

SOPAC

ANNUAL REPORT SUMMARY

SOUTH PACIFIC APPLIED GEOSCIENCE COMMISSION

1 9 9 5






Contents

FOREWORD	1
INTRODUCTION	2
MINERALS AND ENERGY RESOURCES	3
ENVIRONMENTAL GEOSCIENCE	6
HUMAN RESOURCES DEVELOPMENT	8
REGIONAL DATA CENTRE	9
INFORMATION SERVICES	10
FIELD SUPPORT SERVICES	12
MANAGEMENT AND CORPORATE SERVICES	13
APPENDICES	
1 SOPAC Publications for 1995	16
2 Secretariat Staff List	19
3 1995 & 1996 Budgets	20

*Prepared for publication by the SOPAC Secretariat, Private Mail Bag, GPO, Suva, Fiji.
Special thanks for the efforts of Corrie Greene, Russell Howorth and Lala Bukarau.*

August 1996



Foreword

A very successful year was achieved in work program activities together with qualified success in broadening SOPAC's external funding support.

This report provides a summary of highlights during the 1995 calendar year. For more details the Proceedings of the 1995 and 1996 Annual Sessions of SOPAC Governing Council should be consulted.

There is a noticeable change of style in this report as we make a deliberate attempt to reach out to a wider audience. We have tried to avoid too many technical terms so more readers become aware of what SOPAC is about and what it has done. We sincerely hope that it makes easier if not better reading and will mean more to leaders, planners, aid coordinators, development partners and all Pacific Island people for whom SOPAC works.

In the work program, the deliberate policy of focusing on a few program areas has paid dividends particularly in the coastal and human resources development programs. Despite continuing funding constraints, declining staff numbers and the heavy demands of external reviews and program formulation, a very creditable output of country programs including field surveys, published reports and maps together with training activities has been maintained.

The development of the SOPAC Secretariat's own technical capacity through computer-mapping and field survey equipment upgrading has contributed significantly to this output. Steps have been taken to transfer such technological developments to island member countries and to strengthen their capacity to access data and information on CD-ROM. The newly-installed PEACESAT station will also strengthen linkages to SOPAC member countries. Planning for Internet and other communication developments is underway.

SOPAC's capacity in information technology has warranted its lead role among SPOCC organisations to deal with GIS and remote sensing for the South Pacific. This capacity has also instigated efforts in the application to other geoscience activities and resource management areas generally. The next step will be to find ways and means to transfer these technological advances to SOPAC island member countries to meet their national needs.

SOPAC's smaller island member countries are especially vulnerable to water shortages. Many depend on rain as their only source of clean drinking water. In drought situations, supplies run out and people are frequently forced to drink from contaminated wells. This in turn leads to the spread of disease. SOPAC began to address these and other water-related problems in late 1994, when it assumed management of the regional Water and Sanitation Project of the United Nations Development Program. The move represented an expansion of practical technical assistance, and continues to propel SOPAC toward the role of a regional geological survey. During 1995

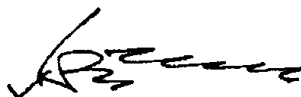
the Project completed a successful first full year of activities within the SOPAC work program.

The recently implemented Medium Term Plan for the period 1995-1999 also saw attempts to establish a small new program in geothermal energy.

Priority into the future continues to lie in national capacity building. In agreeing with this the 1995 Governing Council Meeting reaffirmed that human resource development must continue to be the prime focus.

February 1995, saw the arrival of a new Deputy Director, Alf Simpson former Director of Mineral Development in Fiji. He replaced New Zealander, Jim Eade, who returned home after completing more than seven years at the Secretariat.

I am indebted to all the SOPAC Secretariat staff who remain dedicated to servicing member country needs in the geosciences. I also acknowledge with gratitude the support and cooperation received from member countries, supporting governments and agencies, together with all individuals who contributed to SOPAC's activities throughout 1995.



D.A.P. Muller CSI, AM
Director

August 1996



ntroduction

In the delicate ecosystem of the South Pacific, understanding the environment is crucial for any development and absolutely fundamental and essential. The South Pacific Applied Geoscience Commission is there to serve its island member countries with skilled scientists and technicians, modern equipment for marine and coastal surveying, and as an extensive data and information centre to assist in all aspects of non-living resource development and physical environmental studies.

