

2. サイトの比較

November 17, 1983

SITES COMPARISON

We selected 7 vitally important items and on these items, assessment of JICA mission are as follows:

A. Land

1. Acquisition of enough area

Mindoro: 2 - 3 ha. is available but removal and compensation of illegal inhabitants are necessary.

Palawan: 2 - 3 ha. is available but necessary measures should be taken for the utilization of land which is already allotted for another project.

2. Nature of Soil

Mindoro: hard (soil bearing capacity is high)

Palawan: Clayey

3. Land clearance and banking (filling and levelling)

Mindoro: Cutting down of trees already planted and certain levelling are required.

Palawan: The site is flat but levelling and planting

of necessary number of trees are required.

On land, totally, Mindoro seems to be better.

B. Water

M: Abundant underground water seems to be available by digging about 30 m. deep and the quality is quite good.

Furthermore, because lake water is available all the time, there seems to be no problem in fresh water supply.

P: It is necessary to dig about 60 m. to get underground water. But there are cases when digging does not bring the expected amount. In addition, the water attainable near the proposed site is sometimes brakish.

Also, the river runs by the proposed site dries up during dry season. So, there is uncertainty about reliable supply of fresh water.

On fresh water supply, Mindoro seems to be better.

C. Food Supply

Mindoro: The Mindoro fishers catch larger volume of fish than the consumption in the island and low-priced small shrips are caught in the lake Nauzan. However, price of fish is more expensive than that in Palawan.

Palawan: The price of fish is cheaper and the fish sold in the market seems to be fresher than in Mindoro.

There is good fishing grounds in the sea near Palawan where a large quantity of fish can be caught.

However, it is difficult to acquire enough cheap shrimps.

On food supply, palawan seems to be better.

D. Philippine side expenditure at the initial stage

Main items of expenditure are as follows:

- Mindoro:
- (i) Road Repair
 - (ii) Electric power line incoming
 - (iii) Compensation for fruits trees of Calamansi and coconut.
 - (iv) Compensation for resettlement of two houses (families)
 - (v) Grading and levelling

Palawan: (i) Banking of muddy and lower area.

On this, Palawan seems to be better.

E. Long term prospect of the effect of technology transfer and regional development

Mindoro: Technology transfer will be made smoothly because local residents seem to have already approved the project and be eager to participate. Also they seem to have quite an understanding towards crocodile preservation because of their existence in lake Naiyan.

Low transportation cost between Mindoro and Manila is advantageous in conducting crocodiles farming trade in Mindoro in the future and this is expected to become a core industry in the area.

Palawan: Consensus is not yet established among local residents, so that there is uncertainty in smooth technology transfer.

On this item, Mindoro seems to be better.

F. Understanding and Cooperation of local people

Mindoro: Because of existence of crocodiles in the lake, they seem to have little resistance to them and crocodiles already kept and raised in captivity at BFD Pasi office seem to function as a base for Public relations on this project.

Palawan: Because existence of crocodiles near the site is unknown and no project P.R. seems to be taken place, evaluation is impossible.

On this, Mindoro seems to be better.

G. Environmental conditions of research activities.

This project requires biological research of crocodiles in natural conditions as well as in the farming facilities.

In this respect, the candidate site in the Mindoro has the following advantages:

The lake Naiyan near the site has been the ideal habitat of Mindoro crocodiles and presently, they can be observed and caught. Also, it is possible to release the infants bred in the institute for research and observation purposes.

We also surveyed another items which are roughly summarized as follows:

A. Infrastructure

Mindoro: Lack of telephone and long distance from Calapan are relative disadvantages but, there is no problem in electricity and gas.

Palawan: There seems to be no problem.

3. Health

Both sites seem to be infected by their own specific diseases

Medical facilities are similar on both sites.

3. 施設について

フィリピン側との協議を通じて決定された施設計画は、下記の通りである。その規模や詳細については、無償資金協力部が行う基本設計調査 Phase II においてフィリピン側と協議され決定することとなる。

Facilities

- 1) Research Laboratories
- 2) Administration Rooms
- 3) Kitchen
- 4) Feeding Room
- 5) Warehouse
- 6) Maintenance Room
- 7) Waste Disposal System
- 8) Power Receiving Substation and Generator (stand - by)
- 9) Water Tank
- 10) Breeding Pens
- 11) Motorpool
- 12) Access Road (in the Site) (all weather)
- 13) Water Purification Facility for Water Supply

上記以外にフィリピン側より要求のあった Security Lights and Fence と日本の専門家用の宿舎については、日本の無償資金協力の範囲内で供与可能であるかどうか、決定を保留している。基本設計調査 Phase II の段階までには検討の結論を出し、その点について、フィリピン側との協議により決定する必要がある。

4. ワニの分布と生態

フィリピンには、2種のワニが分布している。イリエワニ *Crocodylus porosus* とフィリピンワニ *Crocodylus mindorensis* がそれである。イリエワニは1801年に Schneider によって記載された。記載に用いられた標本(模式標本)はセイロン産のものであるが、本種の分布は極めて広汎である。東西はフィジー諸島からマッカダイブ諸島、南北はオーストラリア北部からパラオ諸島におよび、奄美大島や八丈島に漂着した例もある。淡水にも棲息するが、汽水域に多く棲んでいる。一方のフィリピンワニは1935年に Schmidt によって記載され、独立の種としてはもっとも最近になって知られた種類である。模式標本の産地(模式産地)はミンドロ島・東ミンドロ州のナウハン湖である。種小名の *mindorensis* は、いうまでもなく採集地のミンドロ島に因んでいるが、この島に固有というわけではない。十分な調査はなされていないが、イリエワニと異なり、淡水棲のワニであることは、ほぼ確実である。

イリエワニは“珍しくない”ことがわざわいして、いずれの地域でも詳細な分布調査がな

されていない。フィリピンでも状況は同様らしく、おそらくフィリピンワニよりは広汎な分布をしていると思われるものの、具体的な棲息地に関する公表されたデータはフィリピンワニのものに比較して少ない。最近まで棲息が確認されている場所としては東ミンドロ州のナウハン湖と北ダバオ州のナブンチュラン地区がある (Ross and Alcala, 1983)。フィリピンワニに就いては、国際野生動物保護基金 (WWF) から派遣されていた Charles Ross 氏に拠って、一通りの分布調査がなされている。Ross and Alcala (1983) によると、以下の通りである。

1. ルソン島

“中部”

“カメリネス”

マニラ

ラグナ・デ・バイ湖

2. ミンドロ島

東ミンドロ州・ナウハン湖

“ ” ・ハルコン山附近のカイチュラン川

3. ブスアング島

ディマニオン

4. マスパテ島

マングアオン

5. サマール島

6. ネグロス島

東ネグロス州・バガトゥバン川

“ ” ・サンタ・カタリナ

西ネグロス州・タブラス

7. ミンダナオ島

“リングァサン沼”

北ダバオ州・タギューム

“ ” ・ナブンチュラン

南ダバオ州・マリタ

北コタバト州・ミドサヤップ

北スリガオ州・プラチュル

サンボアング市・カラリアン湖

南サンボアング州・バガティアン市

8. ホロ島 (スール諸島)

但し、これらの記録は時間的に隔たりのあるものもあり、かならずしも分布の現状を示す

ものではない。たとえば、ホロ島の記録は今のところ von Moellendorff によって1888年頃、つまり百年も前に採集された1頭の孵化してまもない稚ワニ（全長222ミリ）だけしか知られていない。なお、この標本は1943年に Mertens によって公表されるまで、採集時は未知の種であったことも知られず西独・フランクフルト・アム・マイン市のゼンケンベルク博物館に収蔵されていた。

また、Ross and Alcalá (1983) は、今のところフィリピンワニがパラワン島に分布するという証拠はないが、ブスアンガ島にいたのでパラワンにいる可能性もあるとしている。

