

SOPAC



ANNUAL REPORT SUMMARY

SOUTH PACIFIC APPLIED GEOSCIENCE COMMISSION

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June 1995



FOREWORD

A very successful year was achieved in Work Program activities, management planning and the broadening of SOPAC's external support. Despite continuing funding constraints, a shortfall in staff numbers and the unsettling effect of the results of the SPOCC Review of Terms and Conditions of Employment, the SOPAC Secretariat, in its implementation of the Work Program continued to stretch itself and the limited resources available to it to achieve again a creditable output along with about sixty technical reports.

Niue became the newest member of SOPAC, joining in September 1994 at the 23rd Session held in Majuro, Marshall Islands.

The results were made known of the largest single project, SOPACMAPS, funded by the European Union in the waters of Fiji, Solomon Islands, Tuvalu and Vanuatu. It provided bathymetry and imagery of approximately 730 000 km² of largely uncharted areas. Results have directly contributed to the location of banks and seamounts for fisheries activities in these countries.

All field work and monitoring for the Australian-funded Tuvalu Borrow Pit Pilot Project was completed during 1994 by SOPAC with assistance from SPOCC sister organisations. Report writing was at its final stages and expected to be completed in early 1995.

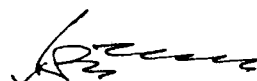
The People's Republic of China joined the group of countries providing SOPAC with support and the United States of America through their State Department and Defence Mapping Agency have contributed to the widening of external support to SOPAC.

A SOPAC Medium-Term Plan designed to complement the SOPAC Strategic Plan was prepared to provide a clear statement of the region's geoscience priorities to the end of the millenium.

The UNDP Water Resources and Sanitation regional project was fully assimilated into the Secretariat in November 1994 lending even greater credibility to the evolving role of SOPAC as the regional geological survey of the South Pacific. The project spent much of its initial days at the Secretariat consulting with member countries on how best the Project could assist with water issues, although early in 1994 SOPAC began administering the training activities of the UNDP water project.

Mr Alf Simpson, former Director of Mineral Development, Fiji, took up the position of Deputy Director in February 1995 replacing New Zealander Jim Eade who completed more than seven years at the Secretariat.

The SOPAC Secretariat remains committed to continuing its vital role of assisting its members with their geoscience needs and gratefully acknowledges the excellent support and cooperation it receives from member countries and supporting governments and agencies.



D.A.P. Muller CSI, AM
Director

May 1995



INTRODUCTION TO SOPAC

The South Pacific Applied Geoscience Commission (SOPAC) is an independent, inter-governmental, regional organisation established by a group of Pacific nations to:

- provide information on the physical environment of coastal areas to assist with resource and environmental management, coastal protection works, and with planning and implementation of coastal development projects;
- study geological hazards;
- investigate the resource potential for onland, coastal and deepsea minerals including construction materials, phosphates, cobalt-rich crusts, manganese nodules, polymetallic sulphides, and detrital minerals such as gold;
- assess and promote the hydrocarbon, wave and geothermal energy potential of the region;
- assess the water resources of the region;
- coordinate marine geological and geophysical research being carried out in the region and manage the resulting data on behalf of SOPAC member countries;
- train member country nationals and improve the institutional capabilities of member countries in the application of geoscience to the management and development of their non-living resources and coastal zones.

The Commission comprises the Governing Council (the member country representatives), the Secretariat, and the Technical Advisory Group (TAG). TAG comprises advisors who are nominated by member countries and by supporting Governments and organisations, or are invited by the Secretariat.

Member countries are currently Australia, Cook Islands, Federated States of Micronesia, Fiji, Guam, Kiribati, Marshall Islands, New Zealand, Niue, Papua New Guinea, Solomon Islands, Kingdom of Tonga, Tuvalu, Vanuatu, and Western Samoa. French Polynesia and New Caledonia are Associate Members.

The SOPAC Work Program is formulated, primarily, from member country requests, and is carried out by its Secretariat based in Suva, Fiji. The work of the Secretariat was re-organised in 1994 in a Medium-Term Plan into the following broad and specific categories:

- **Mineral & Energy Resources:** Minerals, Hydrocarbons, Ocean Energy, Geothermal Energy;
- **Environmental Geoscience:** Coastal Management, Coastal Mapping, Offshore Mapping, Water Resources & Sanitation;
- **Human Resources Development;**
- **Technical Services:** Regional Data Centre, Information Services, Field Support Services;
- **Corporate Services.**

WORK PROGRAM

Geoscience information is a key player in the search for sustainable development strategies in SOPAC members countries. Important areas include the mineral and energy sectors and environmental geoscience. The development of effective management policies for maximising sustainable resource use requires long-term datasets to enable the physical aspects of the coastal environment's geological and oceanographic processes to be fully understood and integrated into the concept of coastal-zone management. Effective solutions to erosion problems and sand and gravel aggregate needs can result from this work. The provision of such geoscientific information assists with coastal management by providing historical data against which any future coastal changes can be measured. Associated training activities improve in-country expertise. Although the 1994 shortfall in staff numbers was a constraint on Work Program implementation, much work was completed in 1994.

MINERALS AND ENERGY RESOURCES

In this area, SOPAC's goals are to advise and assist member countries to assess their mineral resources and promote its sustainable development. Assessment of precious minerals is carried out onshore, in the coastal zone and in the deep sea. Sand and aggregate resource assessment remains a high priority, as increasing demand due to construction and landfill projects has added tremendously to the pressure already placed on existing resources. Traditional sources of sand and aggregate which include beaches, reef flats and storm deposits are being exploited at such an alarming rate to result in environmental concerns being raised regarding the sustainable utilisation of this resource. Development of management strategies for sustainable resource utilisation requires a fundamental understanding of sediment budgets and composition.

Minerals

In 1994, two major geophysical and sampling programs were completed in Nadi Bay (Fiji) and in the Matepono River delta (Solomon Islands). A review of detrital minerals in the region was prepared for promotional purposes and the data assembled into the SOPAC database for regional use.

In an advisory role SOPAC screened mining tender documents for an onland gold prospect in the Solomon Islands. In Vanuatu investigations of auriferous river deposits in Big Bay, Santo, Vanuatu showed little potential to warrant immediate prospecting. Workshops on epithermal mineralisation and mineral exploration were hosted at SOPAC's headquarters in Fiji.