The Commission, also known as SOPAC, is an intergovernmental organisation which helps its island member countries through a varied work program established under the direction of its Governing Council, and which is implemented by its Secretariat based in Suva, Fiji.

The work program is made up of five main areas; minerals and energy resources, environmental geoscience, human resources

development, technical services and corporate services.

The Commission, which was started in 1972, is made up of the Governing Council (the member country representatives), the Secretariat, a Technical Advisory Group (TAG) and a Science Technology and Resources Network (STAR). TAG comprises advisers who are either nominated by member countries, supporting governments and organisations, or invited by the Secretariat. STAR comprises a network of researchers and scientists working in the region or on matters of scientific interest to the member countries.

Member countries of SOPAC are 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.

Participants at the in-country seminar held on Santo in Vanuatu which was organised by SOPAC in conjunction with the Department of Geology Mines and Water Resources. The seminar was undertaken to brief and advise landowners and senior government officials on topics relating to mineral exploration and mining. Due to the lack of information on mineral exploration, landowners and mining companies were frequently in dispute. Similar seminars were held at the central government offices and also in the field where mineral exploration was taking place. The seminars were supported by funding from the Canadian Government.



Minerals and Energy Resources

Now more than ever, SOPAC island member countries need to know all about, and have the capability to tap into, any valuable domestic minerals and cost-effective renewable energy resources. However, there is an increasing consensus that resource development and management should only be undertaken without risk to the environment, traditional ways of life, and the well-being of future generations.

SOPAC provides much needed guidance in this area, through the use of modern specialised equipment and environmentally friendly field surveys to search for minerals and identify energy resources. This guidance focuses not only on the established geographic areas of its work in the coastal zone, the shallower nearshore, and on and beneath the deep ocean floor, but also more recently in onshore areas.

Development of these resources can be expensive and financially risky. Foreign investment is often therefore essential, but often dependent on proof of the resource potential. SOPAC investigations assist likely investors by providing island member governments with detailed baseline data in the form of maps and reports.

At the same time, SOPAC helps to ensure that development, in the long run, will not do more harm than good. Nowhere is this more important than in the Pacific where in many of the countries the primary mineral being mined and used in construction and landfill projects is sand and gravel. As development proceeds, demand is increasing and now all too often far exceeds traditional demands. Erratic and uncontrolled mining of sand from beaches is now leading to increasing erosion problems. The very place where the Pacific Island peoples live is under threat and so there is an urgent need to protect the deteriorating coastlines by identifying and developing alternative mining sites and aggregate sources.

Minerals

Throughout 1995, SOPAC continued to assist its island member countries to identify, manage and develop, deposits of valuable metal-bearing mineral deposits in a sustainable fashion. Although many metal-bearing mineral deposits, such as gold and copper, are already established, many are unexplored and have equal or better prospects. Papua New Guinea, Solomon Islands, Vanuatu, and Fiji contain some of the world's largest onshore gold and copper deposits. On the deep sea bed of the Cook Islands exclusive economic zone occur large areas of rich deposits of cobalt, nickel and copper-rich manganese nodules.

Onshore in parts of the Solomon Islands and Fiji the main mineral targeted by SOPAC in 1995 was detrital gold, and field surveys were completed to establish the possibility of mining alluvial gold deposits.

In the Solomon Islands, work was completed on an alluvial gold survey at the mouth of the Matepono River on Guadalcanal, and an exploration company has expressed interest in the area following the release of the technical report. In a related survey environmental baseline studies on river discharge, currents, water quality and sediment chemistry were carried out in anticipation of gold mining in the river headwaters.

In Fiji, work was complete on a survey undertaken in Nadi Bay and an initial field survey was undertaken in the Nasivi River delta area, both on Viti Levu. SOPAC's geophysical and airlift equipment identified detrital gold in Nadi Bay, but just how much is still unclear, and further work in the area was recommended. Both these field surveys, which included an emphasis on training, were conducted jointly with the Fiji Government.

Training was also highlighted through mineral-related incountry seminars held in Fiji and Vanuatu.

In Vanuatu, seminars were conducted to brief and advise landowners and senior government officials on topics relating to mineral exploration and mining practices. Due to the lack of information on exploration, landowners have often been unaccommodating and less than helpful with the exploration activities of mining companies. Often people accused mining companies of stealing gold when they were just taking samples for analysis. Seminars were held both at central government and in the field where exploration was taking place.

In Fiji, two negotiation seminars were held to assist Ministers and decision makers in government with the preparation of the development of the Namosi copper deposit.

