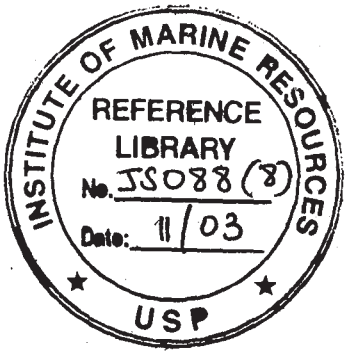
C15/5/4.11

# INSTITUTE OF MARINE RESOURCES

## ANNUAL REPORT TO COUNCIL

## 1982




by

Dr. Leon P. Zann
Acting Director*

and

Dr. U. Raj
Director
Institute of Marine Resources
The University of the South Pacific

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* Acting Director Dr. U. Raj on July study leave. 1982 to March 1983 in absence of Director

1 November, 1982

CONTENTS

# 1. INTRODUCTION

The Institute of Marine Resources was established in January 1978, with the following objectives:

(a) *research into regional marine resources, including fish stocks and stocks of other kinds of marine life, undersea minerals and exploration of the seabed,*

(b) *the development of consultancy services for regional governments,*

(c) *development of educational programmes in marine sciences,*

(d) *the dissemination generally of information on tropical marine environment.*

The task of the IMR is to fulfil the above objectives by being:

(a) *an advisory body for Governments in all questions of the exploration of Marine Resources inside and outside of 200 nautical mile economic zone, and in problems of the protection of the environment,*

(b) *a scientific institute carrying out applied scientific study in living and non-living resources of the sea for the island countries of the U.S.P,*

(c) *an educational institute, through direct research and indirect means.*

In order to fulfil these tasks the Institute is attempting to develop expertise and resources in the following areas:

*marine biology*
*fisheries biology*
*aquaculture*
*food technology as applied to marine products*
*marine geology and marine geophysics*
*physical, chemical and biological oceanography and related marine meteorology*
*marine pharmacology*
*coastal marine engineering.*

# 2. FACILITIES AND EQUIPMENT

## 2.1 BUILDINGS

The main location of the Institute is on the Laucala Campus in Fiji. The Institute is accommodated in two two-storey blocks and a laboratory and lecture hall formerly occupied by the School of Natural Resources (floor area comprises 1700 sqm: offices 736 sqm; teaching/laboratories 20 sqm; research laboratories (3) 150 sqm; workshop 100 sqm; stores 480 sqm).

The Institute has a field station at Dravuni Island, Kadavu, with a small laboratory and 16 bed dormitory (floor area: 103 sqm). The Dravuni station, funded by E.E.C., was completed in December 1981 and was opened by Fiji's Prime Minister, Ratu Sir Kamisese Mara.

A second, smaller station is being constructed in Tonga, at the Fisheries Division headquarters in Nuku'alofa. The Institute is also to have access to a Fisheries Division laboratory.

The Institute's Atoll Research Unit (ARU) is located on Tarawa Atoll, Kiribati. This comprises a laboratory, offices and storage area (floor area 182 sqm) and a three-bedroom cottage nearby.

## 2.2 EQUIPMENT

The Institute is now well-equipped to undertake basic research in oceanography, marine biology and fisheries.

Miscellaneous laboratory glassware, ovens, precision balances, chemicals, photographic and darkroom equipment, fishing gear, nets, oceanographic instruments (salinity, temperature, pH etc., current metres; dredges, grabs, plankton nets etc.) and diving equipment (two high pressure compressors, 14 complete sets of SCUBA tanks and all gear) have been provided by EEC, French and other aid.

The Institute has two motor vehicles: a 4-wheel drive, short wheel base Landrover (18 months old) and a Datsun pickup utility (one month old). Both are in excellent condition. The Atoll Research Unit has one truck, a Whitby (2½ years old), in poor condition. This will have to be replaced as soon as possible.

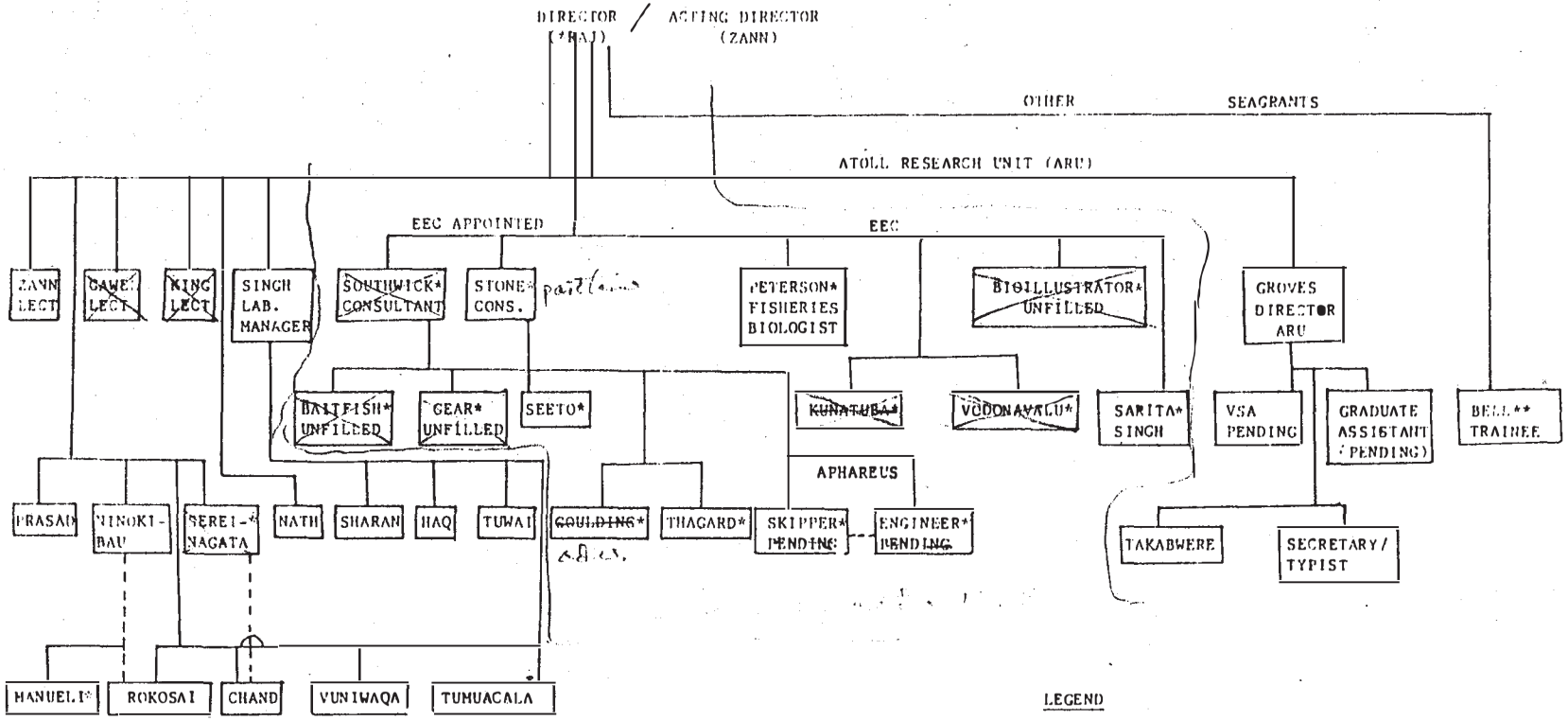
## 2.3 FLEET

*Nautilus:* 13m G.R.P. (fibreglass) launch powered by a V8 Caterpillar diesel. Hydraulic winch, pot haulers and fishing reels; radar, echosounders and radio. (Construction cost $60,000, built in Canada, launched 1976).

*Aphareus:* 13.7m steel fisheries training and research vessel powered by a GM 471 diesel. Hydraulic capstan, hauler, and reels; radar, echosounder, livebait well and ice hold. (Cost $140,000, built in Suva). The *Aphareus* was launched by Adi Lala Mara, the wife of Fiji's Prime Minister, in June, 1982.

Outboard craft: Three 4m rubber inflatable dive dinghies, three 4m alloy dinghies, three timber punts of 5 to 8m. The Atoll Research Unit has one 5m alloy outboard-powered craft.

INSTITUTE OF MARINE RESOURCES - STAFF ESTABLISHMENT, 1982




STAFF CATEGORY

1. SENIOR ACADEMIC AND COMPARABLE

2. GRADUATES, RESEARCH ASST. AND JUNIOR FELLOWS

3. JUNIOR INTERMED. (SECRETARY, TYPIST CLERK, SKIPPERS, FISH. ASST. TECH.

4. *UNESTABLISHED HOURLY PAID STAFF, TEMPORARY ASSISTANTS.

LEGEND

* EEC Establishment

** SEAGRANTS Establishment

LECT. Lecturer

CONS. consultant (part time)

LAB. MANANAGER. Laboratory Manager

PEND. Pending (to be filled before 1983)

## 3. STAFF

Table 1 summarizes the Institute's establishment, post descriptions and staff categories. Thirty seven posts were occupied, temporarily unfilled and pending during 1982.

### 3.1 PERMANENT ESTABLISHMENT, ESTIMATES

The Institute operates with a small core staff but draws upon specialized staff from project funding and affiliated overseas universities and institutes.

The 1982 estimates, and a projected estimate for a core staff only for the following traiannium 1983 to 1985, are detailed in Appendix I.

### 3.2 AID-FUNDED ESTABLISHMENT

Over half the Institute's staff, including several key posts, are funded by EEC aid, International Seagrants and bilateral aid schemes. The implications of the cessation of EEC funding are therefore considerable.

Several vital EEC positions remained unfilled during 1982 because of the short duration of contracts (to December 31, 1982) and unavailability of specialized local expertise. The protracted times involved in recruitment (obtaining approval, advertising, selection etc.) of specialised staff, and long delays in ordering and delivery of equipment from overseas (6-18 months), has affected the execution of some EEC projects.

### 3.3 SHORT-TERM APPOINTMENTS

In addition to the above, the Institute obtained the services of six associate lecturers on part-time bases, from the Ministry of Agriculture and Fisheries and the Maritime Training School, Fiji Institute of Technology.

### 3.4 LEAVE, MOVEMENTS

The Institute was short-staffed during the latter half of 1982.

Long leave, study leave: Lecturer Dr. Zann took long leave and study leave from December 9 1981 to June 9 1982. His teaching commitments were temporarily filled by Mr. Gawel. The Director, Dr. Raj, left on study and long leave in June, 1982 to return in late March, 1983. Lecturer M. King took study and long leave from July 1982 to return in January 1983.

Atoll Research Unit: M. Gawel was sent to ARU, Kiribati, from September 1982 to December 1982, to temporarily relieve Dr. Groves as Director (as requested by Dr. Groves to Dr. Maraj, see ARU Report). Ms. L. Bolton, VSO Research Assistant at ARU, completed her contract in June 1982.

Training leave: Technician H. Haq took 3 weeks leave for training in fish poisoning techniques at University of Hawaii (October 28 to November 20). F. Manueli is currently being trained in geological techniques at Victoria University, (November 1 to December 24). Two EEC graduate research assistants resigned from the Institute to undertake two year courses in Fisheries at Kagoshima University, Japan.

## 4. TEACHING AND TRAINING PROGRAMMES

The Institute services the Diploma of Tropical Fisheries and two third-year degree courses for SNR, as well as post-graduate studies.

### 4.1 POST-GRADUATE

(a) Ph.D:

M.G. King - "The Biology of Natantian Decapods of Fiji, with special reference to *Heterocarpus* spp. and *Parapandalus* spp".

Principal Supervisor: Dr. Uday Raj.
This thesis is at an advanced phase and will be completed in 1983.

(b) M.Sc:

G. Pillai - "The Biology of the mud lobster ("Mana"), *Thalassina anomala* (Herbst).

Principal Supervisor: Dr. Uday Raj. This thesis was submitted in September, 1982.

(c) S. Choy - "The Biology of Penaeid prawns in Fijian coastal waters".

Principal Supervisor: Dr. Uday Raj. This thesis was completed in 1981 and was awarded, with a distinction, in 1982.

(d) M. Guinea - "The Biology of sea snakes of Fiji".

Principal Supervisor: Dr. Uday Raj.
Mr. Guinea has now left USP but the study is expected to be completed in 1983.

(e) Lesley Bolton - "Biology of the marine clam, *Anadara maculosa*".

Principal Supervisor: Dr. Uday Raj
Ms. Bolton has now left USP but this thesis will be completed in 1983.

(f) M. Phil.