A major milestone was the release of an atlas summarising the findings of the Japan/SOPAC Cooperative Study on Deep-sea Mineral Resources of the South Pacific 1985 to 1994 (Phase I and Phase II). Ground work for establishing a Phase III deep-sea mineral program was initiated with the Japanese and approval was granted in December 1994. The deep-sea mineral assessment program saw reports and data resulting from a joint Japan/SOPAC research cruise completed in waters of the Solomon Island in late 1993. A similar deep-sea mineral resource cruise was carried out in Vanuatu's EEZ, the results to be available in late 1995. A summary brochure of manganese nodules in the Cook Islands EEZ was prepared for publication and promotion.

SOPAC continued with work in the sand and aggregate program with studies and field work completed in Kiribati, Marshall Islands, Tuvalu and Western Samoa. As the principal source of sand and gravel in these countries is a reefal environment, continued reclamation on the reef and causeway construction may interfere with the habitat of one of the most important components of beach sand, the foraminifera. In this connection SOPAC has been able to promote significant new research program into foraminiferal and

its input to the sediment budget, with studies being proposed for Tuvalu, Kiribati and the Marshall Islands over a two-year monitoring period to commence mid 1995.

Hydrocarbons

Due to the unexpected departure of the Petroleum Coordinator, little work was done during 1994. The Australian Government supports the position of SOPAC Data Manager based at the Australian Geological Survey Organisation (AGSO), Canberra, a position which has become invaluable due to the lack of an in-house capacity at the SOPAC Secretariat. The Data Manager updated hydrocarbon data catalogues of all countries with data stored in Canberra. These were made available along with their associated petroleum brochures as country-specific data packages at industry conferences in Australia and elsewhere.

Ocean Energy

The SOPAC ocean energy program provides to the member countries technical data and information and advice on the potential marine energy resources from waves and tides to ocean thermal energy conversion. The wave database established at SOPAC headquarters enables wave parameters to be calculated for most sites in the region. Pacific Island nationals continue to be trained to use this information to assist with their country's development of renewable energy.

SOPAC with the Fiji Energy Department, investigated the potential of tidal power with the deployment of two water level recorders and a current meter in a tidal inlet in eastern Vanua Levu. There were also three deployments of a waverider buoy and two directional buoys, two in Kadavu and one in Matuku. Both the tidal and wave projects had SOPAC's follow-up interpretation of the data and SOPAC coordinated arrangements for a Fiji national to undergo training at OCEANOR in Norway.

SOPAC continues to maintain a watching brief on developments with ocean thermal energy conversion. Little activity was experienced in this sector except for some renewed interest in the potential of OTEC along the southeast coast of Viti Levu, in Fiji.

Geothermal Energy

Papua New Guinea, Solomon Islands, Vanuatu, Western Samoa and Fiji have potential for this form of energy. At present SOPAC is taking a regional approach in assessing this potential resource by upgrading SOPAC knowledge on the current levels of technology through a workshop forum.



ENVIRONMENTAL GEOSCIENCE

SOPAC environmental geoscience studies are aimed at providing information on the physical aspects of the coastal environment, including natural processes, geohazards and the interaction between natural and man-induced processes. This information is critical to SOPAC's role in advising on effective strategies for sustainable development in the coastal zone. Coastal management, coastal and offshore mapping are all components of the environmental geoscience program.

Coastal Management

Coastal monitoring programs were continued in Tuvalu (Fongafale) and Western Samoa (Mulinu'u Peninsula), with repeat surveys of established beach profiles. SOPAC's beach profile data base now spans a decade and more in some countries providing an exceptional basis for evaluating shoreline erosion and accretion in particular on atoll islets, which are especially vulnerable to the sea.

Coastal management advice to member nations involves a continuing educational program to the public through the local media, on radio and through illustrated brochure and workshops. Assistance and advice was provided formally to Tonga (for a government initiative to get integrated coastal-zone management off the ground; to Western Samoa for a coastal-zone management seminar; to Fiji (Ministry of Rural Development, on the issue of reef blasting channels); and to Kiribati.

Coastal process studies, vital for an understanding of geological hazards and changes in the coastal zone, were completed in Fiji, PNG and Kiribati. These included field surveys and participation in a workshop on submarine tailings disposal in the coastal zone. Advising on coastal protection and engineering is an area in which SOPAC has been active, sponsoring two workshops in 1994. Adequate understanding of coastal processes and sediment budgets, is an essential prerequisite to the proper design and implementation of coastal protection measures.

Coastal Mapping

Maps are the most efficient way of portraying and communicating thematic information which is fundamental to coastal development planning, coastal-zone management and resource identification. As well as these physical applications, SOPAC maps and data have been utilised for fisheries management, including deep-water fish aggregation device deployment and identification of potential deep-water fishing grounds.

Bathymetric mapping is a very important aspect of the SOPAC program, often providing data in areas which have had no new data in half a century. Two major bathymetry surveys were completed in Kiribati and the Marshall Islands where the most recent data were more than fifty years old. Maps at various scales from sources other than SOPAC data were completed for the Avarua-Avatiu area and Penrhyn Lagoon in the Cook Islands, in addition to a compilation of all swath image data for southeast Viti Levu (Fiji) and the northern parts of Vanuatu. SOPAC has provided bathymetric data and maps to other regional bodies primarily FFA, and SPC.

Remote sensing mapping capabilities and the interpretation of satellite images at SOPAC are now well established. Images for Penrhyn Lagoon in the Cook Islands and Tarawa Atoll in Kiribati were interpreted for bathymetry and the lagoon floor characteristics. Another project was undertaken on Savo Island in the Solomon Islands developing an evacuation plan in the event of a volcanic eruption.

An airphoto survey capability is well established at SOPAC but saw no activity during the year, due to the lack of suitable aircraft. SOPAC, recognising the importance of the historical information in aerial photos, continued to build its air photo database with the purchase of 1983 black and white photos of Majuro Atoll.

Offshore Mapping

Foreign marine scientific research is at a high level in the region, totalling more than one year of shiptime during 1993. The Secretariat coordinates these activities to ensure that member countries can make maximum use of high-technology ships at minimum cost, participate in the cruises, and obtain the data and information collected in their EEZs. Member country nationals are encouraged and assisted to participate in the cruises, and copies of the reports, data, and informa-

tion collected by the research vessels in the EEZs of member countries are obtained for use by the member countries and for archiving in the region.

Water Resources and Sanitation

The Water Resources and Sanitation Project became part of SOPAC in late 1994. The project has secured funding from UNDP for only two years. The Project Manager, Hydrogeologist and Program Assistant were all appointed and in post by mid December 1994. The initial thrust of the project will be to consult with member countries to see how best the Project can assist with water issues. Early in 1994 SOPAC began administering the training activities of the UNDP water program. Workshops relating to the water issues within the region were held during 1994 in Port Vila, Vanuatu; Honiara, Solomon Islands; and Majuro, Marshall Islands.