Offshore, SOPAC also continued to facilitate Japanese deepsea mineral exploration in the South Pacific. In March an Agreement was signed for a third five-year Japan/SOPAC joint program on deep sea minerals exploration in Tonga, Marshall Islands, Federated States of Micronesia and Fiji waters. The major cruise activity for the year was in the exclusive economic zone of Tonga with the research vessel Hakurei Maru No.2 searching for hydrothermal mineral deposits in the Valu Fa Ridge area of the Lau Basin. The cruise provided the opportunity for training of a Tonga national both on board the vessel and in Japan after the cruise, working on the data collected.

During the year the "South Pacific Seafloor Atlas", a summary of the first ten years of Japan/SOPAC deepsea minerals cruises in the exclusive economic zones of Cook Islands, Kiribati, Papua New Guinea, Solomon Islands, Tuvalu, Vanuatu, and Western Samoa was released. The Atlas includes twenty five full coloured A1-size maps.

Aggregate Resources

It is hard to imagine a Pacific island without a beach or reef. But in many SOPAC island member countries the shoreline is the only source of aggregate (sand and gravel) used in construction and landfill. Removing sand from beaches and reef areas can cause rapid erosion and increased vulnerability to rising sea levels either during cyclones and storms or due to any likely "greenhouse effect" in the future. Tuvalu, Marshall Islands and Kiribati are particularly vulnerable, as with the exception of Ocean Island in Kiribati, all islands in these three countries are lowlying atolls.

Tarawa Atoll in Kiribati is an example. In 1995 SOPAC continued working with the government of Kiribati to identify areas in South Tarawa where future beach mining will cause the least damage, whilst at the same time helping to identify likely alternative sand resources on the lagoon floor.

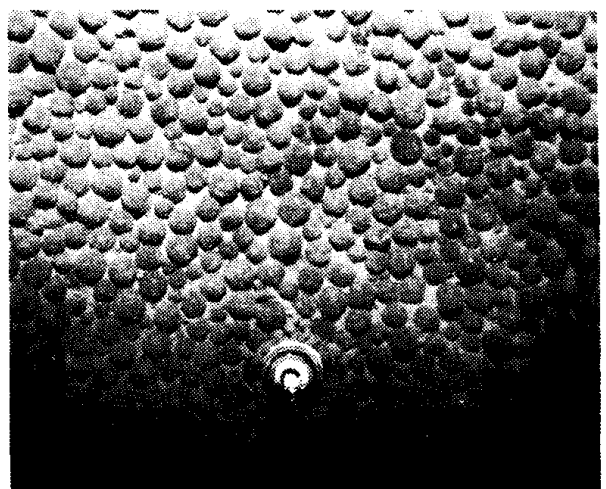
SOPAC also carried out similar field surveys of nearshore and coastal sand and gravel aggregate resources in Tonga and Western Samoa. A coastal resurvey provided a detailed inventory of beach sand resources on Tongatapu, Tonga and concluded that current rates of extraction are unsustainable. In Vaiusu Bay, close to Apia, Western Samoa, a survey identified a potential reserve of three million cubic metres of aggregates in water depths of less than three metres.

Removal of sand can also contribute to degradation of nearshore habitats for sand-producing organisms such as foraminifera. The small shells of these organisms provide the dominant grains of sand on many beaches in the region. Destroying their living habitat, reduces the amount of material being supplied by Mother Nature to the beaches, in turn this often leads to erosion. During the year SOPAC began a collaborative project with Victoria University in Wellington to initiate ecological studies of foraminifera in Tuvalu, Kiribati, Marshall Islands and Fiji, in order to develop a better understanding of sand production rates of these reef-dwelling organisms in the South Pacific.

Hydrocarbons

The goal of the hydrocarbons program is to assess and promote the petroleum potential of the region. With the continued vacancy of

The South Pacific Seafloor Atlas, a summary of the results of ten years (1985-1994) of Japan/SOPAC deepsea minerals resources cruises was released in early 1995. This photo taken with a free-fall camera deployed from the research vessel Hakurei Maru No.2, shows a dense area of manganese nodules on the seabed of the northern Cook Islands. The density is estimated at forty kilograms per square metre.



the Petroleum Coordinator post, only a very limited work program was possible largely through the efforts of the Petroleum Databank Manager based at the Australian Geological Survey Organisation office in Canberra. Six companies requested data from a databank which continued to increase in size with the completion of phase-1 of the AusAID funded Petroleum Promotion Project for Vanuatu.