Schultze (1914) はパラワン島・タイタイ地区のワニの巣を報告しているが、これをヌマワニ *Crocodylus palustris* のものだとしている。ヌマワニはインド亜大陸の北部に分布するワニで、フィリピンにはいない。Schultze の同定は Casto de Elera (1895) に準拠しており、私（青木団員）は同書を参照する機会を今だに得ていないので憶測の域を出ないが、Casto de Elera (1895) のカタログで、イリエワニとイリエワニでないワニ（つまり、フィリピンワニ）が区別されているとすると、当時は未知の種であったフィリピンワニに対しヌマワニの学名を無理やりあてている可能性もある。今回の調査で、フィリピン国立博物館に収蔵されているワニの標本も調べたが、その中に標本番号606番という1959年4月にナウハン湖で採集されたものがあった。これはフィリピンワニであったが、付されたラベルには "*Crocodylus palustris*" と記されていた。これらの可能性や事実を都合良く解釈すると（たとえば Schultze のいう "*Crocodylus palustris*" がイリエワニに非ざるワニという意味だとすると、等など）、パラワン島にもフィリピンワニが分布していたということになる。今回のパラワン島の調査では星野暹先生が入手された1本の歯がワニの存在を示す唯一の実物証拠で、これがフィリピンワニのものなのかイリエワニのものなのかは今のところ不明である。

もう一方の調査地であるミンドロ島では同地の BFD 勤務の諸氏等の助力で実際に生きたワニを見ることができた。調査の対象地区は東ミンドロ州・ナオハン湖であるが、先に述べたようにフィリピンワニは、ここで採れた標本をもとにして記載されているのである。しかし、1980年の原氏の報告によると、この湖における最近の確実なワニの記録は1979年に捕えられた13フィートのものでしかないということであり、このワニの写真は Charles Ross 氏によってイリエワニと同定されたということである。また、Ross 氏はミンドロ島で見たワニは、イリエワニの頭骨2点だけだと語っている（原，1980）。Ross and Alcalá (1983) のリストから判断すると、スミソニアン博物館に収蔵されている USNM 228409 と 228410 番の標本がそれらしい。また、ナオハン湖産もしくはミンドロ島産として同論文中に挙げられた標本は何れも標本番号から考えて古い時代のものである。この論文は1983年の1月に受理されているが、つまり Ross 氏等は原氏に1980年に語った以後もミンドロ島ではフィリピンワニを確認していないらしい。そのような状況の中で、極めて短い滞在にもかかわらず、ナオハン湖産のフィリピンワニを4個体確認できた事は齊京氏と地元の方々の御努力の賜以外の何物でもない。ミンドロ島に到着した時点では、アルコールに浸った稚ワニの標本

が1個あること、齊京氏の作った池に大きなフィリピンワニが1頭と小さなイリエワニ2頭がいるということであった。が、実際にそれらのワニを見ると、4個体のいずれもがフィリピンワニであった。

ナウハン湖畔のパン村では、ワニに関する話しを多少聞くことができたが、なかでもウシガエル養殖所にいた。この事業の National Coordinator である Wilfredo P. Inovjas 氏の話しが最も充実していた。同氏はフィリピン大学で自然人類学を専攻したということであったが、カニクイガエルやフィリピンコブラの学名を知っており、話しの内容も信頼できると判断したので紹介する。

親ワニもしくは大きなワニをナウハン湖の西岸で見ることはないが、稚ワニは割合に良く見かける。湿地の草の間などにいる親ワニは東岸に行くで見られるのではないかと思う。巣は2・3回見たことがあり、この西岸のパツ村にあるウシガエルの養殖所の地先にも作られていたことがある。巣は植物を材料として作られ、その植物は“タンボ”(イネ科の1種)と呼ばれるものである。

同氏の話しのうち、西岸では親ワニを見ない、“だから”東岸にいるのだろう：というのは西岸にはいないと考えるよりも、親ワニは憶病で警戒心が強く人目に触れにくいと考えた方が良好だろう。また、“タンボ”という植物を巣の材料としているというのは、土地の人の話しとも一致しており、興味深い。

野生状態でのフィリピンワニ、もしくはイリエワニの食性の調査はこれからの課題であるが、パツの BFD 事務所で飼われているものにはカニクイガエルが与えられていた。魚の切り身も与えているということであったが、その現場は見なかった。おそらく当才仔と思われる稚ワニのうち、捕えられてから半年ぐらいたったという大きな方の個体は良く太っていたが、最近、採ったという小さい方の個体はやせていた。飼育に用いられている池の構造はこまかい配慮に欠けているように思われたが、大きな方の個体を見る限りでは飼育は上手ではないと思えた。

なにぶんにも実際の見聞が僅かなため、既存の報告の整理と併せてまとめてみた。今後の調査によって、フィリピンにおけるワニの分布と生態に関する細密な知見が蓄積されることを願ってやまない。

引用文献

Casto de Elera, R. P. 1895. Catalogo sistematico de toda la fauna de Filipinas conocida hasta el presente, y a la vez el de la coleccion zoologica del Museo de pp. Dominicos del Colegio - Universidad de Sto.

Tomas de Manila. Vol. 1, Vertebrados. 701 pp.

原幸治. 1980. 東南アジアのワニの分布と養殖, “タイ, シンガポール, インドネシア, フィリ

ピンにおけるワニの原材料の安定供給を確保するための養殖試験事業のフィージビリティ調査報告書” : 45-75

全日本爬虫類皮革産業連合会

Mertens, R. 1943. Die rezenten Krokodile des Natur - Museums Senckenberg Senckenbergiana 26 : 252 - 312

Ross, C. A. and A. C. Alcala 1983. Distribution and status of the Philippine crocodile (*Crocodylus mindorensis*),

Philippine Journal of Biology 12 (1-2) : 169 - 173.

Schmidt, K. P. 1935. A new crocodile from the Philippine Islands Zoological Series of Field Museum of Natural History 20 : 67- 70.

Schneider, J. G. 1801. Historiae Amphibiorum, Band 2.

5. サムートプラカンワニ養殖場の調査報告

調査団による2日間のワニ園視察及び経営者である Utai Youngprdpakorn 氏, Charoan Youngprapakorn 氏の聞き取り調査により以下の情報を収集できた。

5-1 養殖ワニの概要

当園の養殖ワニはほとんどシャムワニであることを確認した。現在飼育頭数は表9-1のとおり 33,500頭(展示用の外国産ワニを除く)と回答があったが、

- 1) イリエワニは、1才以上で多くとも数10頭しか見られない。
- 2) Hybrid ワニ(シャムワニとイリエワニのかけ合せ)は、繁殖用の親ワニ数頭と稚ワニを確認したのみ。
- 3) 年令別の飼育頭数は把握していない(営業上の理由で教えないことも考えられたが)等の事実から実際は、30,000頭以下であろうと推察される。

1才以上の飼育ワニについては多数のシャムワニの中にイリエワニ, Hybrid ワニが混在しているといった状況であり飼育上特に種別の注意は行っていないと思われる。将来的には Hybrid ワニを主体に10万頭の飼育を目標としている。