HUMAN RESOURCES DEVELOPMENT

Human resources development is an aspect of SOPAC's Work Program, and includes general education of island member country nationals in the earth sciences as well as technical, scientific, and management training in marine and coastal geology, environmental geology, and non-living resources assessment. Training activities are grouped into Certificate Courses, Scholarships, Fellowships, Workshops and Seminars, and Development Advice.

Certificate Course

The Certificate in Earth Science and Marine Geology is an ongoing activity run for three months each year over a three-year period. It comprises a Basic Course in year one followed by four six-week Advanced Courses in years two and three.

The objective of this regional training program is to provide continuing development of skills required by technicians in their positions within mineral resources departments throughout the South Pacific. The course is also attended by participants sponsored by mining companies.

During 1994, the Certificate continued with the second year of the current three-year cycle with two Advanced Courses held during the period 21 February to 13 May. Twenty-seven participants representing six member countries attended.

Scholarships

The SOPAC Scholarship Scheme provides first-degree training in geology and engineering for member country nationals. A total of five scholarships were held during 1994 at the University of British Columbia, the University of the South Pacific, the Queensland University of Technology and the Oxford Brookes University.

Fellowships

The SOPAC Fellowship Scheme enables individuals to gain technical and scientific on-the-job training for periods of up to three months, either with Secretariat Staff or with other appropriate organisations. In 1994, 39 fellowships were awarded. The attachments were for periods of up to six weeks. The Fellowship Scheme was also utilised to offer SOPAC Scholars the opportunity to gain work experience during vacation time.

Each year, several senior and junior island member country individuals have the opportunity to gain management experience by attending the Annual Sessions, and spending time at the Secretariat. Nine individuals from three member countries attended conferences during the past year, including participation in the STAR Meeting. Of particular note was participation by senior member country government officials at PACON in Townsville. In addition, there were three research cruises in the region during the past twelve months which had member country participants on board the vessel.

Organisations other than the Secretariat continued to support the Training Program, and the number of attachments during the past year grew accordingly and included four individuals from three member countries as follows: two Solomon Island drillers to NIWA (New Zealand); one Papua New Guinea university student to ANU, Australia; and one Fiji National to BGS, United Kingdom.



Workshops and Seminars

Since 1975, Regional Workshops have provided training opportunities on specific aspects of the SOPAC Work Program, giving island nationals the opportunity to meet together with experts acknowledged as leaders in their field, to receive theoretical and practical training, to discuss problems of mutual interest, and to obtain expert advice on the development and management of the work program for their country.

The Annual Coastal Mapping Workshop was held in Majuro, and attended by participants from Cook Islands, Fiji, Kiribati, Marshall Islands, Papua New Guinea, Solomon Islands, Tuvalu, Vanuatu and Western Samoa. A coastal map at a scale of 1:5 000 is being produced for parts of the Majuro Atoll from field mapping and interpretation of aerial photos.

A Regional Workshop on Seabed Mapping was held in Noumea and attended by 73 participants from various scientific institutions and agencies and 12 SOPAC member countries.

Two Coastal Protection Meetings were held in conjunction with SPREP, one in Apia in February and one in Suva in May.

A one-day SOPACMAPS signing and data presentation workshop was held in Suva during August to coincide with the official handing over of results of the cruises to the participating countries: Fiji, Solomon Islands, Vanuatu and Tuvalu.

A regional Water Policy, Training and Research Workshop was held in Honiara in June in conjunction with UNESCO and UNDDSMS and was attended by participants from all the SOPAC island member states except Guam. This was followed by a Water Policy Meeting held in Majuro in September in conjunction with the 1994 SOPAC Governing Council Meeting.

A regional Drilling Workshop was held in Vanuatu in conjunction with the Australian Drilling Industry Training Council (ADITC) and was attended by participants from Fiji, Federated States of Micronesia, Solomon Islands, Tonga, Vanuatu and Western Samoa.

In-country seminars were held in Fiji on epigenetic mineralisation; Tuvalu on coastal mapping; Tonga in conjunction with SPREP on integrated coastal management; and Western Samoa on beach monitoring.

Development Advice

Assistance was given to the University of the South Pacific in the Marine Studies, Ocean Resources Management, Marine Public Education and Earth Sciences Programs. Assistance was

also given to schools in Fiji in conjunction with MRD staff; and UNHCR by participating in the Third Regional Disaster Management Workshop.

TECHNICAL SERVICES

One of SOPAC's roles as a regional organisation is the effective dissemination of geoscience data and information to its member countries. Governments need access to accurate, timely and relevant information and analysis to assist with policy making on the responsible exploitation of their non-living resources. These resources have the potential to be a critical factor in the economies of many SOPAC member countries.

Regional Data Centre

The Regional Data Centre at the Secretariat was created in late 1992 to provide enhanced data management for both member countries and the SOPAC Secretariat through the development of a regional information system. Outputs include navigation, bathymetric, and geophysical maps, interpreted satellite images and aerial photographs, and summary reports of data held. The Centre provides appropriate software and hardware to member countries to enable them to carry out independent analysis of their own data, together with that from the Secretariat, for management of their resources. The Centre also provides support to other Work Program activities at the Secretariat.

During 1994, a local area network (LAN) system using a Netware-based file server was established to link the PC workstations within the Secretariat allowing the shared use of information. Visits were made to some member countries and training given in the use of PC's and software including GIS and other mapping software.

Development of databases continued. More than fifteen are operational and able to be shared. An e-mail system is operating successfully through ORSTOM, Noumea. There are no direct electronic links between member countries yet, but through a \$40,000 grant from the US Government a PEACESAT terminal is under investigation to be installed at the SOPAC Secretariat in Nabua, Suva. SOPAC member countries Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Niue, Papua New Guinea, Solomon Islands, Tonga, Tuvalu, Vanuatu and Western Samoa all have operational earth stations.

A GIS capability was installed and is in place at the Secretariat for use by staff and visiting island nationals. Regular GIS user group meetings were co-ordinated every two months throughout 1994 and a GIS & Remote Sensing newsletter is produced in-house at the Secretariat to support the user groups initiatives.

Information Services

The Information Program includes the development and maintenance of library services, both at the Secretariat and in member countries; publication of technical and promotional reports; publication of bathymetric and coastal maps; and management of data.