R. Tewaki - "The policies and administration of marine resources in Kiribati".

Supervisors: Prof. R. Crocombe IPS; Dr. Zann IMR,
Prof. A. Pardo (U.S.C.)

This study will be completed by 1984.

## 4.2 B.SC. COURSES

| | | |
|---|---|---|
| NR335 | Marine Biology (final year B.Sc.) | Dr. L.P. Zann |
| NR337 | Fish and Fisheries Biology | Dr. U. Raj & M. King |

## 4.3 DIPLOMA OF TROPICAL FISHERIES

### DTF I

No entries in 1982. Three direct entries into DTF II.

### DTF II

| | | |
|---|---|---|
| NRD51 | Invertebrate Zoology | Dr. L.P. Zann |
| NRD52 | Ichthyology | P. Ryan (SNR) |
| NRD53 | Navigation A | Capt. Ori (FIT) |
| NRD54 | Navigation B | Capt. Tiko (FIT) |
| NRD55 | Practical Fisheries A | R. Stone |
| NRD56 | Practical Fisheries B | R. Stone |

### DTF III

| | | |
|---|---|---|
| NRD61 | Oceanography and Marine Ecology | Dr. L.P. Zann |
| NRD62 | Fisheries Biology and Management | M. King |
| NRD63 | Aquaculture | S. Choy (SNR) |
| NRD64 | Marine Engineering Knowledge | (FIT) |
| NRD65 | Boat Designs and Boat Building | A. Rajalingam (FIT) |
| NRD66 | Fisheries Economics and Management Principles | P. Kunatuba |
| NRD67 | Fisheries Extension and Communications | P. Narayan (MAF) |

*Note: Because of declining demand from Fiji, uncertain enrolment from the regional countries, the high cost of this program and this University's precarious financial position the University has decided to terminate this program. There was no DTF I in 1982. The present DTF II will proceed into DTFIII in 1983 after which the course will discontinue.*

Declining regional enrolments are partly attributable to SPC sponsorship of a Nelson Polytechnic fisheries programme *despite assurances that New Zealand would not mount any programme competing with this University (U.R.). Four USP regionals are attending that course in 1982.*

## 4.4 TRAINING PROGRAMS

The Institute services the UNDP funded "Basic Earth Science and Marine Geology Certificate", an 8 week course in January, February, 1983. Participants come from the USP region as well as Papua New Guinea.

Special training is available for individuals under the Institute of Marine Resources/Hawaii Institute of Marine Biology International Seagrants program. Projects for 1982 include: prawn aquaculture; International Law of the Sea; fish poisoning.

## 4.5 KAGOSHIMA MEMORANDUM OF UNDERSTANDING

The Vice Chancellor and Director of IMR signed a Memorandum of Understanding with Kagoshima University in July, 1982 (Appendix II).

The Memorandum aims to promote research and training co-operation in marine sciences with the Institute of Marine Resources, USP, and the Research Centre for the South Pacific, Kagoshima. Two graduate assistants of IMR are now undertaking two year courses in fisheries at Kagoshima and the research vessel of Kagoshima University, the Kagoshima maru has twice visited Fiji.

## 4.6 PROPOSED NEW PROGRAMS

*Fisheries and marine sciences are amongst the most relevant studies for the island nations of the South Pacific.* With the termination of the Diploma of Tropical Fisheries program this University will offer a minimal component of marine studies in its curriculum.

We therefore strongly recommend that the University increases its offerings in marine studies. Amongst possible programs are:

### (a) B.Sc. in Marine Sciences

We urge the Council to accept our suggestion that a B.Sc. in Marine Sciences be instituted as soon as possible. Much interest has been shown by diplomates of DTF already in the field in upgrading their qualifications. Of the 100 diplomates who have graduated, many now find themselves in research situations not adequately prepared for by DTF. These require further background in marine biology and resources statistics, experimental methodology etc. It is estimated that the course would attract 6 to 10 enrolments per year and be run over an initial period of 5 to 6 years.

The Institute's existing DTF teaching staff and facilities could adequately cover this new program.

### (b) General Marine Studies

We recommend that a marine studies option be run in conjunction with SSED and SOE. Many graduates employed in education departments, other government departments and the private sector require a knowledge of marine resources and environment.

### (c) Practical Training Program

The termination of DTF creates a void in the area of practical training. Fisheries training courses overseas can offer no practical training in appropriate South Pacific fisheries. It is therefore suggested that the Institute mount short-term courses (4 weeks to 6 weeks) in aspects of South Pacific fisheries, such as *Fish poisoning, aquaculture, gear technology, deepsea snapper fisheries, prawn fisheries etc.*

These would be funded by outside agencies such as World Health Organization (supporting a workshop in January 1983); U.N.D.P. (supporting the Earth Sciences and Marine Geology course), Seagrants International etc.

## 5. RESEARCH AND CONSULTANCIES

The Institute continued its research program in 1982 with the EEC Marine Resources Development Project drawing to a conclusion.

### 5.1 MARINE RESOURCES DEVELOPMENT PROJECT

This project began in 1980 under EEC funding from Lome 1. The major projects in 1982 were:

*Deep sea snappers*
*Deep sea prawn biology*
*Mangrove ecosystems*
*Tuna baitfish*
*Traditional fishing knowledge in Fiji*
*Gear Technology*
*Lagoon, reef fisheries**
*Sea mounts**

EEC fisheries biologist Mr. Sten Munch-Petersen arrived in June for a one-year study of tuna baitfish and nearshore lagoonal fish.

Most projects have now been completed and final reports are to be submitted to EEC in January, 1983.

Several projects (*) were not completed because of delays in recruitment and the lack of a suitable vessel. Unspent funds from 1982 will be available for the completion of these projects in 1983 and to meet EEC contracts (continuing) after 31 December, 1982.

Further funding under Lome 2 is uncertain at the time of writing.

Cessation of funding will reduce staff by one half, greately affecting the Institute's research capability. Certain essential positions such as the master and engineer of Aphareus funded by EEC will have to be met in future years from other sources.

A submission for further funding under Lome 2 has been made for 1983 to 1985 (Appendix III).

### 5.2 STAFF RESEARCH

Other research conducted by staff and visitors in 1982 included:

*Biology of river mussels, Batissa*
*Artisinal fisheries in the South Pacific*
*Biology of carid shrimp*
*Ciguatera fish poisoning*
*Crustacean poisoning*
*Nautilus vision*
*Nautilus activity and physiology*
*Outer reef slope benthos*
*Marine isopods of Fiji*
*Zoanthids of Fiji*

### 5.3 *KAGOSHIMA-MARU EXPEDITION*

Fifty scientists from the Kagoshima University in Southern Japan (see 4.5 ) visited Fiji on the fisheries training and research vessel Kagoshima-maru from 29 December 1981 to 9 January 1982, and from 25 November 1982 to 2 December 1982.

Projects included:

*Oceanography of the South Pacific*
*Estuarine hydrology*
*Algology*
*Marine products*
*Nautilus biology*
*Batissa biology*

as well as other projects in medicine, agriculture, botany and fisheries.

The report from the first expedition has now appeared. Dr. Raj is currently assisting in an English language version.

### 5.4 CONSULTANCIES, ADVISORY

Consultancies since the last report include:

(a) A base-line study of Betio, Tarawa (CCOP/SOPAC. November-December, 1981: Dr. L. Zann).

(b) Deepwater prawns in Papua (SPC, April, 1982: M. King).

(c) Consultancy on deepwater prawns for SPC Technical meeting (SPC, July 1982: M. King).

(d) Coral mortalities (Fijian Hotel, July, 1982: M. Gawel, J. Seeto).

(e) Baseline study, Bau waters petroleum exploration (Bennett, May, 1982: M. Gawel, P. Kunatuba).

(f) Baseline study, Nadi petroleum exploration (above).

(g) Relocation of Suva dump (Town and Country Planning, October, 1982: Saula Vodonaivalu).

## 6. ATOLL RESEARCH UNIT

### 6.1 ATOLL RESEARCH UNIT REVIEW

As directed by Council in December 1981, a review of ARU was undertaken by Dr. Treyvaud, Dr. Raj and Mr. Slade (Appendix IV). Dr. Groves, Director of ARU, has lodged objections to 4.1 of the Review.

### 6.2 GENERAL PROGRESS

The Review Report identified 17 projects for 1982 (pp. 8-24). Of these Nos. 3, 4, 5, 7, 8, 10 and 11 have been satisfactorily completed; Nos. 1, 2, 9, 12 and 13 are continuing but will be completed by the end of 1982; Nos. 6 and 14 are being initiated by M. Gawel; and

Nos. 15, 16 and 17 are uncertain at time of writing because of difficulties in funding.

Dr. Groves and Ms. Bolton produced a range of Technical Reports in 1982 on their respective projects (see the Institute's Publications Section 8).

### 6.3 STAFFING

The ARU Director's contract has not been renewed and the position has now been advertised. Mr. Gawel has been Acting Director September to December. Ms. Bolton left ARU in June but a replacement from VSA has not yet arrived.

### 6.4 FUTURE DEVELOPMENTS

Following difficulties at A.R.U. the Director of this Institute indicated that I.M.R. would relinquish control of A.R.U. if it was the wish of the University. However, in accepting the ARU Review Report, The Institutes' Co-ordination Committee not only endorsed this Institute's role but felt that ARU should be strengthened, that its sphere should be extended to include *all* atoll islands of the University region, and its interests be expanded to include other problems of atoll life (i.e. agricultural, physical, social).

A selection of projects is now being proposed by the ARU Advisory Board and this Institute for 1983.

## 7. FUTURE DIRECTION AND DEVELOPMENT OF THE INSTITUTE OF MARINE RESOURCES

The Institute now stands at a cross-roads in its development. It is now fully equipped with a competent core staff but the present unfavourable financial climate threatens its future viability. Continued funding under EEC and other programs are uncertain, and its teaching program has been reduced.

### 7.1 FISHERIES AND MARINE SCIENCES EDUCATION

Following the withdrawal of DTF the academic program of the University of the South Pacific will be seriously lacking in marine sciences offerings. An academic institution serving 11 island countries whose territories mainly constitute the seas and whose resources are largely marine, will have only two, one-semester courses, in marine sciences.

We urge the Council to accept our suggestion that a BSc. program, built on 100 level and 200 level current SNR courses, be immediately instituted. The current facilities and personnel of IMR are adequate to mount such a program.

We also recommend that a general marine option course run by the Institute in co-operation with SSED and SOE be made available to the students of the two respective schools and that this Institute commence relevant extension courses in marine studies.

## 7.2 RESEARCH

The Institute is now being recognized in the international scientific community. Research on deepsea fishes, prawns, fish toxicity, Nautilus physiology etc. have already attracted considerable international attention. Council is urged to continue its support of this Institute's research capability.

It is noted that our co-operative programs with International Seagrants and the South Pacific Center in Research of Kagoshima University have increased the status of this Institution in the US and Japan. By continuing to support the Institute at its present level, there is every hope of attracting additional support from the leading nations in marine sciences and fisheries development.

A number of other institutions in Japan, Australia and the U.K. have already expressed their interest in similar co-operative programs. These provide an opportunity to firmly place USP as an international centre in tropical marine science.

The Institute will continue to encourage attachment of personnel from the regional countries to enable maximum benefits of these programs to be shared by the region.

## 7.3 STAFFING AND FUNDING

The Institute's staff, consisting of a small core of senior scientists, graduate assistants and support staff, constitutes a pool of expertise for teaching, research and consultancy services in the region. *It is imperative that this core staff be maintained as any reduction of staff would seriously affect the operations and credibility of the Institute.*

With its fleet of expensive research vessels and specialized equipment, any marine institute is expensive to operate. Such an Institute cannot adequately function on uncertain, year to year funding and under threats of staff reductions.

This Institute therefore must be given a clear directive at this time whether to continue its present operations or contract to become merely a marine station of the University. *We therefore very strongly urge the Council to make a clear policy decision regarding the future of the Institute of Marine Resources.*

# 8. PUBLICATIONS AND REPORTS 1982

The 1981 Report to Council lists the Institute's publications from 1979 to 1981 as: 1 book; 10 international publications with 7 in press; 25 technical and consultancy reports; and 15 papers in preparation.

Recent publication include:

## 8.1 INTERNATIONAL PUBLICATIONS, PROCEEDINGS ETC.

King, M.G. (1982. Deepwater shrimp resources of Vanuatu. Marine Fisheries Review. 43 (12): 10+7.

