	102.511	33.566	53.614	58.886	1.027.586
※	セグンダ	Segunda		671	600		236		452			166	294	1.053	3.473
※	アグリア	Agria		76	25								20	61	182
	サバ	Macarela	230	346	301		150		163			152	107	1.400	2.849
※	プリメラグランデ	Primera Grande											37	33	70
	カマス	Barracuda	640						100				4	126	870
	セイヨウマアジ	Jurel		300	772										1.072
	マグロ	Atún			8.394										8.394
	出漁日数	Días Ausencia	21	20	20	11	23	8	24	2	3	6	6	39	183

RGV/smla

※ 魚種(属・目)不明

CUARDO Nº 11

表 11

小 型 漁 船 団

ディーゼル油使用量（リッター），漁獲量及び漁獲金額並びに漁獲量当りディーゼル油消費量

月 MES	燃油使用量 ℓ	漁 獲 量 kg	漁 獲 金 額 ¢	日数 DIAS	船舶数 Nº EM	L/Kg
1月 Enero	103.326,88	167.770	7.818.766,03	2842	161	0,62
2月 Febrero	160.625,27	231.298,54	11.084,686,22	3193	171	0,69
3月 Marzo	213.988,97	178.472,02	9.636.937,84	3038	195	1,20
4月 Abril	107.255,67	153.558,66	8.881.899,55	2099	170	0,70
5月 Mayo	105.924,40	167.336,65	8.076.888,26	2549	161	0,63
6月 Junio	71.407,76	138.474,61	4.622,298,35	1952	141	0,52
7月 Julio	110.763,21	342.784,33	7.576.515,68	2668	147	0,32
8月 Agosto	92.115	159.368,34	7.183.610,10	2209	143	0,58
9月 Set.	79.523,88	125.887,83	6.295.449,80	2112	138	0,63
10月 Octubre	85.653.98	134.095.78	7.071.208,45	2110	131	0,64
計 TOTAL	1.130.583,10	1.799.046,76	78.187.600,34	24981	1557	0,63

RGV/smla

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CUADRO NO 12

表 12

工　業　船　団

ディーゼル油使用量，漁獲量及び漁獲金額
並びに漁獲量当り燃料消費量

	燃油使用量 ℓ	漁　獲　量 kg	漁獲金額 ¢	日数 DIAS	船舶数 No.Emb.	L/Kg
1月 Enero	891.825,15	330.256,61	25.592.915,76	1325	66	2,70
2月 Febrero	1,129.075,80	456.944,93	23.189.426,75	1213	70	2,47
3月 Marzo	849.783,80	574,988.74	23.051.017,48	1322	60	1,48
4月 Abril	844.585,22	255.703.92	26.911.442.80	1233	66	3,30
5月 Mayo	927.221,25	488.299,89	27.493.641,87	1435	68	1,90
6月 Junio	822.941,20	303.071,72	24,480.952,44	1142	71	2,72
7月 Julio	1,027.133,60	382.347,85	25.873.655,60	1515	68	2,69
8月 Agosto	708.773	205.298,31	19.932.012,43	1104	53	3,45
9月 Set.	821.343	248.568,92	25.428.099,06	1295	68	3,30
10月 Oct.	973.250	1.040.548,22	33.976.369,31	1487	71	0,94
計 Promedio	9,045.931,72	4,286.029,11	255.929.157,68	3671	670	2,11

RGV/smla

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