Library

The SOPAC library is the main source for marine geoscience information in the region (excluding Hawaii, Australia and New Zealand). It provides access to marine geological information for Secretariat staff, staff of geology departments in member countries, and researchers and other users of geoscience information. Services provided include reference services, acquisition of new books and journals, including material obtained through its gift and exchange program and interlibrary loans. This latter service is provided with the assistance of the Pacific Islands Marine

Resources Information System (PIMRIS) at the University of the South Pacific (USP) Library, the Australian Geological Survey Organisation (AGSO) Library, and the University of Hawaii's School of Ocean and Earth Science and Technology (SOEST) Library.

Six library databases are maintained: one each for aerial photographs; journals; maps and charts; monographs, reports and reprints; newspaper clippings; and photographs and slides. Regular current awareness lists are generated from each of these databases for in-house circulation, and subject bibliographies are also provided for users when requested.

When requested, assistance is provided to the member countries with the organisation of their geology collections or libraries.

Publications

The main activity of the Secretariat's publication services continues to be the scientific review, editing, publication and distribution of reports on the results of the SOPAC Work Program. Primarily for individual member countries and therefore effectively of restricted circulation, these reports are all listed in *SOPAC News* and are generally available on request. Technical bulletins are generally compilations of studies of a particular type, and make results of SOPAC work more widely available than the report series. In 1994 about seventy (70) reports in various categories were produced, one bulletin was published in 1994. Two more bulletins meant for possible publication in 1994 are pushed back into 1995 mainly due to a reduction in staffing levels.

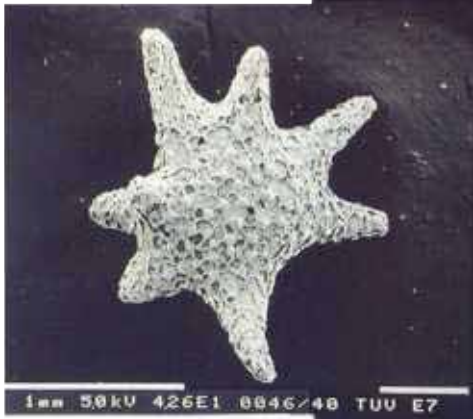
Public awareness materials include the *Annual Report Summary* (this publication), *SOPAC News*, *SOPAC Projects* and promotional brochures. *SOPAC News* circulates topical information about the organisation and its activities. *SOPAC Projects* provides non-technical summaries of the results of the Work Program to ensure that the information and its benefits are available to as wide an audience as possible.

Publications staff also provide support for the annual session of the Governing Council and publish the Session Proceedings.

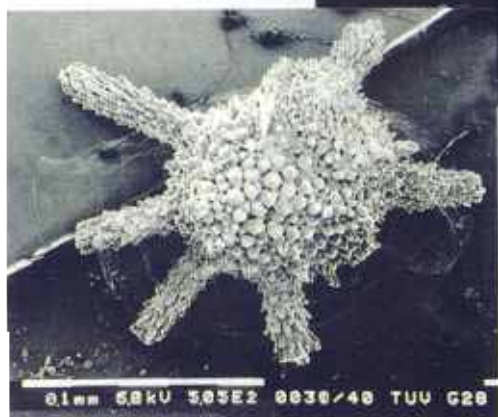
Cartography

SOPAC compiles and publishes a range of maps for member countries, including bathymetric maps of EEZs, lagoons and coastlines, coastal resource maps, coastal morphology maps, and sediment maps. Major work for 1994 are covered under Coastal Mapping.



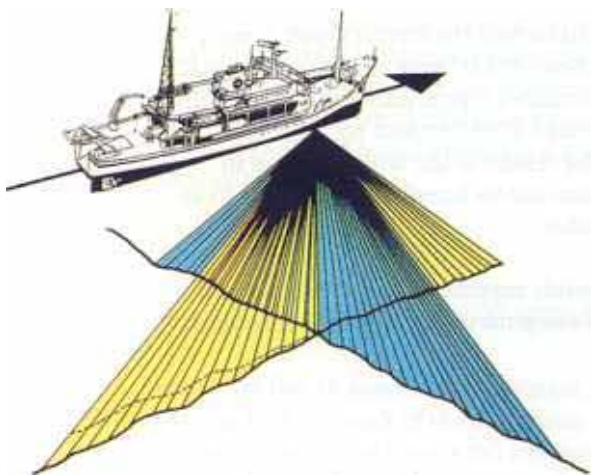


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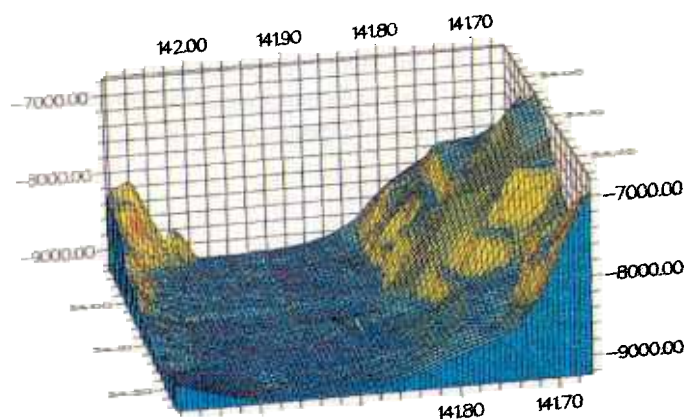
The attached pictures show the primary species of foraminifera that make up the beach sand and gravel resources of most island countries. The principal source of sand and gravel used for construction purposes in most island countries is a reefal environment. Continued reclamation on the reef and causeway construction could interfere with the habitat of one of the most important components of beach sand – foraminifera.



Schematic of how an MBES works. A Multi Beam Echo Sounder (MBES) is part of the principal suite of equipment onboard the RV Hakurei Maru No. 2, a Japanese ship designed exclusively for prospecting for deepsea mineral resources. The MBES installed on the Hakurei Maru No.2 is the Atlas Hydrosweep from Krupp Atlas Elektronik, Germany.



Dredging for sand and gravel in Vaitupu, Samoa. The increase in demand for construction purposes in island countries coupled with increased awareness for development of such resources has prompted requests for studies to identify alternative sources of this resource.



3D representation of the ocean floor derived from data collected using the MBES. The RV Hakurei Maru No. 2 is the ship used by the Metal Mining Agency of Japan for the deepsea mineral resources surveys as part of the Japan/SOPAC Deepsea Mineral Resource Survey program which goes into its third five-year cycle.



Phistegina lobifera



Participants of the SOPAC/USP Certificate in Earth Science and Marine Geology Course. The last course that wrapped up early 1995 was completed by 25 technical officers from the Cook Islands, Fiji, Papua New Guinea, Solomon Islands, Vanuatu and Western Samoa. The Certificate is run for three years at three months full time each year. SOPAC has run this basic earth science and marine geology course for more than ten years.