SOPAC continued to promote interest in the hydrocarbon potential of the South Pacific through a booth at the annual petroleum industry AAPEA Conference in Australia.

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 and ocean thermal energy conversion (OTEC). In the absence of any in-house capacity only a limited work program was completed.

In Fiji, the tidal potential of an inlet in Vanua Levu was investigated. For Cook Islands, Fiji, Kiribati, Tonga, Tuvalu, Vanuatu and Western Samoa, a draft was completed by Norwegian consultants of a brochure on "Ocean Wave Energy in the South Pacific – the Resource and its Utilisation". The intention is to use the promotion brochure to promote and generate interest in the possibility of building wave power stations in the region.

Geothermal Energy Program

This is a new program established to promote the assessment of the geothermal energy potential in the region. Geothermal energy potential exists in Papua New Guinea, Solomon Islands, Vanuatu, Fiji and Western Samoa.

In the absence of specialist expertise, only a limited work program was accomplished. A workshop on "South Pacific Geothermal Energy Resources and Development" was organised by SOPAC in conjunction with a team of New Zealand consultants. Following the completion of the workshop a report detailing the state of knowledge and outlining proposals for future work including field surveys and exploration drilling was completed.

Mining taking place in mid-1995 at the western end of 'Ahononou Beach on the southeast coast of Tongatapu, the main island in the Kingdom of Tonga. The beach is 800 m long and had an average width of 30 m. The beach has a long history of mining, the photo shows that mining has stripped the sand down to the beachrock. The photo was taken during a SOPAC field survey of the beaches being mined on the Tongatapu carried out as part of a project to monitor coastal changes (Technical Report 218). The work was supported by funds from the European Union.



The Pacific islands attract people from all over the world to enjoy their rich and pristine physical environment extending from tropical reefs and beaches in coastal areas to lush waterfalls in high mountainous areas of the larger and higher islands. But erosion caused both naturally and by humans is destroying many beaches and poor sanitation is endangering water supplies. Both phenomena endanger the lives of island people and threaten to set back planned development.

SOPAC's environmental geoscience program provides information on coastal environments, such as shoreline erosion, sediment supply and hazards associated with cyclones or sea-level rise. The program also works with island member countries to develop and maintain safe freshwater supplies and improve sanitation. Program data can be used by island member governments to spur on sustained economic progress while at the same time raise standards of living and protect vital resources for the future.

Coastal Management

In late 1995 the first in-country activity was carried out for Niue, the newest member government of SOPAC. A field survey was completed for an initial study of the coastline of Niue, focusing particularly on the threat of cyclones and the effects of reef blasting.

One of the largest coastal management projects undertaken by SOPAC in 1995 was in South Tarawa, Kiribati. Major infrastructure facilities, including the only secondary school, the new hospital, and a relatively new four-kilometre-long causeway, are all being threatened by erosion. SOPAC scientists used shore surveys and a historical set of air photographs to determine erosion rates and processes. The information will be invaluable for use by government to protect the coastlines and vital infrastructure at risk. Although there is a 14-year record of coastal monitoring in parts of South Tarawa, the data has not yet been used to its fullest potential.

But Mother Nature isn't the only one responsible for destructive coastal changes. Humans interfering with the natural environment can also lead to erosion. On Funafuti Atoll in Tuvalu, a coral rock seawall and various channel dredging and reclamation projects have changed sedimentation patterns and the shape of the shoreline along the lagoon side of Fongafale, the main island. A SOPAC survey studied coastal erosion and evolution of the island, recommended ways for government to replenish the beach and identified locations where gravel may be taken with a minimal environmental impact.

Another SOPAC field survey conducted in the Federated States of Micronesia found that people have been and still are severely modifying large parts of the coastline of Kosrae which is dominated by mangroves. Over the last 35 years one beach on Kosrae has eroded an alarming 15 metres. The study identified the main factors behind this coastal erosion and has recommended a halt to beach mining and the closing of an artificial channel.

In contrast to the sites mentioned above, in 1995 SOPAC also looked at the beach at Natadola in Fiji, which remains relatively untouched by humans. This pristine shoreline, on the main island of Viti Levu, is a popular recreation spot and is being considered for resort development. The SOPAC study supplied baseline data for planning purposes, field mapping and beach profiles and sampling together with airphoto interpretation provided data on coastal changes for the past 2000 years and possible evidence of a recent shift from seaward growth of the beach to short-term erosion. Other work in Fiji included the initiation of a study in the Suva area to assess the vulnerability of the coast to any future rise in sea level.