Zann, L.P. (1982). The Energy Crisis and Pacific Island Fisheries. Austr. Fisheries. 41: 24 - 29.

_____ (1982). Traditional patterns of utilization. pp 31 - 34. In: Proc. Utilization and Management of Inshore Marine Ecosystems of Tropical Pacific Islands, 1979 Seagrants.

_____ (1982). Changing technology in subsistence fisheries. Ibid pp 69 - 72.

King, M.G. and Stone, R.M. (1982). Commercial fisheries in Western Pacific Islands. Ibid pp 72 - 84.

Kott, P. (Associate) (1981). The Ascideans of the reef flats of Fiji. Proc. Linn. Soc. N.S.W. 105 (3): 147 - 217.

Raj, U. and Seeto, J. (in press). A new species of Paracaesio from the Fiji Islands. Copeia.

_____ (in press). A new species of Paratriacanthoides from the Fiji Islands. Japanese J. of Ichthyology.

_____ (in press). A new species of Plectranthias from Fiji Islands. Ibid.

## 8.2 TECHNICAL REPORTS

Groves, G. (1982). High waves at Makin in December 1979. ARU Technical Report.

_____ (1982). Flow through Tarawa Channels. Ibid.

_____ (1982). Earthquakes at Arorae. Ibid.

Bolton, L. (1982). Intertidal fauna of Southern Tarawa Atoll Lagoon, Kiribati. Ibid.

Silver, H. (Associate) (1982). Beche-de-mer in the deeper waters of Tarawa Atoll. Ibid.

Muntz, W. and Raj, U. (1982). Vision in Nautilus. IMR Technical Report.

Zann, L.P. (1982). The marine ecology of Betio Island, Tarawa Atoll. IMR Technical Report to U.N.D.P.

Zann, L.P., Kimmerer, W. and Brock, R. (1982). The Ecology and Fisheries of Fanga'uta Lagoon, Tonga. International Seagrants Report.

Penn, N. (1982). The environmental consequences and management of coral sand dredging in the Suva Region. IMR Technical Report.

Ram, N. and Southwick, G. (1982). On the design and construction of fishing gear for the tropics. IMR Technical Report.

Seeto, J. and Singh, S. (1982). Examination of algal and fish samples from ARU. Ibid.

Gawel, M. and Seeto, J. (1982). Limited marine investigation at the Fijian Hotel, Yanuca Island. Ibid.

King, M.G. (1982). A preliminary trapping survey for deepwater shrimp (Decapoda: Natantia) in Papua New Guinea. Report to S.P.C.

Gawel, M.G., Kunatuba, P. and Vodonaivalu, S. (1982). Biological Impact of Oil Drilling in Bau and Nadi waters In: Meagher and Associates report to Bennett Petroleum.

8.3 BOOK

Halapua, S. 1982. Fishermen of Tonga. 100 pp. IMR/IPS, U.S.P.

APPENDIX I

INSTITUTE OF MARINE RESOURCES

ESTIMATES 1983 1985

# INTRODUCTION

The main objectives of the Institute of Marine Resources are:

(a) research into regional marine resources - biological and geological

(b) development of consultancy services for regional government

(c) development of educational programs in marine sciences and dissemination of information.

To achieve these objectives an expert core staff with a range of skills, drawing from a pool of local and overseas expertise, and adequate and continuing funding are necessary.

The long-term and planned development of IMR are contained in the EEC-funded feasibility study report compiled by John Rounds, Lees and Partners, 1981. In view of the unlikely source of aid funds for major IMR development, a core estimate for 1983-1985 is provided here.

1983-1985 RECURRENT ESTIMATES

SENIOR PROJECT FELLOWS (ANTICIPATED DEVELOPMENT & PROMOTIONS

| ITEM | POST DESCRIPTION | 1982 | 1983 | 1984 | 1985 |
|---|---|---|---|---|---|
| 1 | SENIOR LECTURER | GROVES | GROVES<br>ZANN*<br>KING* | GROVES**<br>ZANN<br>KING | GROVES**<br>ZANN<br>KING |
| | SUBTOTAL | 1 | 3 | 3 | 4 |
| 2 | LECTURER<br><br>OR<br>(SENIOR PROJECT FELLOW) | ZANN<br>KING<br><br>PENIASI | PENIASI<br>(OTHER MARINE GEOLOGIST) | PENIASI<br>SEETO<br><br>OTHER(1) | SEETO<br><br>OTHER (1) |
| | SUBTOTAL | 3 | 1 | 3 | 3 |
| 3 | GRADUATE RESEARCH ASSISTANT | SEETO<br>SARITA SINGH<br>2 OTHERS PENDING | SEETO<br>SARITA<br>OTHERS (2) | SARITA<br>OTHERS (2) | OTHERS (3) |
| | SUBTOTAL | 4 | 4 | 3 | 3 |

* expected promotions

** [illegible] successor

1983-1985 RECURRENT ESTIMATES - INSTITUTE OF MARINE RESOURCES

PERSONAL EMOLUMENTS: SENIOR STAFF

TABLE 1A

| ITEM | POST DESCRIPTION | 1982 | 1983 | 1984 | 1985 | NOTES |
|---|---|---|---|---|---|---|
| 1 | DIRECTOR | 1 | 1 | 1 | 1 | |
| 2 | SENIOR PROJECT FELLOWS | 5 | 5 (+2A)* | 5(+2A)* | 5(+2A) | SEE TABLE 2 |
| 3 | PROJECT FELLOWS | 1 | 1 | 2 | 3 | |
| 4 | LABORATORY MANAGER | 1 | 1 | 1 | 1 | |
| 5 | GRADUATE RESEARCH ASSISTANTS | 4 | 5 | 6 | 6 | |
| | TOTALS | 12 | 15 | 17 | 18 | |

*FRENCH-AID FUNDED POSTS

## INTERMEDIATE/JUNIOR STAFF

**TABLE 1B**

| | 1982 | 83 | 84 | 85 | NOTES |
|---|---|---|---|---|---|
| Fisheries Assistant | 1(D) | 1D | 1D | 1D | Incumbent - hired on yearly basis |
| Personal Assistant | - | 1D | 1D | 1D | 1 secretary to be promoted in 1983 |
| Secretary | 1D+1(A) | 1D | 1D | 1D | 1 promoted to PA |
| Clerk/typist (ARU) | 1D | 1 | 1 | 1 | |
| Clerk/typist | 1D | 1 | 1 | 1 | |
| Executive Officer | - | 1 | 1 | 1 | 1 technician to be promoted to E.O. |
| Senior Technician | - | - | - | 1 | 1 technician to be promoted to Sen. Technician. |
| Technician | 2D | 2 | 2 | 2 | |
| Technician | 2(A) | | | | 1 to be retained as Museum curator |
| Technician ARU | 1D | 1 | 1 | 1 | |
| Skipper | 1(A) | 2D | 2 | 2 | Increase of 1 for new boat |
| Deckhand | 2A | 8D | 8 | 8 | Increase of 6 for new boat |
| Service Maintenance Assistant (ARU) | 1D | 1 | 1 | 1 | |
| Boat Engineer | 1D | 2 | 2 | 2 | Increase of 1 for new vessel |
| Machinist | - | 1 | 1 | 1 | Increase of 1 for workshop |
| Caretaker (Dravuni) | 1A | 1D | 1 | 1 | |
| Labourer | 1D | 1 | 1 | 1 | |
| Cleaner/Handyman | 2D | 2 | 2 | 2 | |
| | 19 | 27 | 27 | 28 | |

## INTERMEDIATE/JUNIOR STAFF

TABLE 1C

| | | |
|---|---|---|
| Fisheries Assistant | - | Euka Ninokibau |
| Personal Assistant | - | 1 secretary to be promoted in 1983 |
| Secretary | - | Sneh Lata Nath |
| | | Jyotika Singh |
| Clerk/typist ARU | - | |
| Clerk/typist | - | Suraghni Sharan |
| Executive Officer | - | |
| Senior Technician | - | a promotion for 1985 |
| Technician | - | Iliavi Tuwai and Hazra Haq |
| Technician | - | Fiu Manueli |
| | | Marilyn Goulding |
| Technician ARU | - | 1 |
| Skipper | - | Mosese Sereinagata<br>(1 to be appointed in 1983) |
| Deckhand | - | Meli Vuniwaqa |
| | | Watisoni Rokosawa |
| | | (6 to be appointed in 1983) |
| Service Maintenance Assistant (ARU) | - | 1 |
| Boat Engineer | - | Ambika Prasad<br>(1 to be appointed in 1983) |
| Machinist | - | (1 to be appointed) |
| Caretaker | - | Filimoni Lavelawa |
| Labourer | - | Suren Chand |
| Cleaner/Handyman | - | Aminiasi Tumuacala |
| | | Mahendra Prasad |

* I. Tuwai to be promoted to E.O., the vacated post to be filled by Marilyn Goulding

** 1 technician to be promoted to Senior Technician grade in 1985, the vacated post to be filled by Technician (1A)

NEW ESTABLISHMENTS - SENIOR ACADEMIC

A. PENDING POSITIONS

1. 1 SENIOR PROJECT FELLOW: OCEANOGRAPHER (1983). A detailed knowledge of the currents around Fiji is a vital prerequisite to fisheries and geological research and an aid to navigation etc. A position is pending through French Aid for a long-term study (to 5 years), (salary, travel (Boat hire etc.), equipment.

2. 1 SENIOR PROJECT FELLOW: ELECTRONICS TECHNICIAN (1983). A technician to service marine navigational instrument and also scientific laboratory equipment. The position to be filled through French Aid in 1983 (to 3 years).

B. FUTURE POSITIONS

3. Current EEC positions (in the absence of Lome II) need to be funded from new sources, possibly the development budget if the present establishment is to be retained. It is necessary to have these project fellows/graduate fellows/support staff for the continued function of the Institute.

4. MARINE GEOLOGIST: If the Institute is to develop in the manner initially planned (and as directed by the Council and suggested by the Institutes Review), its next phase of development must be into the field of non-living or geological resources. The position of marine geologist will therefore be required in the following triannium:

PROPOSAL - EXPLANATION

1. Secretary

1 secretary was hired on EEC grant to type reports and scientific papers for publication. As there is heavy workload on other secretaria staff, this secretary has to be retained.

2. For new research vessel 'Aphareus', one more skipper is to be appoi and 6 more crew is required to man the ship and utilise the fishing gea abroad. The present skipper is to handle the present vessel 'Nautilus' which will still be used for teaching and training DTF students and for research projects.

3. 1 Technician to be retained to carry out task of museum curator and assist in collection of data of research projects. IMR has a very valuable collection of Fiji's marine organism which requires a full-time curator to maintain the collection in satisfactory condition.

4. I Machinist with two vessels and many small boats and engines There is a demand for a machinist to make parts for boats maintenance. At present large sum of money is spent on purchasing spare parts.

GENERAL CHARGES

| | 1982 | 1983 | 1984 | 1985 | REMARKS |
|---|---|---|---|---|---|
| Boat Maintenance Nautilus/Aphareus) | 12,000 | 18,500 | 20,000 | 25,000 | |
| Punts/outboards | - | 4,000 | 4,000 | 6,000 | |
| Landrover | 500 | 1,000 | 1,200 | 1,200 | Fuel cost |
| DTF Teaching | 12,000 | 14,000 | 14,000 | 15,000 | 305011A |
| Meal allowances (Travelling (DTF) | - | 1,000 | 1,200 | 1,500 | 305015 |
| Travel, Other* | - | 4,000 | 5,000 | 5,000 | |
| Postage | 500 | 500 | 600 | 1,000 | |
| Dravuni Station | | 3,000 | 3,000 | 3,500 | |
| Stationery | - | 5,000 | 5,000 | 5,000 | 305012 |
| Library | 6,000 | 6,000 | 7,000 | 8,000 | |
| Instrument Repairs | | 2,000 | 3,000 | 3,000 | |
| Laboratory Consumables: | | | | | |
| Chemicals | 5,000 | 5,000 | 6,000 | 6,000 | |
| Other consumables Nets, knives etc. | | 15,000 | 15,000 | 18,000 | |
| Furniture | | 4,000 | 2,000 | 4,000 | |
| Photocopier | - | - | 5,000 | - | |
| Typewriter | - | - | - | 2,000 | |
| ARU | 12,000 | | | | |

*Regional travel

It is imperative that if the Institute is to have a regional presence that adequate travel funds are available - e.g. for consultancies, travel to field stations in Dravuni, Tonga, ARU.