Airlift drilling at Nadi Bay, Viti Levu, Fiji that confirmed the presence gold in this area in late 1994.

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A digital Conductivity, Temperature, Depth (CTD) probe with a 1200-metre capability. Part of the suite of equipment maintained by the Secretariat for surveys in island member countries. The probe was upgraded in 1994 and now allows for collection of continuous vertical profile data of a water column, conductivity, temperature and depth data to up to 1200 metres.



Drafting staff also produce maps and diagrams for SOPAC technical reports, train member country nationals in drafting and map preparation (both at the Secretariat and by instruction at coastal mapping workshops), and prepare promotional and display material.

Field Support Services

The field support services group is an essential logistical and equipment resource that allows SOPAC to conduct marine geophysical and geological surveys in the member countries. Expertise to mobilise manpower and equipment, developed over two decades of operations in the region, is a significant asset to the member countries. In addition, the field support group provides back-up to the regional data centre at SOPAC headquarters.

In 1994, a total of eight surveys were mobilised to six member countries: Fiji, Kiribati, Marshall Islands, Solomon Islands, Tuvalu, and Western Samoa. New field equipment and upgrades to improve survey capabilities include a digital echo sounder with precision shallow-water and deep-water capabilities, an integrated GPS/microwave navigation equipment and upgrading of our digital CTD from 200 metres to 1200 metres depth range.

Other support received include handheld radiotelephones, sixty 12-volt batteries, a dual port logging computer and two airlift bags. On the down side one current meter was lost during a field survey but the loss was partially covered by insurance.

During the year the Geological Technician processed a large number of marine sediment samples from Fiji, Kiribati, Marshall Islands, Tuvalu and Western Samoa. Technical training was also done with the attachment of the Senior Electronics Technician to NIWA for a period of two weeks and the Geological Technician attending a workshop on drilling methodology in Vanuatu.

CORPORATE SERVICES

During the last 12 months, management has given emphasis to ensuring that the work of the Secretariat is delivered to its members, that SOPAC plays a full role with other regional organisations in SPOCC, maintains close ties and visits donors and supporting institutions, and attends pertinent meetings that require SOPAC's full participation. With the reduced number of professional staff, management has been proactive in streamlining the administration and enhancing program

planning through the promotion of the Medium-Term Plan and has been more active in certain program activities such as ocean energy, hydrocarbons, cruise coordination, coastal management, and seabed mapping. Management continues to be occupied with ongoing reviews including the review of terms and conditions of employment in regional organisations; review of institutional arrangements for a centre for sustainable development in the Pacific; and the review of institutional arrangements for marine resources development for the region.

Planning

New proposals for funding continued to be prepared. Proposals were either developed, submitted or followed through to the following countries and agencies for support: Australia, Canada, CFTC, China, European Union, Japan, IOS, New Zealand, Norway, UKODA, UNDP and US State Department and DMA. SOPAC has joined other SPOCC members in preparing a joint major proposal for Canadian funding under C-SPOD II. The Medium-Term Plan was re-drafted and this led to a reorganisation of the structure of the Work Program into an easier-to-understand format. The reporting in this document follows this format.

Funding

Australia continues to provide support for three projects at SOPAC. The aggregate project supports two professional and three technical staff and is focussing on mapping alternate aggregate deposits, especially sand. The petroleum data management project supports one professional staff. The scholarship project continued and supported one student. Through provision of a special grant two professional positions were supported in 1994 - Training Coordinator and Publications Coordinator (in part). Regular contact with AIDAB is maintained through their office at the Australian Embassy in Suva.

Fiji continued to support SOPAC with an annual special grant. It is also plans to contribute towards the cost of the construction of the new SOPAC headquarters building to be built in Suva.

Canada (through CIDA) has chosen CORA as the new administering agency for existing funds (C-SPOD I) and a review of Canadian funding was completed. Offshore Coordination (October) and Hydrocarbon (December) projects have concluded and a new budget was developed with CORA's assistance. With savings (including a reduction in the number of consultancies), and additional bridging finance Canada supported one professional position in coastal work in 1994 (Marine Geologist). Discussions are proceeding with the Canadian Geological Survey (Atlantic Geoscience Center) on close working relationships, and a Coastal Geologist will be seconded to the Secretariat for one year with a second person being seconded for a second year. Support for the SOPAC Human Resources Development Program continued with funds for scholarships, and computer training. Meetings with other regional organisations are continuing and an integrated regional project, with a strong SOPAC component, has been developed for Canadian support under C-SPOD II.

CFTC affirmed their continuing interest in supporting professional positions at the Secretariat and in support of training activities. CFTC reviewed a request for an Aggregate Geologist, and informed SOPAC that as this is a priority area for CFTC to support, it is proceeding to search for a suitable candidate in the expectation that this request will be approved. A request for a second professional position, Cruise Coordinator, was submitted. CFTC continued its support for training, especially the Certificate in Earth Science and Marine Geology, and workshops and seminars.

China agreed to provide a Coastal Geologist for a one year trial period. The professional provided much needed assistance for coastal management work and started during the third quarter of 1994.

EU-funded projects under Lome III continued to have a major impact on the SOPAC Work Program. EU funding continued to support three professional and eight technical support positions at the Secretariat. The EU also provided major support to coastal field activities, computing support, and seabed mapping, and supported a number of activities within the Human Resource Development and Hydrocarbon programs, including workshops and consultancies. Substantial assistance was provided to seabed mapping activities and the swath mapping SOPACMAPS project was concluded in 1994. A two-year proposal for support of Human Resources Development under Lome IV (1st phase) was submitted at the request of the Pacific ACP:EU Bureau, which has a mandate to develop projects with SOPAC if Lome IV (1st phase) funds are available. Discussion on possible submissions to the EC for support under Lome IV (2nd phase) continued, with submissions due 31 August 1994. Priority was given to projects on coastal protection strategies, mineral resource assessment and management, and water resources.

The French Government supported a project on computer mapping which included three positions: Computer Mapping Geologist; Computer Geologist; and Computer Operator, with special emphasis on remote sensing and coastal mapping. This project also supported the establishment of computing facilities at the Secretariat especially in support of remote sensing and computer mapping. Support from French institutions IFREMER, Brest and ORSTOM, Noumea remained strong with continuing in-kind support. French support is coordinated by the French Embassy in Suva.

The Government of Japan provided substantial support for the Offshore Program, including the services of an Offshore Geologist. Under a special joint agreement, Japan also provides two months survey time each year to investigate deepsea mineral resources in the SOPAC region using the *Hakurei Maru* No.2 and produces substantial information and detailed reports stemming from this work. A third five-year phase of the special joint agreement requested in late 1993 was approved in late 1994.