A coastal protection regional workshop attended by engineers and held in the Cook Islands was jointly organised by SOPAC and SPREP. It addressed matters relating to the cost effectiveness of coastal protection systems, and the report produced was presented to and endorsed by the 1995 Forum Meeting.

Two in-country seminars on beach monitoring were held in Kiribati and Tuvalu.

Coastal Mapping

In order to make educated decisions about the future of their shorelines, SOPAC island member countries need comprehensive coastal maps. Identification of natural resources, protection of particularly vulnerable stretches of land, and inshore fisheries management all rely on up-to-date maps.



Last year, SOPAC produced six new bathymetry maps including: Eastern Majuro Lagoon in the Marshall Islands; Tarawa Lagoon, Temaiku Bight and Betio Harbour in Kiribati; and Apia Harbour and Vaiusu Bay in Western Samoa.

Computer mapping also continued through the use of, and the development of, Geographical Information Systems (GIS). This area of rapidly developing technology allows various data, such as coastlines, reefs, roads and bathymetry to be placed onto the same map. During the year, data from the SOPAC island countries continued to be digitised and put into GIS databases.

Offshore Mapping

The goal of the offshore mapping program is to provide member countries with ready access to information on the waters and seabed of their exclusive economic zones. With the continued vacancy of the Offshore Coordinator post, only a very limited work program was possible.

In addition to continuing to act in a cruise coordination role for research vessels coming into the region the principal activity for the year was an independent review and evaluation of the new SOPACMAPS data collected under European Union funding in the exclusive economic zones of the Solomon Islands, Vanuatu, Tuvalu and Fiji. This included the production of eight new charts of parts of the seabed in these countries.

Water Resources and Sanitation

Nobody can dispute the irony of being surrounded by clear blue water and not having safe drinking water supplies. This sadly is the case for several SOPAC island countries, where reserves are either inadequate or contaminated due to poor sanitation. SOPAC's water resources and sanitation program aims to help member countries achieve safe and plentiful supplies of fresh water, thereby dramatically improving standards of living.

Most importantly, the work carried out by this SOPAC program lays the groundwork for healthy people and sustainable economic development in the SOPAC island countries. It also acts as a springboard for the creation of long-term tourism, agriculture, and forestry industries. Without fresh water and proper waste disposal, developments fail and may endanger the surrounding environment and sustainable human development is unattainable.

The program teaches communities to maintain fresh water supplies. This can include instruction on proper drilling of wells, collecting rain water, or constructing latrines. During the year, staff assessed village water supply systems in several countries, and gave some non-government groups technical guidance, such as with designs for ferrocement water tanks.

A meeting of fourteen water and sanitation utility managers was convened at the SOPAC Secretariat during the year, with an eye towards establishing a permanent regional Pacific water association as a vehicle for the water utilities to help themselves and each other.

Two regional workshops were run by the program at the Secretariat. They were designed to provide member country personnel with training in the use of computer software programs for hydrological and groundwater data collection and analysis.

On the international front, the program established links with groups such as the World Health Organisation (WHO), and the United Nations Children's Fund (UNICEF). Work also began on a project for the United Nations Environment Program (UNEP) to survey technologies for augmentation of fresh water resources in small island states. Information was collected for a global source book on water technologies. The program also gave assistance to three United Nations Educational, Scientific and Cultural Organisation's (UNESCO) regional hydrological research field programs in Tonga, Kiribati and Solomon Islands that will continue into 1996.



A family in the village of Laura. The photo illustrates the risk of pollution due to the undesirable very close proximity of the family latrine and well from which they get their water supply. Laura is the only part of the entire atoll where the groundwater lens may be tapped for fresh water. The site visit was made as part of the UNDP-funded regional Water and Sanitation Project which in 1995 completed its first year as part of SOPAC.



uman Resources Development

The human resources development program provides training which is geared towards enhancing the ability of member country nationals to survey and assess resources and collect physical environmental data, thereby contributing to the building and strengthening of national capacities.

When SOPAC began its work program activities in late 1975, this program only addressed basic technical needs. Today, specialised technical, scientific and management training activities are all part of the program. By the end of 1995, just over one hundred person years of training had been accomplished with close to ten years in 1995 alone. Even more importantly much of the training provided was not available to the Pacific Island national through any other source.