INSTITUTE OF MARINE RESOURCES

ESTIMATES 1982

ESTABLISHMENT

SENIOR STAFF

| CATEGORY A: (minimum, 1 year appointment) | | 1981 | 198 |
|---|---|---|---|
| DIRECTOR | Dr Uday Raj | D | D |
| LECTURER | Dr Leon P. Zann | D | D |
| LECTURER | Michael King | D | D |
| FISHERIES TRAINING OFFICER | Vacant | D | D |
| FELLOW (ARU) | Dr Gordon Groves | D | D |
| LABORATORY MANAGER | Vacant | D | D |
| BIOILLUSTRATOR | Terry Nolan | A (EEC) | A |
| FISHERIES BIOLOGIST | Robert Stone | A (EEC) | A |
| GEAR TECHNOLOGIST | Graeme Southwick | A (EEC) | A |
| MARINE SCIENTIST | Vacant | A (EEC) | A |
| FISHERIES SCIENTIST | Vacant | A (EEC) | A |
| INFORMATION OFFICER | Vacant | A (EEC) | A |
| FELLOW (Marine Advisory Agent) | Steven Halapua | A(SEA-GRANTS) | |
| CATEGORY B: (Short term consultants) | | | |
| CONSULTANT ENGINEER | Noel Bott | A (EEC) | |
| CONSULTANT GEOLOGIST | Prof. Duphorn | A (EEC) | A |

GRADUATE RESEARCH ASSISTANTS AND JUNIOR FELLOWS

| | | | |
|---|---|---|---|
| GRADUATE ASSISTANT (outer reef fish stocks) | Johnson Seeto | A (EEC) | A |
| GRADUATE ASSISTANT (Tuna baitfish) | Jai Raj Prasad | A (EEC) | A |
| GRADUATE ASSISTANT (Mangroves | Saula Vodonaivalu | A (EEC) | A |
| RESEARCH ASSISTANT (Traditional knowledge) | Vacant | A (EEC) | A |
| FISHERIES ASSISTANT (Gear Technologist) | Nand Ram | A (EEC) | A |
| GRADUATE RESEARCH ASSISTANT ( Lagoon & reef fisheries) | Vacant | A (EEC) | A |
| JUNIOR FELLOW (ARU) | Lesley Bolton | A (VSA) | A |
| JUNIOR FELLOW | Holmes Saeve | A (SEA-GRANTS) | A G |

JUNIOR INTERMEDIATE STAFF

| | | | |
|---|---|---|---|
| FISHERIES ASSISTANT | Euka Ninokibau | D | D |
| SKIPPER | Mosese Sereingata | A (EEC) | A (EEC) |
| SECRETARY | Sneh L. Maharaj | D | D |
| CLERK/TYPIST | Suraghni Sharan | D | D |
| CLERK/TYPIST | | D | D |
| TECHNICIAN | Hazra Haq | D | D |
| TECHNICIAN | Iliavi Tuwai | D | D |
| TECHNICIAN | Marilyn Goulding | A (EEC) | A (EEC) |
| TECHNICIAN | Atten Nath Agrawal | A (EEC) | A (EEC) |
| TECHNICIAN | Takabwere | D | D |
| ENGINEER | A. Prasad | D | D |

UNESTABLISHED STAFF

| | | | |
|---|---|---|---|
| FIELD ASSISTANT | F. Manueli | A (EEC) | A (EEC) |
| HANDYMAN | W. Rokosau | A (EEC) | A (EEC) |
| HANDYMAN | M. Vuniwaqa | A (EEC) | A (EEC |
| Cleaner/Handyman | A. Tumuacala | D | D |
| BOATMAN | S. Chand | D | D |

ADDITIONAL ESTABLISHMENT

REQUESTED (1982)

1. EXECUTIVE OFFICER
2. CLEANER
3. CARETAKER - DRAVUNI FIELD STATION
4. SECRETARY

## Estimates - 1982

| | | 1981 | 1982 |
|---|---|---|---|
| **Personal Emoluments** | | | |
| 305001 | Senior Staff | 239,600 | |
| 305002 | Intermediate & Junior Staff | 106,700 | |
| 305002A | Hourly Paid | 7,400 | |
| | | 353,700 | |
| **Other Charges** | | | |
| 305006 | Other Charges | 7,000 | 8,000 |
| 305020 | Special Projects | 2,000 | 3,000 |
| 305094 | D.T.F. Expenses | 10,000 | 12,000 |
| 305095 | A.R.U. Expenses | 8,000 | 12,000 |
| 305096 | Maintenance & Operation of Boats | 6,000 | 12,000 |
| | | 33,000 | 47,000 |
| **Special Expenditure** | | | |
| 30551 | Equipment | 3,000 | 4,000 |
| | | 3,000 | 4,000 |
| TOTAL | | 389,700 | |

# APPENDIX II

## MEMORANDUM OF UNDERSTANDING ON RESEARCH AND TRAINING COOPERATION IN MARINE SCIENCES BETWEEN THE UNIVERSITY OF THE SOUTH PACIFIC AND KAGOSHIMA UNIVERSITY

APPENDIX II

# MEMORANDUM OF UNDERSTANDING ON RESEARCH AND TRAINING COOPERATION IN MARINE SCIENCES BETWEEN THE UNIVERSITY OF THE SOUTH PACIFIC AND KAGOSHIMA UNIVERSITY

This Memorandum of Understanding is between The University of the South Pacific and Kagoshima University and aims to promote research and training cooperation in marine sciences pertaining to the South Pacific region.

1. Both universities agree to the following general forms of cooperation in marine sciences.

   a. Promotion of collaborative research.
   b. Exchange of faculty members and post-graduates.
   c. Joint offering of seminars or training programs.
   d. Exchange of academic and scientific information.

2. The details of implementation of this agreement are contained in the attached Memorandum on Collaboration between The University of the South Pacific and Kagoshima University.

3. Both universities understand that all arrangements relating to this agreement have to be negotiated for each case of collaboration.

4. With mutual agreement, both universities may develop cooperative programs beyond the fields specified in 1.

5. This agreement shall take effect from the date of signature by the representatives of both universities.

5. This agreement shall terminate upon six months' notice by either party.

Date 21 July, 1982

| Kagoshima University | The University of the South Pacific |
|---|---|
| Kanefumi Ishigami<br>President | L.F. Brosnahan<br>Vice-Chancellor |
| Daiichi Kakimoto<br>Dean<br>Faculty of Fisheries | Uday Raj<br>Director<br>Institute of Marine Resources |
| Shigero Iwakiri<br>Acting Director<br>Research Center for the South Pacific | |

# MEMORANDUM ON COLLABORATION
# BETWEEN
# THE UNIVERSITY OF THE SOUTH PACIFIC AND KAGOSHIMA UNIVERSITY

1.) MEMORANDUM

The University of the South Pacific and Kagoshima University,

recognizing that they have a mutual interest in the education of students in marine sciences and in research on utilization and management of the marine resources of island countries in the Pacific resolve to draw up a Memorandum between The University of the South Pacific and Kagoshima University to promote collaborative arrangements between these two organizations.

2.) OBJECTIVES OF THE AGREEMENT

The two organizations wish to develop collaborative arrangements in the following areas:

2.1 The training of students in marine sciences, in particular fisheries.

2.2 The joint offering of short in-service courses and workshops in marine sciences.

2.3 The conduct of joint research projects in the development and management of marine resources for Pacific island countries.

2.4 The free exchange of research publications and teaching materials.

2.5 The participation by staff and students in joint cruise projects for both research and training.

2.6 Co-operation in the utilization of technical equipment of the two organizations.

3.) IMPLEMENTATION OF THE AGREEMENT

3.1 The participating organizations shall each appoint one member of staff who shall act as joint project directors.

3.2 The joint project directors shall be responsible for

a.) The development of joint projects in accordance with the objectives of the agreement.

b.) The implementation of such projects once approved by the Vice-Chancellor of The University of the South Pacific and the President of Kagoshima University.
c.) The investigation of sources of funding to carry out joint projects.
d.) Reporting regularly to their universities on the progress being achieved under this arrangement.

3.3 It is anticipated that the joint project directors will meet periodically as necessary.

4.) TERMS OF AGREEMENT

4.1 The collaboration shall be undertaken on an individual project basis and shall be maintained unless the individual project is cancelled by mutual agreement. A separate agreement shall be entered into by the parties for each individual project.

# 鹿児島大学と南太平洋大学との間における
# 海洋科学研究及び研修交流に関する合意書

本合意書は，鹿児島大学と南太平洋大学との間における南太平洋域に係る海洋科学研究及び研修交流を促進することを目的とする。

1. 両大学は，海洋科学に関する下記の事項について協力する。
   a．共同研究の推進
   b．教官及びポストグラデュエイトの交流
   c．セミナー又は研修の実施
   d．学術情報の交換

2. 合意書の実施細目は，鹿児島大学と南太平洋大学間交流に関する附属覚書に記す。

3. 両大学は，この合意書に基づく協力事項の実施にあたつては，その都度協議するものとする。

4. 両大学は，相互の同意により，海洋科学以外の分野についても交流を行うことができる。

5. 本合意書は，いずれかの大学が破棄通告をした場合，6月後に消滅するものとする。

本合意書は，両大学の代表者が署名した日から効力を有する。

昭和57年7月21日

南太平洋大学副学長
L. F. Brosnahan

鹿児島大学長

南太平洋大学海洋資源研究所長
Uday Raj

鹿児島大学水産学部長

鹿児島大学南方海域研究センター長
事務取扱

APPENDIX III

SUBMISSION TO EUROPEAN ECONOMIC COMMUNITY

DEVELOPMENT FUND PROJECT

# THE DEVELOPMENT OF THE MARINE RESOURCES CENTRE, FIJI :

## PROPOSAL FOR CONTINUED PROJECTS

## FUNDING, 1983 - 1985

Dr. Uday Raj
Director
Institute of Marine Resources
On leave in Japan

and

Dr. Leon P. Zann
Acting Director
Institute of Marine Resources
The University of the South Pacific
Suva, Fiji

24 September, 1982

## INTRODUCTION

Prior funding by the European Economic Community (European Development Fund Project No. 4100.050.94.91) has provided essential research equipment, field stations, an ocean-going training research vessel, motor vehicle and funded research projects in marine resources at the Institute of Marine Resources (see Raj, 1982)

Due to inevitable delays in the delivery of equipment, completion of field stations, the research vessel etc. and the recruitment of staff, the Institute is only now reaching its full capacity.

The termination of this program at the end of 1982 will very seriously affect the capabilities of the Institute of Marine Resources. A competent and highly-specialised staff will be dispersed and research on important, long-term projects discontinued.

It is therefore imperative that the major research programs be continued to the end of 1985, and that use be made of the research vessel, scientific equipment and field station by extending contracts of current staff and by the recruitment of some additional staff for 1983. This will also enable some of the programs to be extended to other countries of USP Region.

PROPOSED PROGRAMS IN 1983 - 1985

(a) Completion of 1979 - 82 pro
to delays in recruiting sta
offshore vessel etc.

(b) New projects and extension
region encompassed by Lome
the Institute already oper
and the Solomon Islands.
Vanuatu and Tuvalu.

(c) Development of consultancy
Institute to respond quick
urgent and acute marine pr

ESTIMATED EXPENDITURE (per annum 1983 - 1985)

| ITEM REF. | ITEM | AMOUNT |
|---|---|---|
| A | CONSULTANCY | $ 39,000 |
| B | TECHNICAL ASSISTANCE | $ 10,000 |
| C | RESEARCH TRAINING | $ 5,000 |
| D | RESEARCH PROGRAM | $118,400 |
| E | NEW PROJECTS | $ 37,500 |
| F | SUPPORT | $ 32,000 |
| | TOTAL F$: | $241.900 |

PLUS 24% CONTINGENCIES (SALARY ADJUSTMENTS ETC.) ADD 5% F$ $ 58,100

$300.000p.