New Zealand continued its support of SOPAC projects through partial support of the Publications Coordinator position under the Information Services program. Special grants were provided during the reporting period to support training of the Senior Electronics Technician in NZ and a regional review of geothermal energy potential. Regular contact with New Zealand is maintained through the New Zealand Embassy in Suva.

Support from the Norwegian Government through NORAD continued in 1994, with the two-year wave-energy assessment and training project coming to a close in 1994. A wave-data maintenance and project-development project is being



developed for Norwegian support for 1994 and 1995. NORAD is also currently considering a request from SOPAC for a Petroleum Coordinator. A request for support for a preliminary ocean monitoring project was turned down, but Norway would be interested in funding such an activity if other funds were also found.

A project proposal for a Minerals Policy Officer was submitted to UK ODA. Although a number of discussions were held in Suva, it appeared that SOPAC would not receive this assistance as a mechanism for using ODA funding could not be found.

The UNDP Water Supply and Sanitation Program was fully assimilated into SOPAC. This followed the decision by SPOCC that SOPAC be the lead agency for water resources assessment and related studies. The Secretariat has developed a project document with UNDP and recruited two professionals (a Project Manager and a Hydrogeologist) with UNDP funding. The current project will be funded by UNDP through until the end of 1995. Other professional positions were being sought from the United Nations (especially DDSMS) as Associate Experts. Other international agencies, such as WHO, WMO, UNICEF, IRC-IWSC have expressed interest in supporting this project.

Discussions and proposals were submitted to the US State Department and US Defence Mapping Agency (DMA). Two consultants were provided by DMA in 1994. The US State Department provided support for the development of databases, and is considering supporting a request from

SOPAC for a regional communications system. Requests to the US Office of Global Change for support of a coastal protection review project under the GEF was referred to individual island countries.

Administration

New administrative systems previously put in place continue to be fine tuned. Administrative documentation and forms are now on the Secretariat network making them more readily accessible in an effort to improve efficiency.

Organisation

The development of proposals for funding of the new SOPAC Headquarters, Training Centre and accommodation are well advanced. Discussion with local authorities are underway. Interim arrangements have been made to continue sharing with the USP Institute of Marine Resources their training facilities.

APPENDICES

Appendix 1

SOPAC Publications for 1994

MINERALS REPORTS

Biribo, N.; Smith, R. 1994: Sand and gravel usage, South Tarawa, Kiribati. *SOPAC Preliminary Report 75*: 16 pages.

Hosoi, Y. 1994: Executive Summary.

"Ocean Resources Investigation in the Sea Area of SOPAC. Report on the Joint Basic Study for the Development of Resources." Volume 4, Phase II: Sea Area of Solomon Islands and Papua New Guinea. *SOPAC Technical Report 209*: 21 pages.

Hosoi, Y. 1994: Preliminary report on the results of the Japan/SOPAC deepsea mineral resources cruise in Vanuatu waters, 1994. *SOPAC Cruise Report 143*: 14 pages.

Lum, J. 1994: Placer gold potential of the Solomon Islands, Vanuatu and Fiji. *SOPAC Technical Report 214*: 59 pages.

Lum, J.; de Biran, A.; Andrew, D.; Toba, T. 1994: Gold potential at the Matepono River mouth and adjacent areas, Solomon Islands - a magnetometer survey, Volume 1. *SOPAC Technical Report 213*: 40 pages.

Lum, J.; Kitekei'aho, T.; Seule, S. 1994: Gold potential of the alluvial sediments of Western Big Bay, Vanuatu. *SOPAC Technical Report 211*: 29 pages.

Smith, R. 1994: Alternative sand and gravel resources survey, Majuro Atoll, Marshall Islands. *SOPAC Preliminary Report 71*:

Smith, R. 1995: Assessment of lagoon sand and aggregate resources, Funafuti Atoll, Tuvalu. *SOPAC Technical Report 212*: 62 pages, 6 appendices, map in pocket.

Smith, R.; Young, S.; Biribo, N. 1994: Bathymetric seismic and alternative sand and gravel resource surveys, Tarawa Atoll, Kiribati, July 1994. *SOPAC Preliminary Report 72*: 18 pages.

Smith, R.; Young, S.; Frost, G. 1994: Borrow Pit Resources - related surveys, Funafuti Atoll, Tuvalu. *SOPAC Preliminary Report 69*: 35 pages.

HYDROCARBONS REPORTS

Johnson, H. & others 1994: Petroleum source rock survey in the Solomon Islands and Vanuatu, Southwest Pacific. *SOPAC Technical Report 207*: 92 pages.

OCEAN ENERGY REPORTS

Barstow, S.; Haug, O. 1994: The wave climate of the Kingdom of Tonga. *SOPAC Technical Report 201*.

Barstow, S.; Haug, O. 1994: Wave climate of Tuvalu. *SOPAC Technical Report 203*: 23 pages + 1 appendix.

Barstow, S.; Haug, O. 1994: The wave climate of Western Samoa. *SOPAC Technical Report 204*.

Barstow, S.; Haug, O. 1994: The wave climate of Fiji. *SOPAC Technical Report 205*: 25 pages + 1 appendix.

Barstow, S.F.; Haug, O. 1994: The wave climate of Southwest Pacific. *SOPAC Technical Report 206*: 39 pages.

Olsen, E.; Barstow, S.F.; Selanger, K. 1994: Wave data collection, Rarotonga, Cook Islands, July 1987 - January 1991. *SOPAC Technical Report 200*.

Olsen, E.; Selanger, K.A. 1994: Wave data collection, Kadavu, Fiji, June 1991 - December 1993. *SOPAC Technical Report 202*.

Olsen, E.; Selanger, K. 1994: Wave data collection, Kadavu, Fiji, June 1991 - December 1993. *SOPAC Technical Report 210*: 28 pages, 2 appendices.

COASTAL MANAGEMENT REPORTS

Eade, J.V. 1994: Tuvalu Borrow Pit Infilling Pilot Project - Summary. *SOPAC Miscellaneous Report 183*: 7 pages.

Eade, J.V. 1995: Summary report of the Tuvalu Borrow Pit Infilling Pilot Project. *SOPAC Miscellaneous Report 190*.

Gillie, R.D. 1994: Coastal erosion problems in the Gilbert Islands Group, Republic of Kiribati (Phase II). *SOPAC Technical Report 191*: 151 pages.

Smith, R.; Young, S.; Frost, G. 1994: Aanderra current meter deployment, Suva Harbour, Laucala Bay, Viti Levu, Fiji. *SOPAC Preliminary Report 70*: 20 pages, 2 appendices.