Certificate in Earth Sciences and Marine Geology

The three-year course has students study for three months of each year. The first year covers basic earth science and next two years are advance courses in earth materials, marine geology, mapping, hydrology, mineral resources and hazards.

In 1995, the final year of a three-year program was completed. Twenty-two participants from the Cook Islands, Fiji, Solomon Islands, Vanuatu, Papua New Guinea and Western Samoa graduated. The course allows students to return to their countries with higher technical skills and understanding of the geosciences.

Scholarships

SOPAC scholarships provide for first-degree training in geology and engineering for member country nationals. Seven scholarships were held in 1995 at the University of British Columbia, Queensland University of Technology, Oxford Brookes University and the University of the South Pacific.

Fellowships

Individuals gain technical and scientific hands-on training for up to three months with a SOPAC fellowship. In 1995, more than thirty fellowships for attachments with the SOPAC Secretariat and other organisations were awarded. Also fellows participated in four research vessel cruises and attended conferences. Other organisations also helped with this training by allowing ten attachments for people from Papua New Guinea, Tonga, Vanuatu, Western Samoa and Solomon Islands.

Workshops and Seminars

Another important aspect of training are regional workshops and incountry seminars that bring vital information to individuals from SOPAC's island member countries. SOPAC explains particular geoscience topics in a clear and concise manner, that in turn increases the capacity of individuals and governments to make sound decisions. These activities are reported in the appropriate technical work program sections of this report.

Lagoon beach mining is ongoing on Majuro Atoll, Marshall Islands. This map of the eastern part of Majuro shows four alternative source areas of sand and gravel aggregate resources identified during a SOPAC field survey in early 1995. Volumes of resources available in each area are large, one million cubic metres (at least one million tonnes) are estimated to occur at water depths shallower than 30 metres in Area 4 alone. Inset shows a hydraulic excavator mining sand on the lagoon side of DUD north of Robert Reimers Hotel (Technical Report 215). The work was supported with funding from the European Union and the Government of Australia.



Regional Data Centre

SOPAC makes it a priority for its member countries to collect, store and be able to clearly understand the information provided to them in surveys and reports. In 1992 the centre was brought on line to supply the latest software and hardware, and organise information collected by all the work program areas in an easily accessible manner.

The majority of the work done by the section last year involved the development of Geographic Information Systems (GIS), a tool that allows aerial and satellite photographs to be made into maps. The data is then used to look at land cover changes, such as deforestation and changes in the coastal zone. The program allows different bits of information to be layered onto a single map. For example, a member country can see any mineral deposits and coconut tree coverage superimposed on one another.