(A) CONSULTANCY

(A) CONSULTANCY

| | | |
|---|---|---|
| 1. | Part-time Gear Technologist (Southwick) | $ 5,000 |
| 1. | Part-time Gear Technologist (Southwick) | $ 5,000 |
| 2. | Fisheries Biologist (Stone) | $10,000 |
| 2. | Fisheries Biologist (Stone) | $10,000 |
| 3. | Senior Research Biologist (Raj/Zann) | $24,000 |
| 3. | Senior Research Biologist (Raj/Zann) | ~~$24,000~~ |
| | | $39,000 |
| | | $39,000 |

(B) TECHNICAL ASSISTANCE

(B) TECHNICAL ASSISTANCE

| | | |
|---|---|---|
| 1. | Fisheries Scientist (M. Petersen) | - |
| | (60,000 from 1979/82 funds) | |
| 1. | Fisheries Scientist (M. Petersen) | - |
| | (60,000 from 1979/82 funds) | |
| 2. | Information Officer (S. Singh) | |
| | The 1983 program to include the compilation of a bibliography of fisheries and marine sciences of Lome 2 countries | |
| 2. | The 1983 program to include the compilation of a bibliography of fisheries and marine sciences of Lome 2 countries | |
| | Salary | $ 8,000 |
| | Regional travel and subsistence | $ 2,000 |
| | Salary | ~~$ 8,000~~ |
| | Regional travel and subsistence | ~~$ 2,000~~ |
| | | $10,000 |
| | | $10,000 |

(C) RESEARCH/TRAINING

(C) RESEARCH/TRAINING

| | |
|---|---|
| Publication of brochures, reports on each project | $ 5,000 |
| Publication of brochures, reports on each project | $ 5,000 |

## (D) RESEARCH PROGRAM

### (1) TUNA BAITFISH

Studies on natural baitfish are to be concluded in Fiji. They will then be extended to the Solomon Islands and Kiribati where baitfish is a major problem in the pole-and-line fishery. The Institute has been requested by Solomon Is. Fisheries to provide a training and research program in this field. As the Graduate Research position is now vacant it may be possible to recruit a Solomon Is. B.Sc. graduate of this University (a name has been suggested) to work at the Institute of Marine Resources and Solomon Is. Fisheries in 1983.

| | |
|---|---|
| Graduate Research Assistant (unfilled) | |
| Technical Assistant (M. Goulding - curator of IMR Marine Reference Collection) | $ 5,500 |
| Regional air travel & subsistence | $ 3,000 |
| Research vessel charter | $ 6,000 |
| Publications | $ 500 |
| | $23,000 |

### (2) MANGROVE ECOSYSTEMS

Mangrove ecosystem studies are to be concluded in Fiji. With continued funding they would be extended to Solomon Is., Kiribati and Vanuatu.

| | |
|---|---|
| Graduate Res. Asst. (S. Vodonaivalu) | $ 8,000 |
| Regional travel & subsistence | $ 3,000 |
| Boat hire | $ 500 |
| Mapping etc. | $ 500 |
| Publications | $ 500 |
| | $12,500 |

(3) OUTER REEF FISH STOCKS

The Outer Reef Fish Stocks program would be continued in Fiji in conjunction with the Sea Mounts survey. The study would be extended to Kiribati, Tuvalu and Solomon Islands.

| | |
|---|---|
| Graduate Research Assistant (J. Seeto) | $ 8,000 |
| Technical Assistant (F. Manueli) | $ 4,400 |
| Regional travel & subsistence | $ 5,000 |
| Research Vessel charter | $ 5,000 |
| Publications | $ 2,000 |
| | $24,400 |

(4) TRADITIONAL KNOWLEDGE

The study of traditional knowledge in Fiji would be extended to the end of 1983. This post was filled late in the program (March, 1982) and research should be continued. In Fiji studies on the subsistence catch might be commenced in co-operation with Fisheries Division's extension program.

Traditional knowledge studies would be extended to Tuvalu and Kiribati in 1983/84.

| | |
|---|---|
| Research Assistant (P. Kunatuba) | $ 8,000 |
| Travel within Fiji | $ 1,000 |
| Subs. | $ 1,000 |
| Publications | $ 2,000 |
| | $12,000 |

(5) GEAR TECHNOLOGY

Gear technology development would continue, and be based in Fiji. Information on gear design (e.g. shrimp and snapper traps, deepwater drop-lines etc.) would be passed on to regional members.

| | |
|---|---|
| Fisheries Assistant (to be filled) | $ 8,000 |
| Technical Assistant (Thaggard) | $ 4,000 |
| Travel, research vessel charter | $ 2,000 |
| Cost of gear and construction materials | $ 5,000 |
| | $19,000 |

(6) LAGOON REEF FISHERIES

Lagoon reef fisheries would continue. The program would be extended to Kiribati where problems in fish poisoning, the effects of causeways on fish migration etc. are acute. The Kiribati advisory board of the Atoll Research Unit have identified this area as a priority. The Solomon Islands has also requested an urgent study of fish poisoning.

| | |
|---|---|
| Graduate Research Assistant (unfilled) | $ 8,000 |
| International travel, air freight & subsistence | $ 3,000 |
| Boat hire & research vessel charter | $ 2,000 |
| | $13,000 |

(7) INVESTIGATION OF SEA MOUNTS

This program did not commence in 1982 because the offshore vessel was not available. The Apharcus, now operational, would be used in this program in 1983.

| | |
|---|---|
| Graduate Research Assistant (unfilled) | $ 6,000 |
| Research vessel charter | $10,000 |
| | $16,000 |

NEW PROJECTS

(1) NEARSHORE MARINE COMMUNITIES

Social impact of exploitation - fisheries industrial development, reclamation, dredging, tourism etc.

The project would include Fiji and Tonga where EEC research stations have been erected, and at ARU in Kiribati.

| | |
|---|---|
| Graduate Research Assistant | $10,000 |
| Field Assistant - | $ 5,000 |
| Travel, research vessel time | $ 5,000 |
| | $20,000 |

(2) FISH AGGREGATION DEVICES

A survey of tuna and tuna-like fishes and other fish communities aggregating around FAD's. The feasibility of using "Aphareus-size" vessel for economically exploiting these species. If proven economically profitable it will enable village co-operatives and smaller units to enter medium scale fisheries programmes in S. Pacific. The project will be based in Suva, where numerous FADs are now operated by IKA Corporation but the project will be relevant for the entire USP Region. It will be carried out in close co-operation with IKA Corporation and in conjunction with Sea Mounts study.

Fisheries Scientists and graduates - already provided for in other projects (mainly Sea Mounts and outer Reefs).

| | |
|---|---|
| Cost of 2 FADs @ $1000 each - | $ 2,000 |
| Special gear (floating nets, longlines, etc.) - | $ 3,000 |
| Research vessel costs - | $ 3,000 |
| | $ 8,000 |

(3) MARINE FOOD-FISH POISONING

Several species of food fish, shellfish and crustaceans (crabs) become toxic every year in almost every country of USP Region. The causative organisms are varied, as are the types of toxicity which result. Some are known while others are not. At present there is no easy method of predicting the possible outbreaks or identifying toxic specimens from non-toxic individuals. The Institute, in collaboration with Tohoku University in Japan, has established a mouse-assay test laboratory for screening toxic specimens and toxic dinoflagellate counting to assess possible outbreaks of poisoning. The Institute will be hosting a training workshop on Marine Food Poisoning in January 1983 with some support from the World Health Organization.

It is proposed to strengthen this laboratory, provide some resources to test samples from the Region, and to act quickly when acute problems arise in member countries.

| | |
|---|---|
| Technical Assistant | $ 5,000 |
| Consultancy, travel, airfreight of toxic materials, etc.) | $ 3,500 |
| Running cost of mice colony | $ 1,000 |
| | $ 9,500 |

SUPPORT

Research Vessel Aphareus crew. The completion of the 14m research-training vessel Aphareus in July, 1982, has finally given the Institute an ocean-going capability. Because of financial constraints the University is unable, at this time, to recruit a suitable crew. It is imperative that if this vessel is to be safely and adequately used, that it be crewed as soon as possible. Of highest priority is the post of a sea-going marine engineer.

Crew

| | |
|---|---|
| Master | $10,000 |
| Engineer | $ 9,000 |
| Deckhand | $ 3,000 |
| Casual fishing crew | $10,000 |
| | $32,000 |

APPENDIX IV

# ATOLL RESEARCH UNIT

A REVIEW REPORT TO THE UNIVERSITY COUNCIL (THROUGH VICE-CHANCELLOR)

BY


DR. E. TREYVAUD - DIRECTOR, PLANNING & DEVELOPMENT

DR. U. RAJ - DIRECTOR, INSTITUTE OF MARINE RESOURCES

MR. D.A. SLADE - CONSULTANT, IRETA

Review of Atoll Research Unit



Appendices

# REVIEW OF ATOLL RESEARCH UNIT

## 1. Purpose of the Review

1.1. The Council of the USP at its meeting in December decided on the recommendation of the Vice-Chancellor to conduct a review of the ARU. The objectives of the review were:

1. To review the effectiveness of the existing organizational structure of the unit and to make recommendations in relation to the staffing of the unit.

2. To evaluate the progress made in relation to existing projects.

3. To consider future programmes of the ARU in association with the Advisory Committee and to develop a work programme for 1982.

4. To consider any further matters raised by the ARU Advisory Committee.

1.2. The review committee consisted of Mr. D. Slade of IRETA, Dr. U. Raj, Director of the Institute of Marine Resources and Dr. E.R. Treyvaud, Director of Planning and Development.

## 2. Review Procedures

The review took place over one week. The time table followed was -

Friday 12 February - Initial discussions with the ARU Advisory Committee - Persons in Attendance were:-

| | | |
|---|---|---|
| Dr. R. Treyvaud | - | Director, Planning & Development, USP |
| Dr. U. Raj | - | Director, Institute of Marine Resources, USP |
| Capt. Roger Middleton | - | Marine Department |
| Brendan Dalley | - | Chief Fisheries Officer |
| Ian Grainer | - | Chief Engineer, PWD |
| Taketiau Beriki | - | Chief Medical Officer |
| Rui Williams | - | Chief Agricultural Officer |
| Koraubara Tetabea | - | Deputy Secretary, Ministry of Natural Resources Development |
| Lesley Bolton | - | Atoll Research Unit IMR, USP |
| Gordon Groves | - | Atoll Research Unit IMR, USP |

Saturday 13 Feb. ) - Visit to regions including the island of
Sunday 14 " north Tarawa, Betio and the Agricultural Research Centre.

Monday 15 " - Interviews with the following:-

| | | |
|---|---|---|
| G. Groves | - | Head of ARU |
| Koraubara T. | - | Deputy Secretary, Ministry of Natural Resources Development. |
| B. Dalley | - | Chief Fisheries Officer |
| R. Williams | - | Chief Agricultural Officer |
| B. Onorio | - | Fisheries Officer |
| T. Mareko | - | Agricultural Officer |
| T. Teburoro | - | Scholarship Off |
| Dr. G. Krishnan | - | FAO Consultant |
| L. Bolton | - | ARU Volunteer |
| B. Notiet | - | Agricultural Officer |
| K. Tetabea | - | Ministry of Natural Resources Development |

Tuesday 16 - Preparation of Draft Report for consideration by ARU Advisory Committee.

Wednesday 17 - Consideration and modofication of report by ARU Committee. In addition to the people present at the initial meeting, th following were in attendance:-

| | | |
|---|---|---|
| The Hon. Ierimia Tata | - | Minister of Educa. |
| The Hon. Roniti Teiwaki | - | Minister for Natural Resources |
| Mr. Sean Marriot | - | Fisheries Officer |

3. The Existing Organization

3.1. The ARU presently is controlled by the Institute of Marine Resources. The ARU in the country has a close relationship with the Ministry for Natural Resources which is the first government contact point of the Unit.

3.2. The Advisory Committee has been established to advise on the future development of the ARU. They have agreed to meet four times a year.

3.3. The financial administration and recording is conducted by the USP Centre Director, Dr. Sullivan. The functions of the centre include the payment of staff, local purchase of materials and supplies and the preparation of financial reports for the Bursar.

3.4. Equipment - A complete equipment inventory is attached. The major items of equipment are a motor van and boat, both of which are in poor repair.

## 4. Staffing

### 4.1. The Role of the Senior Project Fellow - Dr. Groves

4.1.1. Dr. Groves was appointed as a Senior Lecturer responsible to the Director of the Institute of Marine Resources for the Administration and conduct of the Unit and for the implementation of the Lagoon Circulation Study and the Shore Processes Study.

4.1.2. On the administrative side the review team was concerned at his apparent inability to closely supervise the activities of his two staff, to ensure that the equipment of the ARU was maintained in acceptable order and to report on the activities of the Unit to Suva. Dr. Groves claimed that the absence of adequate communications with Suva inhibited his ability to perform this function. However, it was noted that when regular satellite discussions were programmed he failed to take advantage and was absent from several such sessions, recently.