Solomon, S.E. 1994: A review of coastal processes and analysis of historical coastal change in the vicinity of Apia, Western Samoa. *SOPAC Technical Report 208*: 62 pages.

Young, S.; Musunamasi, P.; Ratu, S.; Singh, R. 1994: Deployment of current meter and water level recorders in Natewa Bay and Salt Lake in Savusavu, Vanua Levu, Fiji. *SOPAC Preliminary Report 73*: 8 pages.

COASTAL MAPPING REPORTS

Howorth, R., Woodward, P. 1995: Kiribati in-country seminar on beach monitoring, 22-26 January 1995. *SOPAC Preliminary Report 77*: 29 pages.

Larue, M. 1994: Report on the 7th Australasian Remote Sensing Conference, Melbourne, Australia. *SOPAC Miscellaneous Report 178*.

Solomon, S.E. 1994: A review of coastal processes and analysis of historical coastal change in the vicinity of Apia, Western Samoa. *SOPAC Technical Report 208*: 62 pages.

Woodward, P. 1995: Resurvey of Mulinu'u Peninsula Beach Profiles, Western Samoa, 6-9 December 1994. *SOPAC Preliminary Report 76*: 35 pages.

Woodward, P. 1995: Resurvey of Funafuti beach profiles, Tuvalu, 30 January - 1 February 1995. *SOPAC Preliminary Report 78*: 17 pages.

OFFSHORE MAPPING REPORTS

Elaisi, A. 1995: Seafloor mapping in the West and Southwest Pacific, Lifou, Noumea, New Caledonia, 4-9 November 1994.

- SOPAC Miscellaneous Report 185.
- IFREMER, 1994: SOPACMAPS Project. Final Report - Central Solomons Trough. *SOPAC Technical Report 192*.
- IFREMER, 1994: SOPACMAPS Project. Final Report - New Hebrides Intra-Arc Basins. *SOPAC Technical Report 193*.
- IFREMER, 1994: SOPACMAPS Project. Final Report - Malaita. *SOPAC Technical Report 194*.
- IFREMER, 1994: SOPACMAPS Project. Final Report - Melanesian Arc Gap. *SOPAC Technical Report 195*.
- IFREMER, 1994: SOPACMAPS Project. Final Report - North New Hebrides Back Arc Area. *SOPAC Technical Report 196*.
- IFREMER, 1994: SOPACMAPS Project. Final Report - Pandora Bank Area. *SOPAC Technical Report 197*.
- IFREMER, 1994: SOPACMAPS Project. Final Report - Alexa/Charlotte Banks Area. *SOPAC Technical Report 198*.
- IFREMER, 1994: SOPACMAPS Project. Final Report - South Tuvalu Banks Area. *SOPAC Technical Report 199*.
- ORSTOM, Noumea 1994: Seafloor mapping in the West and Southwest Pacific, Results and Applications, Lifou-Noumea (4-9 November 1994), New Caledonia. ABSTRACTS. *SOPAC Miscellaneous Report 184*: 72 pages.
- Stevenson, A.J.; Herzer, R.H.; Ballance, P.F. 1994: Geology and submarine resources of the Tonga-Lau-Fiji region. *SOPAC Technical Bulletin 8*: x, 350 pages.

HUMAN RESOURCES DEVELOPMENT REPORTS

- Howorth, R. 1994: Coastal Crossword. *SOPAC Training Report 59*.
- Howorth, R.; Woodward, P. 1994: Tuvalu In-country Seminar and beach monitoring. *SOPAC Miscellaneous Report 62*.
- Howorth, R.; Woodward, P. 1994: SOPAC 1994 Coastal Mapping Workshop, Majuro Atoll, Republic of the Marshall Islands, 1-12 August 1994. *SOPAC Training Report 66*.
- Howorth, R.; Woodward, P. 1994: Tuvalu In-country Seminar and beach monitoring. *SOPAC Training Report 62*.
- Kitekei'aho, T.; Elaise, A. 1994: Report on Courses for the SOPAC Certificate in Earth Science and Marine Geology. *SOPAC Training Report 64*.
- Kitekei'aho, T.; Howorth, R. 1994: SOPAC Scholarship Scheme, January 1990 - March 1994 - Narrative Report to CORA. *SOPAC Training Report 61*.
- Kitekei'aho, T.; Howorth, R. 1994: SOPAC Scholarship Scheme, January 1990 - March 1994 - Narrative Report to CORA. *SOPAC Training Report 61*.
- Kitekei'aho, T.; Elaise, A. 1994: Report on 1994 Courses for the SOPAC Certificate of Earth Science and Marine Geology Course. *SOPAC Training Report 64*.
- Kitekei'aho, T. 1994: SOPAC Human Resource Development Program. Prepared for (the) Regional Meeting of Ministers of Planning and Senior Planners on Human Development Strategies in the Pacific. *SOPAC Training Report 65*: 6 pages.

- Lawless, J.V.; Elaise, A. 1994: Epigenetic Mineralisation Workshops. *SOPAC Training Report 63*.
- Vanuatu Drilling Workshop Report, 8-18 March 1994. *SOPAC Training Report 60*.

TECHNICAL SERVICES REPORTS

- Accasina, G.; Allinson, L.; Walton, P. 1995: Proposal to become a PEACESAT Hub Site. *SOPAC Miscellaneous Report 189*.
- Allinson, L. 1994: Proposed upgrade to the Department of Mining and Petroleum information system, Papua New Guinea. *SOPAC Miscellaneous Report 180*: 12 pages.
- Allinson, L.; Taufao, S.; Martin, F. 1994: Regional Information Technology Strategies, SOPAC/FFA meeting, 11-13 May 1994. *SOPAC Miscellaneous Report 179*: 9 pages.
- Crook, K. (Ed.) 1994: Abstracts of papers presented at the STAR Session 1994. *SOPAC Miscellaneous Report 182*: 30 pages.
- Martin, F.; Larue, B.M. 1994: ZEDLOG for Windows - User Manual, Version 1.0. *SOPAC Miscellaneous Report 181*.
- Sherwood, A.M. 1994: Final Report for the Position of Technical Editor, Information Program, April 1990 - December 1994. *SOPAC Miscellaneous Report 186*.
- SOPAC News (3 issues)
- GIS & Remote Sensing News (6 issues)
- SOPAC Projects (1 issue)
- Annual Report Summary 1994
- SOPAC Secretariat 1994: Proceedings of the Twenty-third Session (Majuro, Marshall Islands, 14-22 September 1994. *Proceedings 23rd Session*: 75 pages.