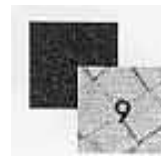
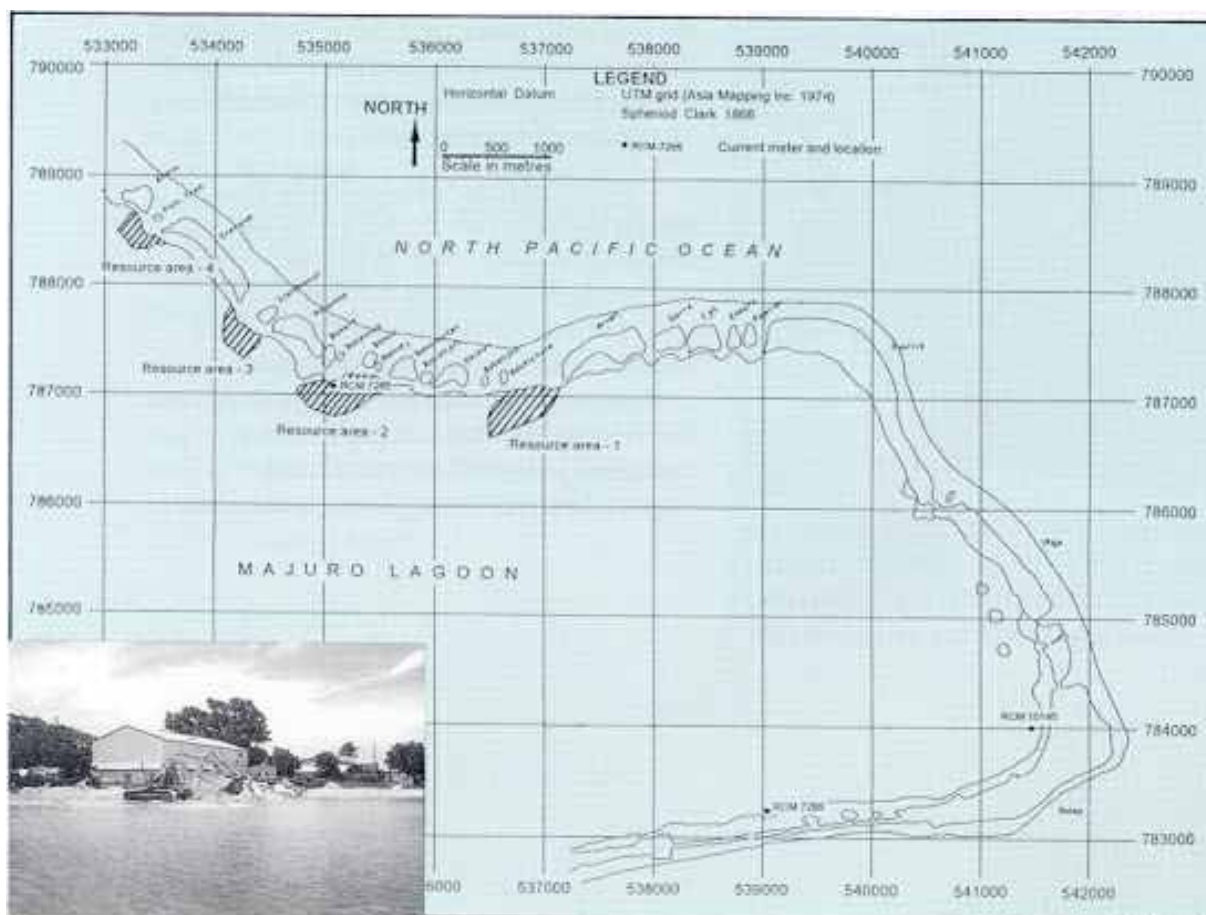
The system is a benefit because even people who do not have a science background can easily see variations in the environment. A map showing present-day features can be displayed with an historical one. Changes in coastlines, forests and land use are then all readily apparent. Governments then can use the information to support environmental planning.

The results of the recently completed seabed mapping (SOPACMAPS) Project in the exclusive economic zones of the Solomon Islands, Fiji, Vanuatu and Tuvalu were released in GIS format on CD-ROMs to provide the countries with valuable information that can be used to assess offshore resources, seamounts which assist fisheries people, hydrocarbons and mineral deposits.

One area where GIS was used during 1995 was in Vanuatu. The system was used to create a minerals resource database for the country. The joint British Geological Survey/SOPAC project provided the government and the public with information on current and past mineral exploration licences. The minerals resource database shows on maps, the locations of present and expired licenses, the types of minerals explored for, and how to access survey reports. The government can use the information as a promotional tool to attract potential mining companies.

Increasingly, remotely-sensed data, and in particular satellite imagery data, works hand in hand with GIS and other types of computerised cartography. These are crucial tools because in certain cases aerial photography is prohibitively expensive.

Training and assistance in computer system development remained a priority in 1995. Tutorials and systems upgrades were carried out in a number of countries including the Cook Islands, Vanuatu and Western Samoa. Along with work in member countries, the centre also provided advice on implementing the Internet in Fiji, continued to upgrade the Secretariat's network, and started a newsletter on GIS and remote sensing.



The variety of information collected and collated each year by SOPAC is used by the island member countries for important policy decisions on development and resource management. But all the data collected and stored in inaccessible files would mean nothing without SOPAC's information services program. Government departments of member countries use this program to produce technical and promotional reports, bathymetric and coastal maps. Staff and associates depend heavily on the library for research. The information services program is unquestionably a vital organ of the SOPAC body - its voice.

Located in the heart of the South Pacific, SOPAC's library is one of the region's most respected sources of marine geoscience information, open to Secretariat staff, students, researchers and

governments of member countries. Services range from reference assistance to acquisition of the latest books and journals. The library also receives extensive material through its gift and exchange program and interlibrary loans. Assistance for the latter is provided by, amongst others, the Pacific Island Marine Resources Information System (PIMRIS) at the University of the South Pacific, the Australian Geological Survey Organisation and the University of Hawaii.