表10-1 養殖ワニの飼育頭数と産卵数等

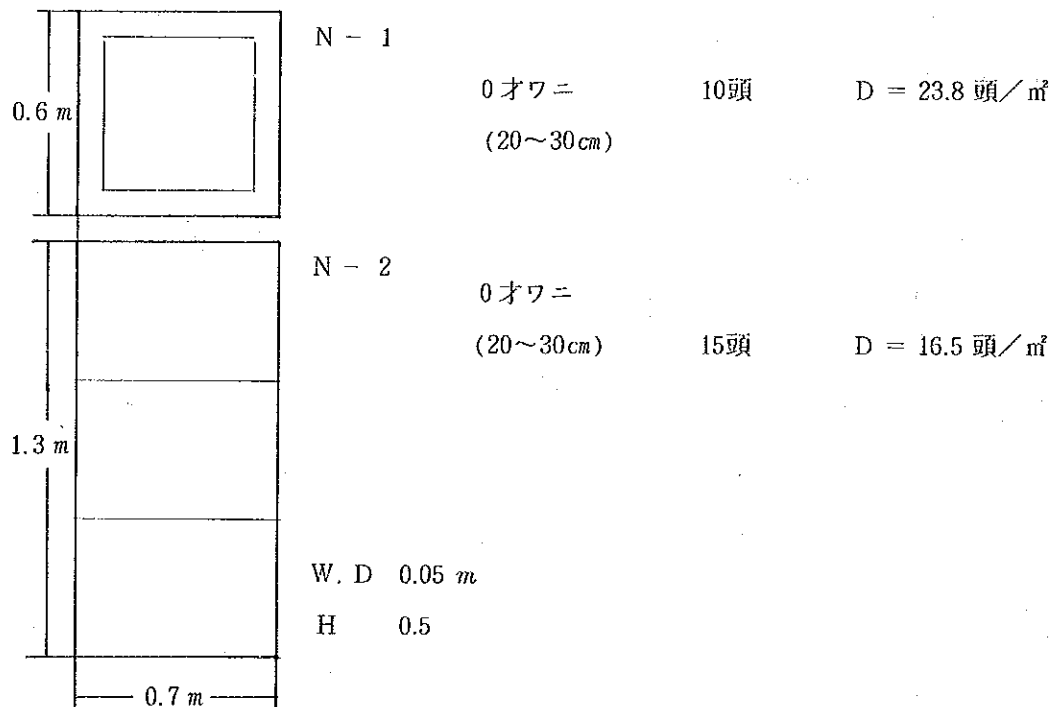
ワニの種類	項目 (頭) 飼育頭数	(卵/頭) 産卵数	(%) 受精率	(%) 有精卵のふ化率	(%) 1才ワニまでの生残率
シャムワニ	20,000	20~40			
イリエワニ	10,000	30~50	75~80	ほぼ 100 %	80~95
Hybrid ワニ	3,500	40~50			
計	33,500				

5-2 飼育施設の構造と飼育密度

ここでは主要な飼育施設を次の3つに区別して説明する。

- 1) 稚ワニ飼育槽 (Nursary Tank) 0才ワニの飼育用
- 2) 飼育槽 (Rearing Tank) 1才以上のワニの飼育用
- 3) 繁殖池 (Breeding Pond) 親ワニの繁殖用

1) 稚ワニ飼育槽 (Nursary Tank)



注) 飼育施設説明のための注意、凡例は次のとおりである

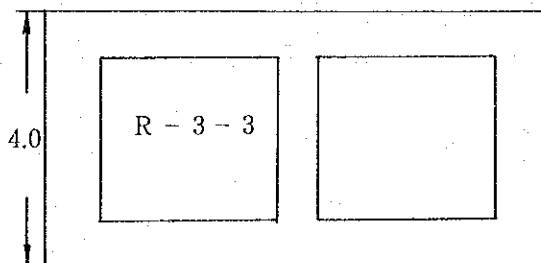
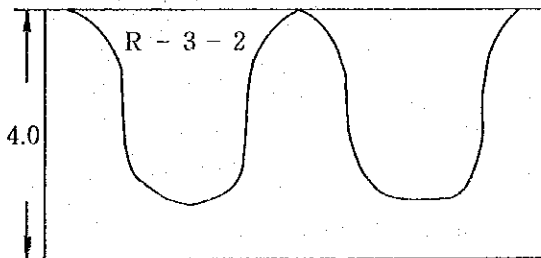
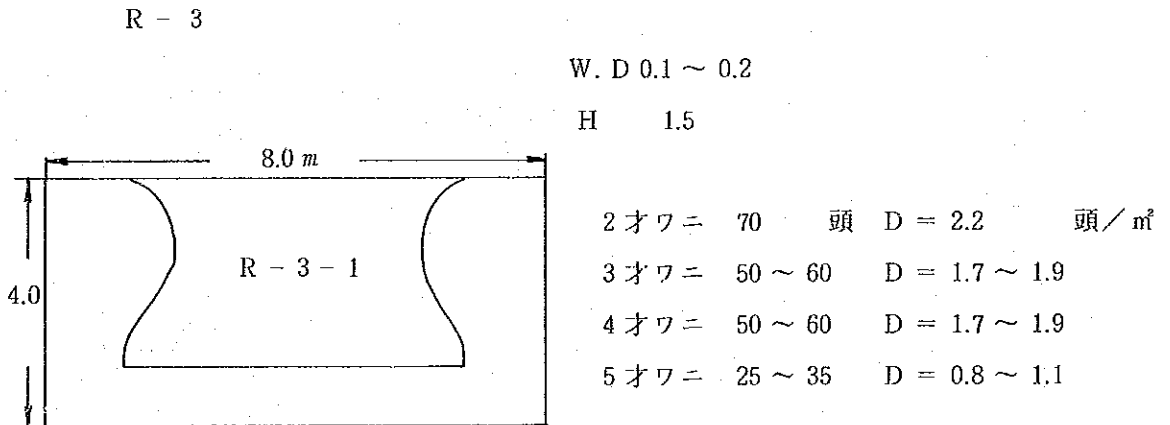
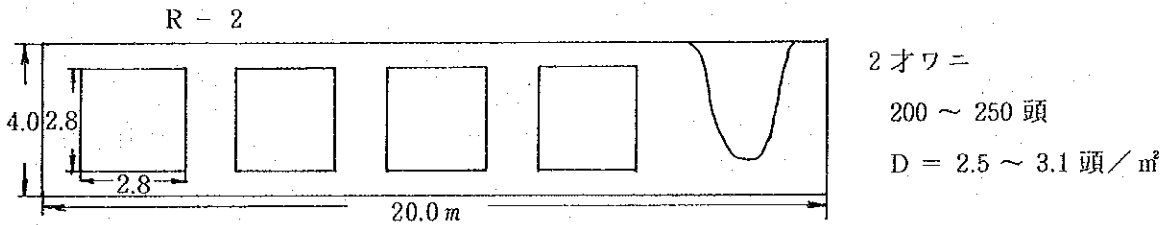
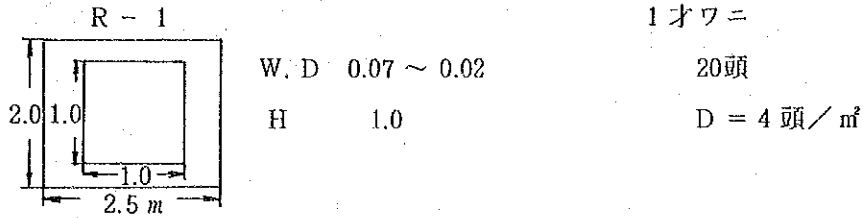
1. 長さの単位はことわらない限りメートル
2. N-1, R-2, B-1等は飼育施設のタイプを示す。
3. D; 飼育密度, W. D.; 水深, H; 壁面の高さ

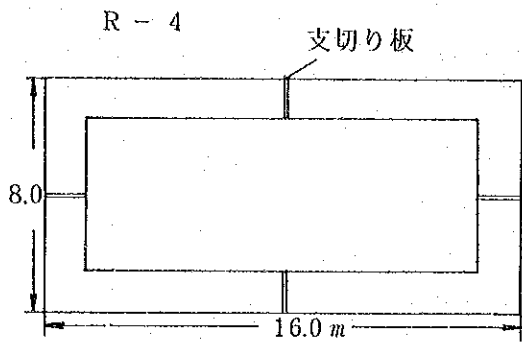


稚ワニ飼育槽は金網製の小屋の中であり一般客は立ち入り禁止となっている。天井はスレート製で採光用の半透明プラスチック窓を設けている。当飼育槽での飼育期間は教えてもらえなかった。

2) 飼育槽 (Rearing Tank)