4.1.3. On the research side Dr. Groves had not provided adequate progress reports to the Director of the Institute of Marine Resources on the projects being undertaken. He suggested that he was unable to provide supervision in the areas of Marine Biology and Fisheries. In his own discipline area he argued that his progress had been retarded by the following factors:

the absence of adequate equipment to measure lagoon circulation. He insisted that availability of a Trisponder ( cost $\approx$ $F30,000) was absolutely essential for position fixing.

the lack of research and secretarial assistants.

the inability of the USP to provide a computer.

4.1.4. Dr. Groves, during the time the review team was there, prepared and produced a number of interim reports which are appended.

The reports are -

* ARU Shore Processes Study which included some beach profiles taken in 1980 and early 1981.

* ARU Lagoon Circulation & Study which included a Production Model for Circulation in the Tarawa Lagoon.

4.1.5. The reports did not indicate that Dr. Groves had (despite the limitations) undertaken adequate field work over the last 12 months to assure satisfactory progress on either of the projects. The Head of IMR instructed Dr. Groves to produce more comprehensive interim technical reports by the end of June 1982, in accordance with a previous directive from USP.

4.1.6. It is recommended that -

(i) the USP immediately send an Apple Computer to Dr. Groves.

(ii) that Dr. Groves formally be required by the University to provide technical reports on the two projects under his control by June 30, 1982.

(iii) that the work performance of Dr. Groves be evaluated after receipt of these reports.

(iv) that Dr. Groves be replaced as administrative Head of the Unit as soon as additional staff are appointed.

4.2. Miss L. Bolton - Project Officer (VSA) who is responsible for the conduct of three marine biology based programmes. The Committee found the work of Miss Bolton satisfactory for her industry.

4.3. Tekabwere Arinoko - Technician responsible for the maintenance of equipment and the provisions of technical assistance for the conduct of the research projects. The servicing of equipment, in particular the motor vehicle and boat, is extremely poor. The technician did not have the necessary tools to complete the servicing and was inadequately supervised. A list of deficiencies has been prepared and the position should be reviewed at the end of six months.

4.4. Dr. J. Sullivan as Centre Director is responsible for the general administration. He suggests that a considerable proportion of his staff time is directed towards this activity. At present he is undertaking a complete review of the finance and financial procedures involved in ARU matters. The committee does not believe he should continue with this responsibility, and the work should be undertaken by a secretary.

4.5. Vacant Positions

4.5.1. Secretary - A secretary is provided for in the ARU Budget. The appointment should be made at a high level, on local salary. The secretary should be responsible for -

(a) general stenographic duties

(b) the maintenance of the ARU library

(c) the procurement of supplies and the maintenance of appropriate financial records.

4.5.2. Two Project Fellows (Marine) - Should be appointed in accordance with the marine projects and specifications thereof, covering the areas of marine ecology, fisheries biology or oceanography and marine geology, respectively.

4.5.3. Project Fellow Agriculture - An appointment of a local agricultural fellow is recommended to provide day to day supervision and assessment of the proposed agricultural related activities. He will also be expected to make local arrangements for the visits proposed for visiting experts.

4.5.4. Project Fellow -Social Sciences - It is recommended that Dr. J. Sullivan be appointed as a part time project fellow to complete projects 4 & 5.

5. Organization

5.1. With the proposed expansion of the projects into the area of agriculture (detailed below) and the wider involvement of staff from the Rural Development Centre, Institute of Natural Resources and IRETA the review team considered alternative university agencies under which the ARU could be placed.

5.2. Two alternatives were suggested:

(a) Centre for Appliied Studies in Development

which has a general project or co-ordinating role and is not tied to a specific area or discipline.

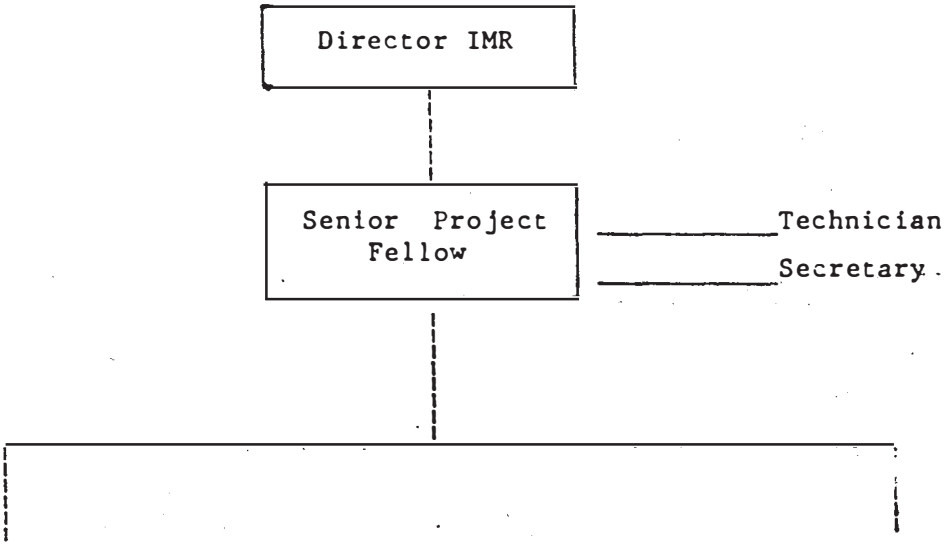
(b) The Office of the Vice-Chancellor

for an initial period of one year until the project is developed further.

5.3. The Committee suggests that no change in the structure be made at this stage and the ARU remain under the direction of IMR. The Committee noted that the Director of the IMR will have to co-ordinate closely with other Institutes particularly IRETA and the RDC in implementing the 1982 work programme. A regular satellite exchange involving all concerned will be of great assistance.

5.4 Future Organization:

Shown below is an outline of the proposed future organization.




| Resident Project Fellow | | Non Resident | |
|---|---|---|---|
| Oceanography | - Dr. Groves (IMR | Agriculture | - Mr. Slade (IRETA) |
| Marine Biology | - Ms Bolton (VSA/IMR) | Veterinary Science | - Mr. Moengango (RDC) |
| Agriculture | - Vacant (IRETA) | Soil Science | - Dr. Morrison (INR) |
| Social Science (PT) | - Dr. J. Sullivan | Entomology | - Prof. Beaver (SNR) |
| Marine | - Vacant (IMR) | Chemistry | - Dr. Frevert (IMR) |
| Marine | - Vacant (IMR) | Extension | - Dr. Cillie (IRETA) |

5.5. In order to implement this establishment it is recommended

1. That the USP undertake to fund the salary and expenses of one agricultural officer to assist in the conduct and co-ordination of the agricultural project as required. The funds to be provided through the EEC vote from Alafua.

2. That the IMR advertise immediately for two project fellows to undertake the work on beach processes and fisheries. The funds to be provided from the Atoll Research Unit and EEC votes.

3. That a secretary/administrator be immediately appointed

4. That a Senior Project Fellow be appointed from the resident fellows to administer and co-ordinate the total programme and assume financial responsibility from the Centre Director.

5. That consideration be given to the appointment of a part time project fellow in the social sciences. The funds to be provided from the EEC Vote.

6. Work Programme 1982 - The list below indicates the projects proposed for 1982 and the persons responsible for such projects. These projects have been drawn up in consultation with government officials and the concurrence of the Advisory Committee has been received.

The programme is summarized on the attached table and details and costing of all programmes are as shown.

## PROPOSED WORK PROGRAMME 1982

| | PROJECT | PROJECT OFFICER | COST |
|---|---|---|---|
| 1 | LAGOON CIRCULATION STUDY | DR GROVES | $ 25,000 |
| 2 | SHORE PROCESSES STUDY | DR GROVES | 8,000 |
| 3 | INTERTIDAL ECOLOGY PROJECT | MISS BOLTON | 2,000 |
| 4 | TE BUN PROJECT | MISS BOLTON | 2,000 |
| 5 | CORALS OF TARAWA | MISS BOLTON | 2,000 |
| 6 | COURSE-WAYS & RECRUITMENT OF FISH FRYS | TO BE RECRUITED | 11,000 |
| 7 | HYDROGEN SULPHIDE IN FISH PONDS | DR FREVENT | 2,000 |
| 8 | SOIL CLASSIFICATION | DR MORRISON (INR) | 4,000 |
| 9 | DRIP IRRIGATION AND NUTRIENT FILM | MR SLADE (IRETA) | 10,100 |
| 10 | AROID RESEARCH AND BREEDING | DR WILSON (IRETA) | |
| 11 | TARO BEETLE RESEARCH | DR BEAVER/MR SLADE | [illegible] |
| 12 | VETERINARY CARE PROJECT | MR MOENGANGONGO (IRDC) | 6,000 |
| 13 | ELEMENTARY TECHNICIAN TRAINING | TAUILIILI UILI | |
| 14 | WILD (TUNA) BAITFISH POPULATION RESEARCH | TO BE RECRUITED | 13,500 |
| 15 | AGRICULTURAL EXTENSION - SOCIAL FACTORS | DR J SULLIVAN | 2,300 |
| 16 | SOCIAL FACTORS INFLUENCING | DR J SULLIVAN | 2,30 |
| 17 | INFORMATION ON ATOLL RESEARCH | DR. J. SULLIVAN | 3,000 |

PROJECTS

## LAGOON CIRCULATION STUDY

This constituted a top priority project, commenced at the inception of ARU. Recruitment of Professor Gordon Groves, a well accomplished and Senior Oceanographer from the University of Hawaii, was forseen as a great strength in carrying theproject forward. To date the progress has been disappointing and a great deal of effort needs to be made now by Professor Groves. A summary of progress is appended.

(i) the study so far has been concentrated in South Tarawa Lagoon area only.

(ii) for several months no field work has been carried out.

(iii) for analysis of results and construction of a prediction model Professor Groves inists that he needs computer services.

(iv) Professor Groves also finds difficulty in accurate position fixing of drougues, using landmarks and a Sextant. For accurate positioning he requires a Trisponder.

The review team recommends the following:

(a) Professor Groves should begin further field work at once and he should channel all his efforts in this project to gather more data.

(b) Professor Groves should produce an interim technical report of his findings by June, 1982.

(c) An Apple computer will be made available to Professor Groves at the Tarawa Centre of USP for his data analysis. Alternatively, opportunity will be provided to Professor Groves in Suva for Computer analysis, once he has collected more data.

(d) Negotiations will be initiated with CCOP/ SOPAC and/or the University of Hawaii to borrow a Trisponder but in the interim this should not deter or delay further field studies in areas of the lagoon where position fixing is relatively easy. Marine Department is prepared to loan boats and buoys to assist in position fixing and the study in general.

## 2. SHORE PROCESSES STUDY

Several areas are covered under this single major project

(a) BEACH PROFILES AND BEACH EROSION:

Some work has been carried out on beach profiles by Professor Groves, in Co-operation with CCOP/SOPAC. Results of these transects are appended to this report. It is quite clear that a great deal more needs to be done to determine the shifting profiles of some active beaches and to ascertain precisely the erosion problems on Tarawa. No work has been undertaken on any of the outer islands where the problem is perhaps even more paramount.

It is recommended that Groves continues with the studies on Tarawa with a view to providing a technical report on beach profiles by June, 1982. It is further recommended that a graduate research assistant be recruited to undertake more detailed studies, including some in Outer Islands, with a view to suggesting protection measures on eroding beaches. Such measures could also include the proposed mangrove planting at appropriate sites.

(b) COURSEWAYS AND SAND BUDGETS

Practically no other result, except for lagoon circulation studies, bearing directly on the effects of building courseways, is evident. There is little or no information on Coral Sand Budgets and the possible effects of the proposed Courseway between Betio and Bairiki.

Since the Government is planning to proceed on the building of this courseway, contingent upon obtaining adequate funds, the completion of circulation studies of South Tarawa lagoon will provide some answers and possible methods of dealing with the problems that may arise from such construction.

Apart from Betio/Bairiki courseway, other courseways and their relationships to lagoon circulation must be established. This should be undertaken by Professor Groves with support from a graduate research assistant. Close co-operation with CCOP/SOPAC who have carried out similar work is envisaged.

Coral sand budget studies should also assist reclamation projects. If the initial workload of a graduate research assistant, working on beach profiles and beach erosion together with courseways and coral sand budget studies, proves too difficult, a second assistant at graduate level is recommended. Both these studies should have specific goals and results should be presented by December, 1983. A great deal of Hydrographic Data for the proposed Betio/Bairiki courseway is available from the Public Works Department.