CORPORATE SERVICES REPORTS

- SOPAC 23rd Session Documentation
- SOPAC Secretariat 1994: Report on Work Program Activities of the SOPAC Secretariat 1993-1994. *SOPAC Miscellaneous Report 187*.
- SOPAC Secretariat, 1995: SOPAC Medium-Term Plan 1995-1999. *SOPAC Miscellaneous Report 188*: 24 pages, 2 appendices.

Appendix 2

Secretariat Staff List [as at December 1994]

	NAME	COUNTRY OF ORIGIN	DATE JOINED	CONTRACT START	CONTRACT END
MINERALS					
Marine Geologist	Robert Smith	Australia	Oct 88	Jul 92	Jul 95
Marine Geologist	Jackson Lum	Fiji	Nov 92	Nov 92	Nov 95
Chief Draftsman	Phil Woodward	Australia	Aug 88	Aug 94	Jul 97
Technical Secretary	Litia Waradi	Fiji	Apr 89	Jan 91	Dec 95
Offshore Geologist	Yoshitaka Hosoi	Japan	Aug 93	Aug 93	Aug 95
Aggregate Geologist	"vacant"				
HYDROCARBONS					
Petroleum Coordinator	"vacant"				
COASTAL MANAGEMENT					
Coastal Geologist	"recruiting"				
Coastal Geologist	Chunting Xue	China	Sept 94	Sept 94	Sept 95
COASTAL MAPPING					
Mapping Geologist	Michel Larue	France	Oct 92	-	Oct 94
Computer Geologist	Franck Martin	France	Sep 93	Sep 93	Dec 94
Computer Operator	Bougainville Bakoso	Fiji	Jan 88	Permanent	-
OFFSHORE MAPPING					
Offshore Coordinator	"vacant"				
WATER RESOURCES					
Project Manager	Ed Burke	New Zealand	Dec 94	Dec 94	Dec 96
Hydrogeologist	Derrick Depledge	New Zealand	Oct 94	Oct 94	Oct 96
Hydrologist	"vacant"				
Program Assistant	recruiting				
HUMAN RESOURCE DEVELOPMENT					
Training Coordinator	Russell Howorth	New Zealand	Oct 86	July 92	Jul 95
Assistant Training Coordinator	Fuka Kitekei'aho	Tonga	Nov 91	Nov 94	Nov 96
Technical Secretary	Anna Elaise	Fiji	Jul 90	Nov 90	Dec 95
REGIONAL DATA CENTRE					
Computer Systems Manager	Les Allinson	Australia	Nov 92	Jan 93	Dec 95
Technical Secretary	Lavenia Kamali	Fiji	Mar 89	Jan 91	Dec 95
INFORMATION SERVICES					
Publications Coordinator	Alan Sherwood	New Zealand	Apr 90	Apr 92	Apr 95
Assistant Editor	Lala Bukarau	Fiji	Nov 85	Oct 94	Sep 96
Librarian	Dillie George	PNG	Dec 90	Feb 92	Dec 95
Draftsman	Niko Naibitakele	Fiji	Jul 92	Permanent	-
Technical Secretary	Sunita Prasad	Fiji	May 89	Jan 91	Jul 95
FIELD SUPPORT SERVICES					
Senior Electronics Technician	Simon Young	Fiji	Jan 93	Jan 93	Jan 96
Electronics Technician	Peni Musunamasi	Fiji	Jun 89	July 92	Permanent
Marine Mechanic	Joe Mausio	Fiji	Mar 89	Dec 89	Dec 95
Workshop Assistant	Setareki Ratu	Fiji	Oct 86	Permanent	-
Technical Support Assistant	Graeme Frost	Fiji	Mar 92	Mar 92	Mar 96
Senior Geology Technician	Sekove Motuiwaca	Fiji	Apr 80	July 92	Permanent
CORPORATE SERVICES					
Director	Philipp Muller	W/Samoa	Jan 92	Jan 92	Jan 95
Deputy Director	Jim Eade	New Zealand	May 87	Mar 92	Feb 95
Finance & Administration Controller	Umar Farook	Fiji	Apr 91	Apr 94	Apr 97
Special Fund Coordinator	Teuea Toatu	Kiribati	Jun 91	Jun 91	Jun 96
Senior Technical Secretary	Laisa Baravilala	Fiji	Jul 87	Permanent	-
FINANCE & ADMINISTRATION					
Accountant	Angela Pal	Fiji	Feb 91	Feb 92	Feb 95
Administrative Assistant	Nazmeen Whippy	Fiji	Jul 86	Permanent	-
Assistant Accountant	Atesh Narayan	Fiji	Jan 93	Permanent	-
Secretary/Clerk	Annette Olssen	Fiji	Oct 90	Permanent	-
Registry Clerk	Aseri Tokalaulevu	Fiji	Jan 93	Permanent	-
Receptionist/Clerk	Unaisi Bainiloga	Fiji	Feb 87	Permanent	-
Driver/Clerk	Enele Gaunavou	Fiji	Jul 88	Permanent	-
Office Assistant Cleaner	Niu Daurewa	Fiji	Sep 87	Permanent	-

Appendix 3

1994 Revised Budget & 1995 Approved Budget

SUMMARY OF ANTICIPATED INCOME (INCLUDING IN-KIND SUPPORT CONTRIBUTION) AND EXPENDITURE BY PROGRAMS
— REVISED 1994 & APPROVED 1995 BUDGETS

	1994 REVISED BUDGET F\$	1995 APPROVED BUDGET F\$
Mineral & Energy Resources	714,215	1,244,400
Environmental Geoscience	823,100	1,655,000
Capacity Building	1,029,200	1,044,500
Technical Services	1,029,500	1,040,000
Corporate Services	1,215,200	1,297,000
TOTAL	4,811,215	6,280,900

Appendix 4

Meetings Attended

MANAGEMENT HAVE ATTENDED THE FOLLOWING MEETINGS:

PACON Review Meeting	February	Canberra	Deputy Director
SPOCC Annual Meeting	February	Apia	Director
4th Economic Summit of SIS	March	Kiritimati	Program Coordinator
Governing Council Review Committee Mtg	March	Suva	Director/Deputy Director
Use of GIS in Coastal Management	April	Barbados	Deputy Director
FFC Meeting	May	Honiara	Director
SIDS Global Conference	May	Barbados	Deputy Director
Second Coastal Protection Meeting	May	Suva	Director/Deputy Director
SPOCC Special Meeting	July	Brisbane	Director
FOC Meeting	July	Brisbane	Director
South Pacific Forum Meeting	July/August	Brisbane	Director
FOC Budget Meeting	November	Suva	FAC