飼育槽は通常室内にあるが、天井は角材で組まれ採光に留意している。





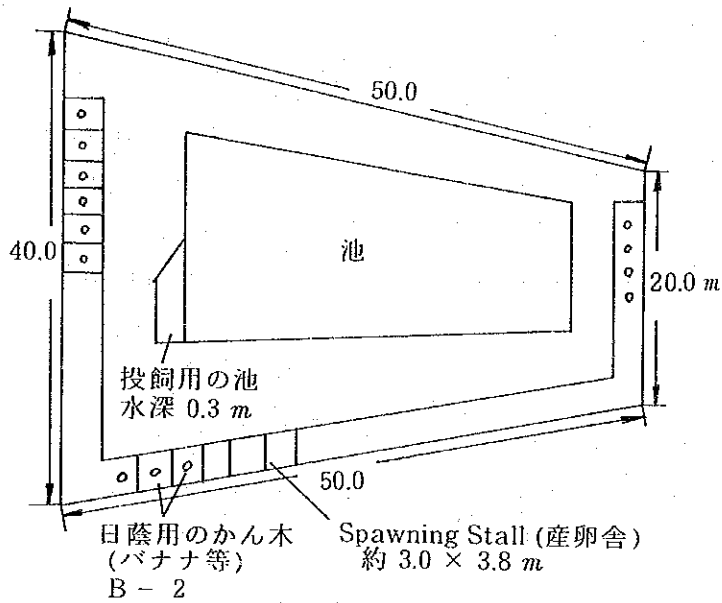
2才ワニ 150頭 $D = 1.2$ 頭/㎡
 4才ワニ 75 $D = 0.6$
 5才ワニ 40 $D = 0.3$

W. D 0.15 ~ 0.20 m
 H 1.2

3) 繁殖池 (Breeding Pond)

繁殖池は屋外にあり天井はない。

B - 1



No of Spawning Stall = 32

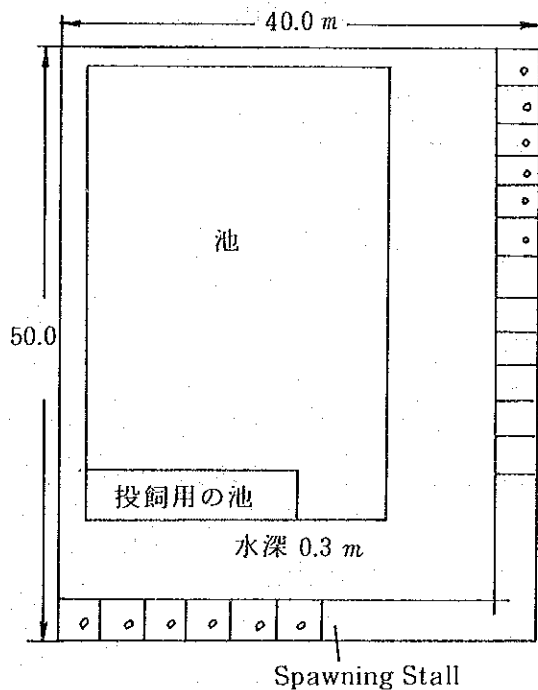
$D = 0.04$ 頭/㎡

約 1,500 ㎡

シャムワニ 60頭

W.D: 1.5 ~ 1.8 m

B - 2



約 2,000 ㎡ $D = 0.035 \sim 0.04$ 頭/㎡

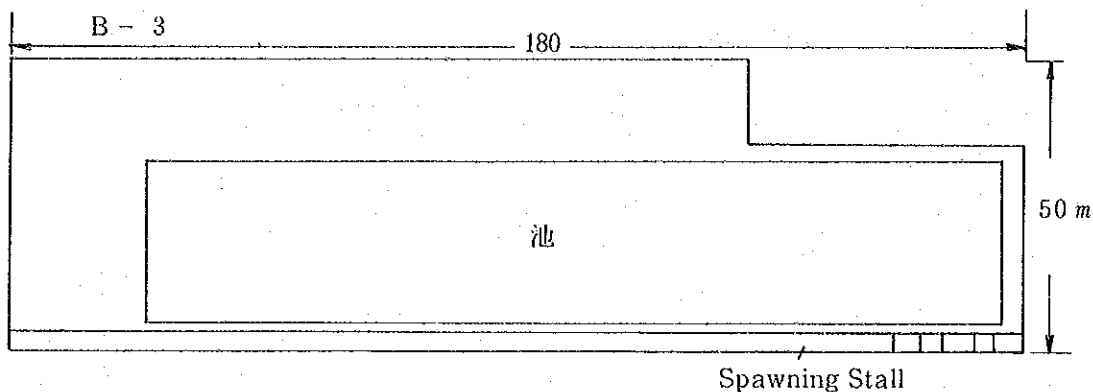
シャムワニ 70~80頭

内 hybrid ワニ 3頭 (12~13才)

W.D: 1.5 ~ 1.8 m

池はアオコが発生

No of Spawning Stall = 28



現在建設中であり、1頭当たり $3 \times 3 \text{ m}$ を見安に 5,000 頭の飼育を計画しているという。ただし、1頭当たり $3 \times 3 \text{ m}$ とすると当施設では、1,000 頭弱しか収容できず、飼育頭数の計算は曖昧であることが指摘できる。

No of Spawning Stall = 75, 当池の Spawning Stall は池より小型で $2.4 \times 3.1 \text{ m}$ であった。

表 5-2 調査した飼育施設におけるワニの年令別飼育密度

飼育施設	ワニの年令	飼育密度	1頭当たりの飼育施設面積
1) 稚ワニ飼育槽	0才	16.5 ~ 23.8 頭/m ²	0.04 ~ 0.06 m ² /頭
	1	4	0.25
2) 飼育槽	2	1.2 ~ 3.1	0.3 ~ 0.8
	3	1.7 ~ 1.9	0.5 ~ 0.6
	4	0.6 ~ 1.9	0.5 ~ 1.7
	5	0.3 ~ 1.1	0.9 ~ 3.3
3) 繁殖池	親ワニ	0.035 ~ 0.04	25.0 ~ 28.6

5-3 餌料の種類と供給

餌ワニには、エビのむき身に卵をまぶして与えているというのが実際の投餌は見る事ができなかった。一部小魚も併用して与えているようである。1才以上のワニには、雑魚（ヒメジ、キチジ、平アジの類を確認した）と鶏頭を与えていた。魚と鳥肉の比率は 7 : 3 と回答があった。魚は近くのサンパカン市営魚市場（車で約15分）から小型トラック2台で運ばれる。1日計 5 ton の餌を与えるといわれ魚では約 2 万パーツ（約 20 万円 → 40 円/kg）である。餌用の魚類はトロール船漁獲物である。

冷蔵施設はなく、魚市場の施設を利用しているというが鮮度は良くなかった。年令または体重当たりの餌の量については正確な回答が得られなかった。

5-4 水の供給と水質管理

水は井戸水を使用し各飼育槽及び繁殖池にパイプ(φ約5cm)で給水されている。飼育槽は1日1回換水しているといわれ、排水管も付いているが、水の状態を見ると毎日全飼育槽で水替えしているとは思えなかった。繁殖池については通常上方からパイプ給水しオーバーフローによる排水を行っているにすぎず、換水率は不明である。

一方、稚ワニの飼育槽については水質浄化装置を使用する等水質管理に注意を払っている。これは病気の予防が目的である。

5-5 ワニの繁殖

先に述べたように当園の親ワニはほとんどがシャムワニであり、産卵舎内の産卵巣の状態からみて、シャムワニについては繁殖していることはほぼ間違いない。また、稚ワニの中に Hybrid ワニを確認したことから同ワニの繁殖も認められる。ただし、イリエワニについては稚ワニはいるものの親ワニは確認できず人工管理下で繁殖しているかどうか確認は得られなかった。