INTERTIDAL ECOLOGY OF TARAWA LAGOON:

Lesley Bolton has made good progress in the study of the macroflora and fauna of the intertidal lagoon. She has also begun a modest marine reference collection. In the next few weeks she will be doing library work in Hawaii (East-West Centre) to complete her technical report by June, 1982. An interim progress report is appended. Additionally Dr Zann of IMR has recently contributed to a CCOP/SOPAC commissioned work on the ecology of the lagoon and a report is expected in 1982.

It is recommended that this project should be ongoing and the new VSA, after Bolton's departure in June, 1982, should continue with this study and make a more complete marine reference collection. Future studies of the lagoon should include studies on nutrients, sedimentation and bacterial pollution to acquire a full understanding of the overall lagoonal environment.

It is envisaged that other project fellows with expertise in chemistry, soil science and microbiology could contribute to the ongoing project on ecology of the lagoon.

Te Bun

Lesley Bolton has been studying the Biology and ecology of the marine Clam Anadara sp. (locally called Te Bun) towards her M.Sc. thesis which she expects to present for examination in the second half of 1982. Moreover, she has carried out some seeding experiments and introduction of the species, with success, into outer atolls where the clam has been non-existent. A copy of her report is appended.

It is recommended that Lesley Bolton should complete her field investigation by May 1982 and proceed to Suva to begin writing up her M.Sc. thesis under the direct Supervision of her supervisor. It is further recommended that the seeding experiments should be continued by the new VSA, in co-operation with the Division of Fisheries.

5. CORALS OF TARAWA

A comprehensive collection of the Corals of Tarawa have been made by Lesley Bolton with assistance of Dr Raj and Dr Zann. A paper on the Corals of Tarawa will be submitted shortly for publication and it should add to the general study on the Ecology of the Lagoon.

MISCELLANEOUS

The ARU Staff have carried out some miscellaneous studies and these are appended with this report.

6. COURSEWAYS AND THE RECRUITMENT OF FISH FRY INTO TARAWA LAGOON

Rationale:

Tarawa lagoon is connected to the open sea by a series of Channels which provide a free flow of Oceanic and fish, to and from the lagoon. The presence of these Channels is therefore of great importance for lagoon circulation and free movement of fish between the open Ocean and the Lagoon for breeding. Nevertheless, a need for road transportation has led to the closure of many channels in South Tarawa by building courseways and plans are underway for similar construction in North Tarawa. There is great concern that such courseways will very adversely affect the recruitment of fish into the lagoon.

Objectives:

(i) To carry out a quantitative survey of fish and fish fry moving through the Channels of North Tarawa throughout the yearly cycle.

(ii) Based on the results of (i), to recommend method(s) of construction of future courseways to ensure by-passes and thus to ensure adequate recruitment of fish fry into the lagoon from the open ocean.

Activities:

A graduate research assistant, in close Co-operation with the Fisheries Division of the Government of Kiribati, will carry out a detailed sampling of fish and fish fry moving through selected North Tarawa Channels, at regular intervals, over a minimum period of one year.

Budget:

| | |
|---|---|
| Graduate Research Fellow | F$ 8000.00 |
| Travel | 1000.00 |
| Fishing Gear and Preservatives | 2000.00 |
| Total | F$11000.00 |

## HYDROGEN SULPHIDE ($H_2S$) STUDIES IN FISH PONDS AND TARO PITS

Rationale:

Hydrogen sulphide is easily produced in anaerobic conditions which prevail, at times, in stagnant fish ponds and taro pits in Atolls. The ground water can be easily spoilt with detrimental effects during such generation of $H_2S$. Monitoring the conditions and factors associated with the production of $H_2S$ in fresh water - limited atoll islands is of great significance.

Objective:

(i) To evaluate the conditions necessary for generation of $H_2S$ production in stagnant fish ponds, taro pits and ground water in Tarawa.

(ii) To establish a system of monitoring $H_2S$ and conditions for generation of the gas.

Activity:

Dr Frevert, of the University of Bayreuth, Israel, will spend his sabbatical leave in Tarawa during August/September, 1982, to carry out the above work.

Budget:

| | |
|---|---|
| Travel for Dr Frevert | A$ 1600.00 |
| Materials and consumables | 400.00 |
| Total | A$ 2000.00 |

## SOIL CLASSIFICATION

Rationale:

Little and inadequate information on soil types present on the various atoll islands is available to enable land use classifications to be developed by the Kiribati Agriculture Division to assist in its overall crop production planning.

Objectives:

To train Agricultural staff from Kiribati to undertake Soil Classification by selecting one island from the Tarawa atoll, bringing Kiribati staff to this point and to use it as a training area to produce a soil classification map for guidance of future land use classification.

Activities:

Under local assistance and organisation of the Atoll Research Unit, with USP and local Government staff participation, undertake a training Soil Survey of one island.

Budget:

| | |
|---|---|
| Staff Travel (1-2 weeks) USP - Kiribati Return | 1700.00 |
| Local staff travel | 1000.00 |
| Materials and Freight | 1300.00 |
| Total | ...00 |

9. THE EVALUATION OF DRIP IRRIGATION AND NUTRIENT FILM TECHNIQUES (NFT) FOR PRODUCTION OF SELECTED VEGETABLES FOR IMPORT SUBSTITUTION

Rationale:

Many thousands of dollars are expended importing fresh vegetables for Betio and Tarawa in general. The Agricultural Division has successfully demonstrated vegetable production methods using sand culture techniques but yields are low and nutrient problems, with the high pH of coral sand, still exist.

This project is proposed to enable the more recent methods which conserve both water and minerals to be evaluated on a pilot scale. A local Agricultural Officer has received training in England in NFT techniques.

Objectives:

To establish drip (trickle) irrigation methods demonstrating vegetable production comparing nutrient solution with local (brackish) water plus base dressings added to the soil and the nutrient film technique

Activities:

Under local assistance from the Atoll Research Unit and with USP analytical services and the participation of the Kiribati Agriculture Division the USP will supply and assist installation of equipment and provide solutions required for the production of crops and their evaluation by the Kiribati Agricultural Division Staff.

Budget:

| | |
|---|---|
| USP Staff Travel for installation and assistance | |
| 4 Visits x 1 week @ 1150 | 3600.00 |
| Instruments, Conductivity meter etc. | 1000.00 |
| Analytical Services | 2000.00 |
| Pump, Trickle line Filters, Taps, Shade Cloth | 2000.00 |
| Chemicals and Nutrients | 500.00 |
| Tanks - Stands | 1000.00 |
| Total | 10100.00 |

0. AROID RESEARCH AND BREEDING

Rationale:

Production of Aroids on Atolls is limited by the high soluble salt levels of atoll ground water and limited germplasm.

Objectives:

Through floral induction and breeding techniques to attempt to provide increased salt tolerance and higher yields from new cultivars of a range of aroids acceptable as dietary components.

Activities:

The collection of existing tolerant cultivars, segregation of tolerant seedlings by screening in the laboratory and their eventual propagation for distribution to the Atoll Research Unit.

Budget:

| | |
|---|---|
| Plant Breeding Expert p.a. Dr J Wilson - Based at Alafua February 1982 | 12,000.00 |
| Facilities | 5,000.00 |
| Travel for collection & Seed Production (4 trips x 1 week each) | 3,600.00 |
| Chemicals, Nutrients, Laboratory Expendables | 2,000.00 |
| Contingencies | 2,000.00 |
| | 24,600.00 |

11. TARO BEETLE CONTROL

Rationale:

The Taro (or babai) beetle presently identified as Papuan hubneri is a destructive pest of local babai (Cyrtosperma chamissionis), bananas and other minor crops. Work up to 1980 has identified the problem, defined the very local distribution of this pest, attempted eradication and investigated biological control with a locally obtained strain of the fungus Metarhizium sp. This work was undertaken and is summarised by Latch (1980).

Objectives:

1. To evaluate the success of the eradication experiments undertaken on North Tarawa under the guidance of Dr Simmonds in 1977-1978.

2. To continue to attempt control with the Metarhizium fungus under the guidance of Dr G M Latch.

3. To attempt to obtain from Papua New Guinea and release on Tarawa parasitic Scoliid Wasps.

4. Local evaluation of insecticides environmentally safe to control specific outbreaks pending development of longer term biological methods.

5. To confirm the identity of the Taro Beetle.

Activities:

1. Visit from an entomologist to determine success or otherwise of the 1977-78 eradication experiments.

2. Provision of equipment and a consultancy by a pathologist (e.g. G M Latch DSIR, Palmerston North, New Zealand) to enable further work with fungal pathogens to be undertaken in co-operation with Agriculture Division staff.

3. To investigate the feasibility and if possible undertake release of th eScoliid wasp from Papua New Guinea (Contact Lowlands Agricultural Experiment Station, Kererat, New Britain, Papua New Guinea) with local staff participation.

4. Local experiments undertaken by Agriculture Division Staff with environmentally acceptable insecticides provided by USP.

5. Confirming Identification of the local species by DSIR. Auckland, New Zealand

Budget:

| | |
|---|---|
| Visit by entomologist and assistance | 1,000.00 |
| Laminar Flow Cabinet | 5,000.00 |
| Autoclave | 2,000.00 |
| Media | 2,000.00 |
| Technical Assistance | 2,000.00 |
| Preliminary Activities, Travel & Assistance | 2,000.00 |
| Cost of Insecticides | 500.00 |
| Cost of Airfreight on Samples | 100.00 |
| | 14,600.00 |

* Latch G M C, "Biological Control of the Babai beetle on Tarawa by the Fungus Metarhizium anisopliae. A report on my visit to Tarawa, Kiribati in March, 1980"., on File of Chief Agricultural Officer, Tarawa together with Appendices.

## 12 ANIMAL NUITRITION AND CARE TRAINING PROJECT

Rationale:

The Rural Development Centre of the USP located in Tonga has decided to operate training courses for agricultural workers located in rural areas to undertake para veterinary studies in selected areas. These courses were developed for countries where there was a general absence of veterinary services. Details of the programme will be sent from the Centre.

Objectives:

On completion of a course of study students shall be able to

(i) diagnose simple diseases in pigs and poultry and take appropriate action to prevent and alleviate such disease.

(ii) Render first aid to injured animals including suturing, tooth extraction and dressing.

(iii) Develop and operate a small scale piggery or poultry farm.

(iv) Utilise local foods for the feeding of small animals.

Activities:

The course involves eight weeks full time attendance at the RDC in Tonga plus field work in the country of the student under the supervision of RDC staff.

Budget:

| | |
|---|---|
| Travel and Accommodation for one student | 3,000.00 |
| Supplies and Materials | 1,000.00 |
| Travel of Supervisor and Accommodation Kiribati | 2,000.00 |
| | 6,000.00 |

## 13. ELEMENTARY LABORATORY TECHNIQUES - TRAINING

Rationale:

At the planning meeting of Agriculturalists held at Alafua in 1981 regional representatives suggested that a Training course for laboratory technicians in crop soils and foliar analysis be commenced. This recommendation was accepted by IRETA.

Objectives:

To strengthen the basic skills of agricultural workers in the area of biological laboratory techniques and instrumentation. To assist in developing a regional network of laboratory services for use in agriculture.

Activities:

A training programme is presently being devised at Alafua to implement an appropriate inservice programme. Details of the programme will be forwarded on completion. It is anticipated that up to two Kiribatese may attend such courses..

Budget:

The estimate cost of training two students is approximately $8,000.00

## 14. PROJECT TO ASSESS WILD BAITFISH POPULATIONS IN THE REPUBLIC OF KIRIBATI

Rationale:

1.1 Following the cessation of phosphate mining in Banaba in 1979, the only major resources available to the country are marine. Fish, more particularly tuna, provide the greatest potential for exploitation.

1.2 The Republic of Kiribati, following the establishment of 200 mile fisheries zone, controls 1,015,000 square nautical miles of the equatorial Pacific. These waters are rich in stocks of tuna, particularly skipjack industry has been accorded the highest priority by the Government.

1.3 An assessment of the fishing methods suitable to exploit the tuna resources of Kiribati, indicates that the Pole and Line Method, using live bait, is the most suitable technique. The reason is that Pole and Line fishing is labour intensive and doesnot involve a great deal of high technology. This method is being used successfully, by the Japanese distant water boats, to expoit the stocks of skipjack in Kiribati waters.

1.4 Various surveys have been carried out to assess the viability of establishing apole and line fishery in Kiribati. These surveys were operated on a quasi-commercial rather than a scientific basis. The first was the ill-fated Van Camp Survey, the second part of which was prematurely terminated by the loss of the catcher boats, during Hurricane 'Bebe'. The next survey was carried out by the Japan International Corporation Agency (JICA) over a 12 month period. This was followed up by a U.K. funded and UNDP - sta survey. The results of these surveys indicated that the wild bait resources would support a fleet of upto eight medium-size catcher vessels.