当園での繁殖は全て産卵舎 (Spawning Stall) による自然繁殖であり、ふ卵器は使用していない。

5-6 その他

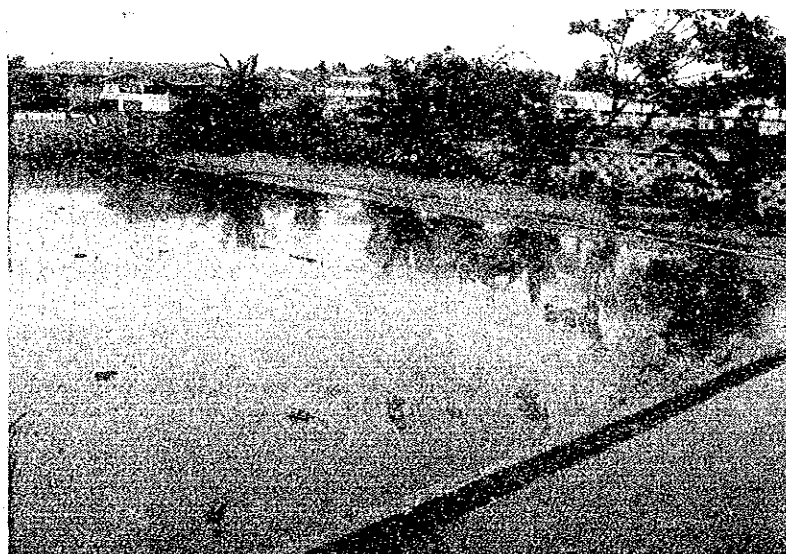
- 1) 餌ワニ及び養殖飼育ワニの肥満状態は良好とはいえず、餌は満腹量与えていないと思われた。
- 2) 餌育ワニの中には指先や尾部が奇型のワニがかなり見られた。
- 3) イリエワニの飼育頭数が少ないのは繁殖自体が難かしいためなのか、飼育上の問題点により養殖メリットがないためか(性格はワニの中で最も獰猛である)疑問が残った。
- 4) 職員は現在事務、売子、施設係等を含め総計 161 名(うちワニ飼育係は40名)である。
- 5) 観光客は、年間 100 万人(タイ人60万人、外国人40万人:入場料はタイ人10パーツ、外国人80パーツ)という。観光収入と養殖ワニ(皮)の収入の比率は無回答であった。
- 6) 掃除係の人が無防備で(ホウキ1本で)親ワニのいる繁殖池の囲りを掃除しているのには驚かされた。
- 7) 観光客の回廊からの落下防止対策安全対策は不十分である。



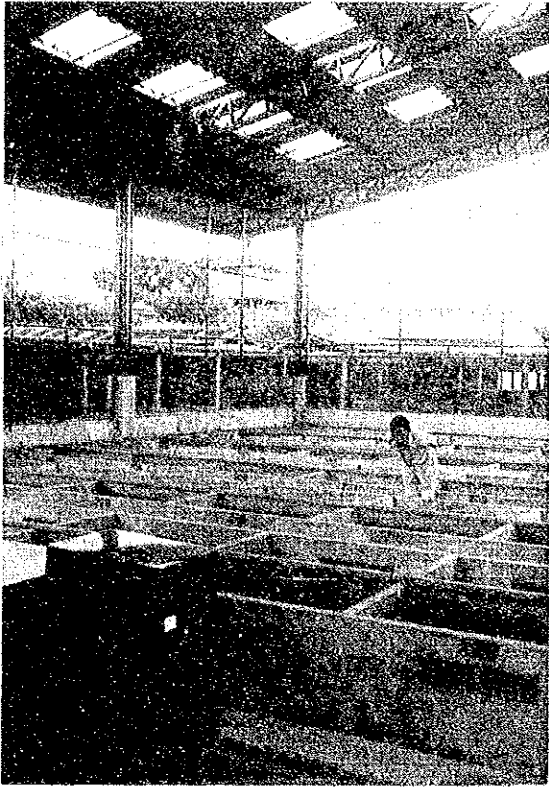
飼育池の外側 (排水溝と通路)



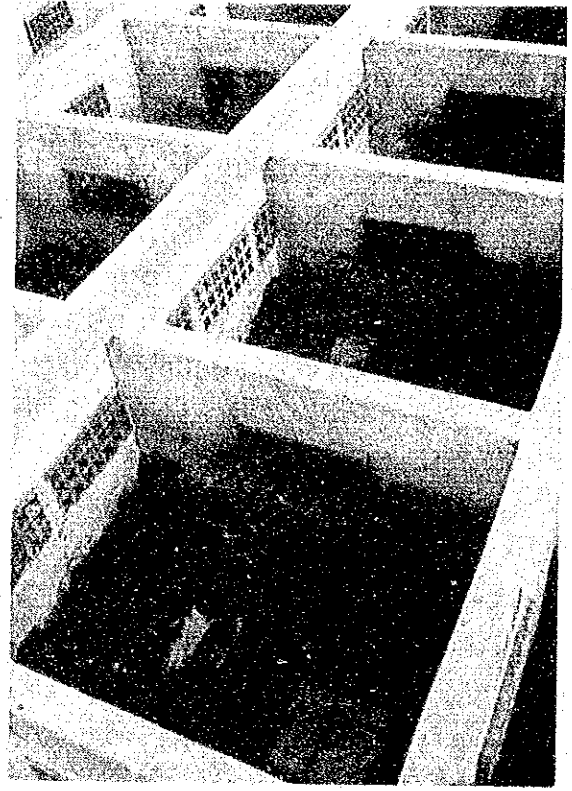
ニオワニの飼育池



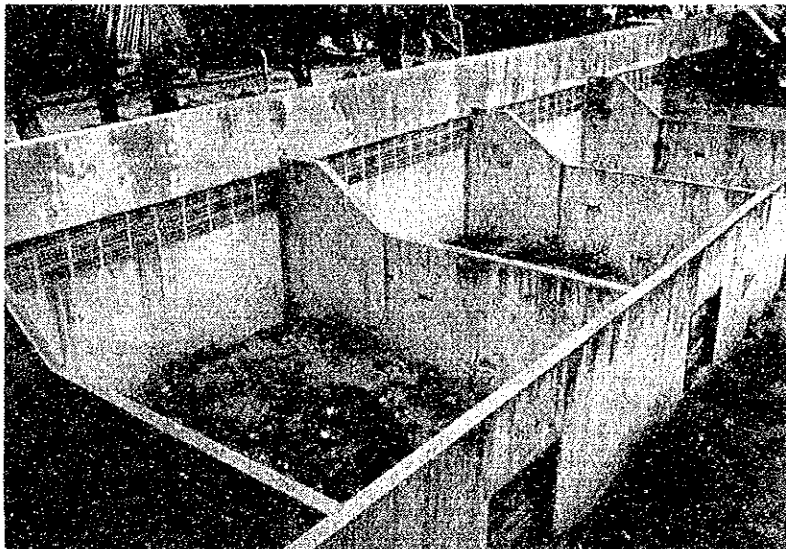
繁殖池の一つ (奥に産卵場が見える)



稚ワニ飼育場 (壁は金網)



稚ワニ飼育池



産卵場

6. 調査団が比側に呈示した資料

(1) 調査趣意書

Objective of the team

In response to the request by the Republic of the Philippines we came here to investigate and clarify the background and content of the request on the project, to conduct field survey on the candidate sites, and to have discussion with R.P. authorities concerned for the way how to carry out the cooperation on this project, so that we will be able to acquire necessary information and get mutual concensus on as many items as possible for the formulation of the project cooperation programme.

This time therefore, our team consists of two sub teams, namely one for grant aid and the other for project technical cooperation.

Furthermore, additional survey missions or surveyers will be dispatched later for necessary follow up survey and concensus formulation about the project.

Survey Methodology

We plan to do the survey by the following;

(1) Discussion with Ministry of Natural Resources.

Here we first explain about our cooperation scheme for your full understanding. We hope this will prevent any problems from occurring later in the implementation of the project. Subsequently we ask questions and exchange views to get clear picture about the project.

Our mission puts high priority on site selection.

(2) Field survey of the candidate sites.

We conduct field surveys on the sites to examine their suitability for locating the farming institute.

(3) Survey on the local construction conditions and collection of other relevant data.

This is done mainly for the preparation of the basic design of the institute for grant aid purpose.

Survey and consultation items are listed chronologically below

1. First discussion with the government of the Philippines.

- (1) Background of the Project
- (2) Objectives and Activities of the Project
- (3) Function of the Institute
- (4) Selection of Site
- (5) Management System
- (6) Budgetary arrangement
- (7) Operation Planning
- (8) Others

II. Field survey of the proposed sites

- (1) Topography
- (2) Geology
- (3) Meteorology
- (4) Water utilization
- (5) Situation of the infrastructure around the sites
- (6) Feed availability such as local fishery and other animal farming
- (7) Facilities in the neighbouring towns
- (8) Water quality
- (9) Social condition such as acceptability of local people and accessibility to the sites

III. Second discussion with the Government of the Philippines

- (1) Field survey report
- (2) Further discussion on the item I. above

IV. Field survey

- (1) Further survey
- (2) Survey of local construction conditions

V. Collection of other relevant data and information

(2) 質 問 表

Questionnaire

I. Background of the Project

- a) Whether the Philippines ratified the Convention on International Trade in Endangered Species of Wild Fauna and Flora (so called the Washington Convention).
- b) How the Philippines corresponds to the Washington Convention.
- c) What position does this project occupies in the overall national development program.
How will the technology thus developed be utilized in the national development program. By what organization and by how much budget.
- d) Please explain about the Philippines Government's conservation programs of wild fauna and flora.
- e) Please list development programs concerning Mindoro and Palawan.
- f) Other governmental policies or programs relevant to the Project.

II. As to the Project

- 1) Objectives and Activities of the Project:
 - a) Please list the objectives of the Project.
Are they quantifiable.
 - b) Social and economic role of the Project and its effect.
 - c) In what way the establishment of the Institute contributes to the development of rural communities.
 - d) What kind of activities are needed for the Institute for the accomplishment of the objectives.
 - e) What do you want from Japanese Technical Cooperation (ex. Expert dispatch, Training in Japan etc.)
- 2) Function of the Institute
 - a) What functions are required to the Institute to carry out the above activities.
 - b) Whether there are any training or diffusion programs of crocodile farming technology.
 - c) Approximate number of crocodiles to be farmed for the above activities of the institute.

3) Selection of Site:

- a) Reasons that the two proposed areas (Lake Naujan and Puerto Princesa) are selected for the site.
- b) Whether there are any local development programs affecting the establishment of the Institute, if any, what influences.
- c) What are the local conditions around the sites, such as industries, population, employment situation, household income, etc ?
- d) Access to the proposed sites
- e) Please submit records of disasters around the site area (flood, earthquake, wind).
- f) How much is the water level difference in the rainy season and the dry season ?
- g) Situation of infrastructure such as electricity, water, and other public utilities at the sites.
- h) Living conditions Around the sites.
- i) Are there any regulations affecting the project.

4) Management System :

- a) What position the Institute will share in the Ministry of Natural Resources.(General Organization Chart)
- b) Organization of the Institute
- c) Staff planning program in this organization

5) Overall budgetary program for the project.

- a) Please submit the accounts of the past 3 years' balance and the annual budgets of the Bureau of Forest Development and the Ministry of Natural Resources.
- b) Whether financial arrangements for the Philippines government's work (topographic survey, geologic survey) is made ?
- c) Whether budgetary measures for the Philippines government's work (grading, roadconstruction, incoming of electric wiring etc.) are ensured.
- d) Budgetary measures for the procurement of adult crocodiles.
- e) Budgetary measures for running local cost such as maintenance cost, feed, wages for local experts and staff, transportation and travel allowance for experts and staff, heat and light, fuel cost etc.)

6) Operation planning

- a) Recruitment of counterpart personnel and other employees.
- b) Arrangements for the dwelling units for the counterparts from other areas.
- c) Means of transportation for commutation
- d) Whether the procurement of adult crocodiles is ensured. Feasibility of procurement.
- e) Capability of distinction between male and female crocodiles, and judgement of age before the procurement.
- f) What kind of foods are fed to crocodiles ?
- g) Whether the sufficient food is available regularly.
- h) Please list major fishing ports near the Site.
- i) Whether there are poultry farms and slaughter houses near the Site.
- j) What methods are considered effective for the prevention of robbery of crocodiles.
- k) Is it necessary to have a water treatment facility.
- l) How do you cope with waste treatment ?

7) Others

- a) Presentation of Data
 - i) Distribution of crocodiles per species and region-wise population of crocodiles in the Philippines.
 - ii) Seasonal weather conditions at the Site area (rainfall, temperature, water temperature, floods, typhoons etc.) --- data in past several years.
- b) Survey and Test by the Philippines Government
 - i) Please make detailed geologic survey at the selected site and provide plans promptly (request items and specifications are in sperate sheets).
 - ii) Please execute boring, penetration test, laboratory test of immediately for the planning of building and earth work.
(request items and specifications are in separate sheet)

c) Privileges and Exemptions

The Republic of the Philippines will take necessary measures to assume (through its implementation agencies) all customs, duties, internal taxes and other fiscal levies which may be imposed in the Philippines on the Japanese Nationals with respect to the supply of products and services.

d) Treatment for Japanese experts during the Technical Cooperation.

The Japanese experts and their families shall be granted in R.P., the privileges, exemptions and benefits no less favourable than those accorded to experts of third countries working in the R.P. under the Colombo plan Technical Cooperation Scheme. Also, R.P. provides at her own expence

- (1) Transportation means and travel allowance for the official travel of Japanese experts.
- (2) Suitably furnished accomodations.

Field Survey Items

1. Siting requirements

- (1) Land
 - a) availability of adequate area
 - b) acquisition of land
 - c) construction of facilities

- (2) Weather
 - a) waterfall, temperature
 - b) flood, typhoon etc.

- (3) Water
 - a) water supply, quality
 - b) discharge regulation

- (4) Acquisition of parent crocodiles

- (5) Acquisition of feed

- (6) Adequacy of infrastructure

Transportation

Communication

Electricity

Gas

Water

Telephone

- (7) Relation with local residents

- (8) Prospect of income from visitors

2. Living Environment

- (1) Residents, food supply
- (2) Safety
- (3) Disease, medical facilities

7. 調査団質問事項に対する比側の回答

PROJECT TITLE: RP-JAPAN CROCODILE FARM
BREEDING INSTITUTE

I. BACKGROUND

The Philippines is the origin of two crocodile species; the Mindoro crocodile (Crocodylus mindorensis) and Saltwater crocodile (Crocodylus porosus) which are now on the verge of extinction.

The decimation of crocodiles is attributed to uncontrolled and all season hunting for hides, meat, medicine and for sports: natural predation by other animals specially in the egg and hatching stages; extensive collection of eggs; and loss of habitat due to construction, river diversions, water pollution and human disturbances/encroachment.

The declining population of crocodile, as well as other wild fauna and flora, has been felt not only in the Philippines but also world-wide. In fact, there is an increasing trend towards the protection of wild fauna and flora on a international scale, as seen in such cases as the rapid increase in number of party nations to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (cites) what is called, "Washington Convention" signed in 1973 and ratified by the 59th nations before the end of 1979.

As one of the more concerned nations, the Philippines, ratified the CITES which listed the crocodiles including the Philippine species and its Appendices of Endangered Species. Thus, trade of the same the convention is strictly controlled.

This convention on International Trade in Endangered Species of Wild Fauna and Flora significantly calls for and encourages each concerned nation to initiate nationwide action-programme towards the proper conservation and development of endangered wild fauna and flora.

In response to this, the Philippines had made initial action-oriented programmes which are now gaining conservationists and public support. These programmes are geared towards conserving endangered faunal species like pawikan, Philippine eagle, Philippine tamaraw, to name a few.

The importance of establishing crocodile stock farming in the country therefore, cannot be undermined. Primarily, it is a conservation program but ultimately, it is envisioned to serve the industrial sector since it is a source of raw materials for export and employment opportunities.