1.5 The National Fishing Company, Te Mautari Ltd., was established in 1981. It is a wholly Government owned company and was set up to develop the commercial fishery. Currently the company is operating two tuna catcher boats of the 100 grt class. It is intended to expand the fleet in the near future. The importance of a continuing supply of wild bait for the expansion of the operation therefore paramount.

1.6 Three species of bait fish are caught by usi- stick-held dip net or beach seine: Herklots punctatus, Spratelloides delicatulus and Dussumiera acu There are side catches of other species but the three above constitute the major part of the bait catches.

1.7 Herklotsichtys p. is also a food fish, relative important to the subsistence economy because of the ease of its capture. Its schooling habits are disrupted by an onset of bad weather, particularly when the westerly wind blows. However, its behaviour patterns have not been established in Kiribati situation.

1.8 A theory of southerly migration was put forward by T Tikai (1978). Until recently there were no stocks of Herklotsichtys p. south of Abemema. Howeve in 1981, stocks have established themselves in all the southern atolls.

1.9 Since Herklotsichtys p. forms the major species of the bait catches througout the year, it is important that a greater knowledge of its biology in Kiribati is known. Spratelloides d. is available all the year round, but Dussumiera a. appears to be seasonal. Hence, there is a pressing need for an intensive study of these three bait species, in order to assess the stocks and their resistance to exploita tion and factors governing their biology in Kiribati waters.

Objectives:

2.1 A study is required of the major bait stocks available to the Gilberts group, with particular reference to Herklotsichtys/punctatus

2.2 The study should cover migratory patterns, spawning habits, population assessment, climatic and hydrological effects on behaviour.

Activities:

3.1 Time span of study - 2 man years, continuous.

3.2 Operational methods - Regular sampling by beach seine or cast net, diurnally and nocturnal sampling.

3.3 Visual observation of school movements is also necessary.

3.4 Elucidation of important aspects of the biology of the three species, as far as possible.

Budget:

| | | |
|---|---|---|
| 4.1 | 1 Graduate for 2 man years | $20,000 |
| 4.2 | Equipment - A 4.5 metre boat plus outboard engine (already in ARU) | |
| | Running costs of boat & fuel | 1,000 |
| | Laboratory equipment and preservations | 1,000 |
| | Small beach seins and cast nets | 500 |
| 4.3 | Travel | 1,000 |
| | | F$23.500 |

Note:

This study will be undertaken jointly with the Divison of Fisheries. A Senior Fisheries Research officer of the Ministry will assist in the project.

## 15. KIRIBATI AGRICULTURAL EXTENSION, SOCIAL AND ANTHROPOLOGICAL FACTORS

Rationale:

Very little progress has been made towards the satisfactory establishment of vegetables as a normal part of the diet of local people. This may be due in part to a number of factors, such as Government activities and policy, sociological factors, nutritional habits, and limits imposed by the atoll environment and location.

Objectives:

It is the aim of this project to examine the reasons why retention of traditional foods has continued despite demonstrated ability to produce vegetables and other alternative crops. This study will commence on Tarawa. Extension to other areas will be determined in future.

Activities:

1. An examination of the local traditional diet, attitudes, beliefs, food gathering and preparation activities and the role and status of those who gather or prepare food.

2. An assessment of the role of subsistance compared with living at the differing levels in the money based economy, on the dietary habits of the people.

3. The assessment of external factors on food nutrition and usage. Such factors may include government policies, availability of exchange, employment, social factors and aid together with the secondary factors (e.g. fuels, methods, equipment) which may influence diet.

4. Definition of the reasons for absence of vegetabl in the diet.

Budget:

| | | |
|---|---|---|
| Salary of Social Scientist | 2,000 | |
| Miscellaneous | 300 | 2,300 |

## SOCIAL FACTORS OF LAGOON USE AND SHORE COLONISATION

Rationale:

It is evident that the lagoon plays a major role in life on Tarawa, and studies have suggested that problematic areas associated with lagoon usage are sociological as well as biological. No work, however, has been devoted to these sociological factors which are probably of as much if not more importance than purly tidal and marine ones.

Objectives:

It is necessary to regard the problems of lagoon pollution as due as much to sociological factors of sanitation, urbanization, colonization and nutrition, as to engineering or oceanic factors. Instead of examining only tidal patterns and other purely scientific data, the social diversions of the use of the lagoon and its shores need to be taken fully into account. It is the aim of this project to provide this context for other purely scientific studies.

Activities:

1. An examination of current lagoon and shore studies and a summary of the lagoon ecology.

2. An assessment of the sociological factors influencing the lagoon and its shores.

3. Presentation of a synthesis of these local factors with those previously assessed scientific factors.

Budget:

| | | |
|---|---|---|
| Salary of Social Scientist | $ 2,000 | |
| Local travel and Support | 300 | 2,300 |

17. INFORMATION PROJECT ON ATOLL RESEARCH IN KIRIBATI

Rationale:

Many unrelated and unco-ordinated research and investigational activities have been undertaken on Kiribati and a bibliography of this work has been compiled in the recent past. Updating of this bibliography is now desirable to support existing and future research and also to enable the proposed sociological investigations to be completed in the appropriate context.

Objectives:

To update existing bibliographies and to include sociological orientation of listings relevant to the proposed investigations (15, 16 above).

Activities:

1. A search of institutions in Kiribati for relevant materials together with previous and international bibliographies through exising USP information retrevial services.

2. Assembly of data and cataloging to produce an updated bibliography cross referenced to facilitate multidisciplined research.

Budget:

| | | |
|---|---|---|
| Salary | $ 2,000 | |
| Local Travel and Support | 300 | |
| Publication Costs | 1,000 | 3,000 |

Appendix 3

LIST OF ITEMS AT ARU AS OF FEBRUARY, 1982

| antity | Item |
|---|---|
| 1 | vehicle, Whitby Warrior |
| 1 | poseidon 3.3 cu ft/min. compressor (ser. 02A OPA or 021 OP1) with rotax engine (ser. 3149008) |
| 3 | spark plugs for rotax<br>compressor spares, engine mounts, frame mounts, v. belts, filter pads |
| 1 | can activated charoal for compressor - ½ used |
| 3 | cans compressor oil - 2 left |
| 1 | fryan aluminium boat |
| 1 | yamaha 40hp outboard motor |
| 1 | yamaha 10 hp outboard motor |
| 2 | anchors (1 lost) |
| 1 | water pump centrifugal |
| 1 | marvac high vacuum pump, ser. 760709 |
| 2 | thermometer, 10 to 250 deg. (1 broken) |
| 1 | colorimeter with 6 test tubes, ser. A450, type 0065 |
| 1 | dissecting microscope, vmt-2, ser. 447963 |
| 1 | illuminator and transformer for dissecting microscope, ser. G92605 |
| 1 | long arm vs-4 for dissecting microscope |
| 1 | compound microscope, cho-213, ser. 410972 |
| 1 | salter balance 100 g |
| 1 | salter balance 500 g |
| 1 | portable autoclave |
| 1 | omnifuge with omnirotor with 8 seats, ser. 00081670 |
| 1 | balance, sliding mass, single bar |
| 1 | analytical mettler balance, dust cover and lamps, ser. 797987 |
| 1 | portable water quality monitor, model 2003 with probes, oxygen, conductivity, ph, ser. X829 (does not work) |
| 3 | max-min. thermometers |
| 1 | fridge-freezer, ser. 10038 |
| 1 | deep freeze (bought Aug. 81) |
| 1 | clayson oven, ser. 79269 |
| 2 | U.S. divers aquarius regulators (1 lost) |
| 1 | diving regulator |
| 2 | aluminium scuba tanks |
| 2 | back pads for scuba tanks |

| Quantity | Item |
|---|---|
| 2 | burettes, 100 ml |
| 45 | beakers, 1 L |
| 10 | beakers, 500 ml |
| 10 | beakers, 250 ml |
| 4 | straining troubs, 75 x 25 mm, 20 slides |
| 480 | cover slips, chance 2, 20 by 22 mm |
| 20 | cover slips, chance, 22 by 40 mm |
| 5 | funnels, 152 mm |
| 10 | funnels, 100 mm polypropelene |
| 100 | test tubes, 13 by 125, volac |
| 144 | test tubes, beresilicate, 75 x 12 |
| 1 | tube rack of polypropylene for drying |
| 1 | poly test tube rack |
| 4 | plastic aquaria |
| 20 | aquarium diffusers |
| 3 | aquarium nets |
| 4 | aquarium filters |
| 2 | towels |
| 4 | filter paper no. 1, 100 in pack |
| 4 | filter paper, Whatman no. 91, 200 in pack |
| 1 | tripod stand |
| 10 | wire gauze, asbestos centre |
| 2 | bunsen burner for LP (liquid petroleum) gas |
| 1 | pipette filler (rubber bulb) |
| 20 | hoffman clips |
| 1 | hand-held wind meter |
| 1 | dissecting kit |
| 1 | plastic bag sealer and glue |
| 1 | fire extinguisher |
| 30 | plastic buckets (9 left Aug. 81) |
| | plastic bags, variety of sizes - lot used |
| 8 | rolls of PVC hose |
| | nylon multistrand strong fishline, approx. 250 m |
| | rubber bands, paper clips - short supply |
| 12 | cellulose tape |
| 1 | Leishmans solution, 100 ml |
| 1 | Chrystal violet, 5% alcohol, 100 ml, 100 ml |
| 1 | aniline blue, 50 ml |
| 2 | sodium chloride, 500 g |

| tity | Item |
|---|---|
| 6 | lead weights, 3 lbs |
| 2 | weight belts |
| 3 | pairs fins |
| 2 | snorkels (1 lost) |
| 3 | dive masks |
| 1 | speargun with shafts, (Tony Wainwright has this - did not give back) |
| 2 | SOS oil filler depth gauges |
| 2 | tank content gauges for diving |
| 1 | binoculars |
| 1 | sextant |
| 1 | laboratory drawing board |
| 3 | clip boards<br>drawing implements, set squares |
| 1 | paterson enlarger with lens and lemp (minus stand and timer) |
| 20 | kodak plus x pan film (10 left Aug. 81) (1 left) |
| 2 | photographic paper veribrom, packs of 100 ( 1 left) |
| 2 | film fixer (none left Aug. 81) |
| 2 | DA 163 film developer (none left Aug. 81) |
| 2 | D 76 film developer |
| 1 | developing outfit |
| 3 | enlarger lamps |
| 2 | measuring cylinders, 1000 ml |
| 2 | measuring cylinders, 500 ml |
| 2 | measuring cylinders, 250 ml |
| 2 | measuring cylinders, 100 ml |
| 2 | measuring cylinders, 25 ml |
| 3 | microscope slide holders, 100 capacity |
| 3 | pipettes, 1 ml |
| 3 | pipettes, graduated, 100 ml, bulb type |
| 3 | pipett 25 ml |
| 6 | pipettes, 5 ml |
| )00 | vials, 20 ml, poly with foil caps |
| 100 | glass bottles, 60 ml, wide mouth screwtop |
| 50 | glass bottles, 30 ml, wide mouth screwtop |
| 20 | reagent bottles, 250 ml |
| 20 | reagent bottles, 125 ml |
| 1 | dessicator, 200 ml |
| 2 | burettes, 25 ml |

| Quality | Item |
|---|---|
| 4 | magnesium sulphate, 500 g |
| 4 | magnesium chloride 500g |
| 1 | manganese chloride, 200g |
| 2 | sodium thiosulphate, 500 g |
| 1 | starch powder, 500 g |
| 2 | sodium hydroxide, 500 g |
| 2 | potassium hydroxide, 1 lb |
| 1 | potassium iodide, 1 lb |
| 1 | potassium dichromate, 1 lb |
| 1 | silver nitrate, 125 g |
| 1 | formaldehyde, 4 L - ½ used |
| 2 | hydrochloric acid, 2.5 L |
| 2 | sulphuric acid, 2.5 L |
| 1 | methyl red, 25 g |
| 1 | grams iodine, 25g |
| 20 | absolute ethanol, 2.5 L (1 broken on arrival) |
| 1 | nitrate selective ion |
| 3 | cold chisels |
| 2 | vernier calipers |
| 1 | soldering iron |
| 1 | measuring tape |
| 1 | miscellaneous small tools (saw, hammer, screwdriver, etc |
| 1 | hand tally counter |