This project also falls within the country's development strategies of attaining a sustainable economic growth

and in improving the welfare of the populace. It also promotes agro-industrial development and enhances the growth of small and medium-scale enterprises.

Among the government policies that support the project includes the following:

- 1) the development of an efficient management of natural resources that is more responsive to priority programs in food, energy, industry, exports, housing, and construction.
- 2) a continued effort in protecting the country's rare and endangered species which includes among them the Philippine crocodile; and
- 3) the promotion of export competitiveness through technological upgrading and skills development.

However, the project should conform with the following government regulations; namely:

- i) approval from the National Environmental Protection Council so as to determine whether the implementation of such development projects proceeds in harmony with the environment; and
- ii) a ban on all imported exotic species and the breeders shall be mainly composed of two (2) major species namely that of *Crocodylus porosus* and *Crocodylus Mindorensis*.

II-1 OBJECTIVES

A. Development Objectives

The long-term objectives of the project are: to promote the socio-economic well-being of the rural communities through the introduction and development of crocodile stock farms, and to promote the preservation of crocodiles by providing an alternative and adequate source of export-quality species.

B. Short-term Objectives

1. To top the local manpower supply in the construction maintenance and other related activities of the Institute.
2. To formulate an effective and appropriate technology that will maximize the breeding capability of the selected crocodile species.
3. To determine the effectiveness of raising/breeding crocodiles under controlled conditions so that the wild population can be protected and preserved.
4. To restore the population of the crocodile to a level safe from extinction.
5. To develop the appropriate technology in effectively propagating the crocodile.
6. To determine constraints, especially diseases and feeding problems, that will affect the well-being of the stock.
7. To promote the national awareness and appreciation of wildlife species found therein for the benefit and enjoyment of the local residents as well as foreign visitors.
8. To formulate a program which will provide for the dissemination of the breeding technology to a larger number of beneficiaries.
9. To develop and maintain other farms in order to produce enough volume of progenies for export abroad.

II-2 ACTIVITIES OF THE PROJECT

During the construction of the Institute, it is expected that the residents of the nearby areas will be tapped to fill the manpower requirements of the projects, especially laborers, carpenters, masons and other semi-skilled workers.

When the project begins to operate, additional employment opportunities will be generated in view of the numerous positions required in operating the Institute. Among them are: care-takers, security force, laboratory staff, gardeners, cleaners and administrative support staff.

In order to attain and realize the above-mentioned objectives, the Japanese government, through JICA, should be requested to provide the following:

1. Crocodile Breeding and Research Institute - A building complex which will include the following facilities should be established in a property selected and suitable area.

1. Research Laboratories
2. Administration Building
3. Feeding Building
4. Warehouse
5. Staff house and maintenance room
6. Waste Disposal Building
7. Powerhouse
8. Water Tank & Dumping Station
9. Breeding Ponds (large area)
10. Boat Piers
11. Motorpool (Boats & Land Vehicles)
12. Access Road
13. Security Light & Fencing
14. Recreational Facilities (Tennis Court & Basketball Court)
15. Parking Lot

2. Dispatch of Crocodile Experts to the Institute - A group of crocodile experts should be detailed to the Institute until such time that the local experts can effectively manage and administer the activities/researches of the Institute. These experts would ensure the safety and well-being of the initial stock. They will also conduct researches related to the breeding of the crocodile.

3. Training of Local Experts - Local experts should be sent to Japan to undergo research training on crocodile breeding. Local training will also be undertaken.

4. Equipment - In order to effectively operate the Institute, the following equipment should be installed or should be made available.

1. Laboratory Instruments
2. Experimental Instruments
3. Freezer Equipment
4. Medical Instruments (with chemicals & medicines for Experiments)
5. Office Equipment:
 1. Typewriters
 2. Copying Machine
 3. Tables/Chairs
 4. Cabinets and Rocks
6. Portable generator
7. Audio-Visual Equipment
 1. Overhead Projector with Screen
 2. Video Camera
 3. Video Cassette Deck & TV Set
8. Communication Equipment
 1. Radiotelegraphic Machine
 2. Intercom & Paging System
 3. SSB Radio
 4. VIIF Radio (mobile & handheld units)
9. Vehicles & Tools for Maintenance
 1. Trucks
 2. Forklift
 3. Payloader
 4. Motor Boats (small)
 5. Refrigerator Truck

II-2 FUNCTIONS OF THE INSTITUTE

The main functions of the Institute would be:

1. To train Project personnel and eventually the local residents on the advance methods of crocodile farming.
2. To conduct research on the suitable methods and techniques of breeding and propagation.
3. To conduct research on how to control problems on diseases, feeds, egg fertility and other difficulties that will affect the breeding of the species.

A comprehensive program, which will transfer the breeding technology to a larger number of beneficiaries, should be initiated. This will be the initial step towards the establishment of small-scale breeding farms.

An initial stock of 150 female and 50 male crocodiles will be maintained in the institute.

II-3 SELECTION OF SITE

The two areas selected for the site are Lake Naujan in Mindoro and Iwahig, Palawan. These were selected based on the following criteria:

1. existence of crocodiles in the area;
2. accessibility to transportation;
3. adequacy of land area with a component body of water.
4. presence of vegetative cover, preferably trees/shrubs and grasses; and
5. relative distance from human settlements.

answers to the other questions, please refer to the attached profile of Mindoro and Palawan.

II-4 Management System

II-5 Overall Budgetary Program

The budgetary appropriations from 1981 and 1983 MNR-Office of the Minister and BFD are attached for reference.

Related informations on the Philippine counterpart funds for the Project will be submitted later, after consultation meetings with the Ministry of the Budget have been completed.

II-6 Operation Planning

Answers to questions a to 1 will be submitted later (on or before Friday, November 18, 1983), although some preliminary informations will be found in the attached provincial profile for the two areas (Questions C & H).

II-7 Others

Informations for item a will also be submitted later together with the detailed answers on items c and d.

Conduct of the activities involve in item b will be finalized later.

Answers to Questionnaire

6. Operation planning

- a. Recruitment of counterpart personnel and other employees.

Answer: Counterpart personnel are available in the central and district offices. Laborers/ caretakers shall be recruited from the local areas.

- b. Arrangements for the dwelling units for the counterparts from other areas.

Answer: The Philippine government will provide dwelling units within the project site for the counterparts from other areas.

- c. Means of transportation for commutation.

Answer: The Philippine counterparts shall be provided with dwellings, there is no need for transportation. Only the experts will need the transportation.

- d. Whether the procurement of adult crocodiles is ensured. Feasibility of procurement.

Answer: The Philippine government will be responsible in the procurement of adult crocodiles.

- e. Capability of distinction between male and female crocodiles and judgement of age before the procurement.

Answer: The Bureau of Forest Development has biologists who can differentiate sexes of the crocodiles as well as the age before procurement.

- f. What kind of foods are fed to crocodiles.

Answer: Ross and Datuin (1981) reports that the two species of crocodiles in the Philippines eat a variety of food. Young crocodiles subsist on insects, crustaceans, frogs and other small animals. As they grow larger, they still eat these foods but are able to catch increasingly larger prey like snakes, lizards, land and pond turtles, small mammals and birds. Fish are a minor part of their diet and normally only sick and dead fish and some slow moving fish species are eaten. In the Institute, crocodiles shall be fed with fish, frogs, entrails of pigs and chicken as well as foetus of pigs.

g. Whether the sufficient food is available regulaly.

Answer: Food is available.

h. Please list major fishing ports near the Site.

Answer: This is provided in the Provincial profiles of Oriental Mindoro and Palawan.

i. Whether there are poultry farms and slaughter houses near the site.

Answer: Yes.

j. What methods are considered effective for the prevention of crocodiles.

Answer: Fencing of ponds or pens.

k. Is it necessary to have a water treatment facility.

Answer: This was considered during the discussions of the grant-in-aid and shall be provided by the Japanese government.

l. How do you cope with waste treatment.

Answer: Wastes including that waste from the crocodile pens shall be treated before drainage to the river of lake.

7. Others

a. Presentation of Data

i) Distribution of crocodiles per species and regionwise population of crocodiles in the Philippines.

Answer: Ross and Datuin (1981) reports that Crocodylys mindorensis is found in the islands of Luzon, Misamis, Busuanga in Northern Palawan, Negros, Samar, Mindanao and Jolo. It was recently found in the islands of Negros and Samar; it is likely to be found in other Visayan Islands and in Palawan. Crocodylus porosus was more widely distributed and probably occurred on most of the Philippine islands in coastal areas, large lakes like Lake Naujan and major rivers. No formal study was done in the population of crocodiles.

ii) Seasonal weather conditions at the site area. (rainfall, temperature, water temperature, floods, typhoon, etc.) -date in past several years.

Answer: Climate (annual) in Mindoro (Material enclosed)

- a. rainfall - 20-24cm
- b. no. of rainy days - 188
- c. temperature
 - mean - 26.9° C
 - maximum - 30.6° C
- d. days with thunderstorm - 89

Palawan (Material enclosed)

- a. rainfall - 1,566.9 mm
- b. no. of rainy days - 127
- c. temperature
 - mean - 27.5° C
 - maximum - 31.4° C
- d. No. of days with thunderstorm - 29

Answers to 7 b., c., and d. will be provided later,

Prepared by:

LUZ C.GONZALES
Chief, Wildlife Mgt, Section

Staff list of the Institute

I.	Office of the Institute Director	6
	1. Institute Director	1
	2. Asst. Institute Director	1
	3. Secretary	2
	4. Clerk/Typist	2
II.	Administrative and Financial Support Staff	27
	1. Administrative Officer	1
	2. Administrative Assistant	1
	3. Accountant	1
	4. Accounting Clerk	1
	5. Special Disbursing Officer	1
	6. Personnel Officer	1
	7. Personnel Clerk	1
	8. Technician for electricity	1
	9. Mechanic	2
	10. Driver	7
	11. Security Guard	4
	12. Cook	1
	13. Kitchen Helper	1
	14. Janitor	2
	15. Doctor	1
	16. Nurse	1
III.	Research and Development Division	35
	1. Biological Research Personnel Biologist	
	2. Nutrition Development Chemist/Biologist	
	3. Disease Research Vet. Med./Technical	
IV.	Training Services Division	12
	A. Course Design Section Biologist	
	B. In house Personnel Training Biologist	
	c. Wildlife Extension Section Biologist Sociologist	

8. 天然資源省の予算推移

(1) 1981

Bureau of Forest Development

Current Operating Expenditures

1.0 Development and Conservation of Forest Resources. For development and conservation of forest resources, in- cluding forest resources management, reforestation and afforestation, and general administration and support services	<u>444,967,000</u>
1.1 Forest Resources Management....	234,346,000
1.2 Reforestation and afforestation	179,877,000
1.3 General Administration and Support Services	<u>30,744,000</u>
Total Current Operating Expenditures, Bureau of Forest Development	<u>444,967,000</u>

Capital Outlays

2.0 Construction of Permanent Improvements, For construction of permanent improvements	<u>7,755,000</u>
2.1 Construction of permanent Improvements	<u>7,755,000</u>
Total Capital Outlays, Bureau of Forest Development.....	<u>7,755,000</u>
Total New Appropriations, Bureau of Forest Development	<u>452,722,000</u>

Management of national parks, game
refuges and bird sanctuaries, including
the inventory of wildlife and the
protection and preservation of endangered
species of flora and fauna 16,678,000

(2) 1982

Bureau of Forest Development

Current Operating Expenditures

1.0 Conservation and Development of Forest Resources. For conservation and development of forest resources, including conservation, development, protection of forest resources and general administration and support services

500,524,000	
1.1 Conservation of Forest Resources	139,140,000
1.2 Development of Forest Resources	232,292,000
1.3 Protection of Forest Resources	87,961,000
1.4 General Administration and Support Services	41,131,000
Total Current Operating Expenditures, Bureau of Forest Development	<u>500,524,000</u>

Capital Outlays

2.0 Capital Outlays. For capital outlays, including construction of permanent improvements and acquisition of equipment

21,846,000	
2.1 Construction of Permanent Improvements	19,098,000
2.2 Acquisition of Equipment	<u>2,748,000</u>
Total Capital Outlays, Bureau of Forest Development	<u>21,846,000</u>
Total New Appropriations, Bureau of Forest Development	<u>522,370,000</u>

Preservation and development of national parks, wilderness areas, game refuges and bird sanctuaries, including the wildlife therein

18,737,000

(3) 1983

Bureau of Forest Development

Current Operating Expenditures

1.0 Conservation and Development of Forest Resources. For conservation and development of forest resources, including conservation, development, protection of forest resources and general administration and support services

1.0 Conservation and Development of Forest Resources. For conservation and development of forest resources, including conservation, development, protection of forest resources and general administration and support services	511,402,000
1.1 Conservation of Forest Resources	140,875,000
1.2 Development of Forest Resources	228,696,000
1.3 Protection of Forest Resources	90,336,000
1.4 General Administration and Support Services	51,495,000
Total Current Operating Expenditures, Bureau of Forest Development	<u>511,402,000</u>

Capital Outlays

2.0 Capital Outlays. For capital outlays, including construction of permanent improvements and acquisition of equipment

2.0 Capital Outlays. For capital outlays, including construction of permanent improvements and acquisition of equipment	26,996,000
2.1 Construction of Permanent Improvements	19,604,000
2.2 Acquisition of Equipment	<u>7,392,000</u>
Total Capital Outlays, Bureau of Forest Development	26,996,000
Total New Appropriations, Bureau of Forest Development	<u>538,398,000</u>

Preservation and development of national parks, wilderness areas, game refuges and bird sanctuaries, including the wildlife therein

Preservation and development of national parks, wilderness areas, game refuges and bird sanctuaries, including the wildlife therein	23,229,000
---	------------

9. 面談者リスト

ARNOLD B. CAOILI	M.N.R. DEPUTY MINISTER
ANTONIO Y. CAPAI	M.N.R. ASST. MINISTER
JESUS B. ALVAREZ Jr.	B.F.D. ASST. DIRECTOR
LUS GONZALES	P.W.D/ B.F.D.
L. FERER	P.W.D/ B.F.D.
VICTORIA P. TA-ASAN	NEDA
VICTOR LORETO	FAPMO
LUISA FGNAEIO	FAPMO
RUDY M. LEAL	PWS/BFD
ERLINDE E. CARRASCO	BFT/MTI
D. M. GERODIAS	FAPMO. (consultant)
Dr. MANUEL BRAVO	FORI
PELAGIO BAUTISTA Sr.	BFD (Calapan)
FELIX DE GUZMAN	BFD (Calapan)
TED J. RAGUDO	BFD (Puerto Princesa)
ADAM AUSAN	BFD (Puerto Princesa)
EMY COJAMCO.	BFD (Puerto Princesa)
CITA LU MANSALE	PFDA
DANTE M. JIMENEA	PFO. BFAR (Calapan)
ADOLF G. COMIA	P.A.O.
WILFRED P. INOVEJAS	MNR
Dr. CARME E. CASPE	M.A.
EROSTRO Y. QUETURIO	PFO BFAR
EDWIN T. DUMLAO	
LUIS O. PANTUA	OFFICE OF GOVERNOR, Calapan
FELIX B. ANTONIO Jr.	TFRWSS
ARTURO B. AMURAO	NAI
RICO AXALAN	OMEC
DEMETRIO B. AQUINO	Geodetic Eng'r EDUARDO R. SALVADOR
Dr. JUAN L. UMALI	M.A.
W.A. MASANGCAD	PAGASA (Puerto Princesa Airport)
G.B. PACIO Jr.	DFO. (Roxas)

JICA