Databases are maintained for aerial photographs, journals, maps and charts, monographs, reports and reprints, newspaper clippings, photographs and slides.

Unfortunately, due to funding constraints SOPAC lost the services of the Librarian at the end of 1995. Beginning in 1996 the Program/Library Assistant will seek to just maintain a basic library service. Because of this reduced capacity provision of services to member countries requiring assistance with their geology libraries is currently on hold.

Publications unit assumes the unenviable task of making sure SOPAC's technical reports and bulletins are well-written, scientifically sound and easy to understand. Editors review the documents closely, and also supervise their distribution throughout the region. Editorial and publishing services are also provided to member countries on request.

In 1995, SOPAC produced about 90 reports in various categories. They continue to be used by member countries to make coastal and resource management decisions and are sold to non-members who may wish to invest or are interested in the region. Reports are available on request and are listed quarterly in *SOPAC News*, which is sent to all member countries. Nearly 1000 individuals and organisations are currently on the mailing list.



Dillie George (seated), a Papua New Guinea national, was Librarian at SOPAC until the end of 1995. Program/Library Assistant, Sunita Prasad (standing) has the task of maintaining a basic library service from 1996.

Technical bulletins, generally compilations of studies, are more widely distributed than reports. They allow recipients to view wider bodies of research on a specific topic or area. Technical bulletins on Pacific islands' coasts and a mineral exploration cruise have been in preparation for two years, but have been pushed back to 1996 due to continuing staffing constraints.

Other items sent to press during the year included the *Annual Report Summary* (this publication), the Proceedings of the SOPAC Governing Council's annual sessions and *SOPAC Projects*. Published twice a year, the latter offers non-technical summaries of the results of work program projects. The idea is to provide the information to as wide an audience as possible.

Collaborative efforts with outside agencies continued throughout the year, when SOPAC assisted the Fiji Mineral Resources Department in publishing a memoir on the Metallic Mineral Deposits of Fiji. The project summarises the geology of Fiji and contains new information on mineral prospects. The book will also serve as a guide for future mineral exploration. Issues of the *GIS & Remote Sensing News* continued to be published and produced jointly with the Management Services Division of the Fiji Forestry Department to keep a local GIS User Group and their overseas counterparts briefed on the latest developments in this highly-specialised field.

The cartography staff continue to keep maps up-to-date with new geological discoveries and political boundary shifts in the South Pacific. SOPAC compiles and publishes a range of maps for member countries, including bathymetric charts, coastal resource maps, coastal morphology maps and sediment maps. Most notable of these is the new South Pacific Region Maritime Limits Map prepared jointly with Forum Fisheries Agency. The map shows agreed and potential maritime jurisdictional limits within the South Pacific.

Cartography staff also continued to train member countries individuals in drafting and map preparation, prepare promotional and display material, and provide drafting support in the production of maps and diagrams for SOPAC technical reports.

PEACESAT

The Pan-Pacific Education and Communications Experiments by Satellite or PEACESAT is a successful non-commercial service that provides voice and data communications. It was established at SOPAC in 1995 as a new link between the Secretariat and member countries, with a grant from the US Department of State through the Bureau of Oceans and International and Scientific Affairs.

The satellite system supplies voice and data communication and allows Pacific island organisations and governments affordable access to information services essential for resource management. Conventional methods, such as the telephone, are expensive and unreliable especially. The satellite system is better, especially for conferences and trouble-shooting sessions.

The SOPAC initiated Pacific Island Resource and Environment Information Service (PIREIS) provides distance education in the earth sciences, water and sanitation and disaster mitigation programs, along with assistance with the fellowship programs. Other training areas include offshore, coastal zones, minerals, hydrocarbons and map production.

The information program and the regional data centre at SOPAC will also distribute data, assist GIS and remote sensing users. It is also possible to access Internet e-mail through the system.

SOPAC has been aware for many years of the benefits of PEACESAT through the Forum Fisheries Agency. The Forum Fisheries Agency established fourteen satellite terminals in its member countries in the late 1980s and early 1990s and has provided terminals in all of the Pacific island member countries of SOPAC.

PEACESAT was started in 1971 as an experiment with distance learning, emergency information and teleconferencing. The program was put on hold in 1985 when the satellite used ran out of fuel. It was re-established in 1989 through another United States defunct weather satellite. Currently there are more than forty sites in twenty-five countries.

Field Support Services

This program helps conduct marine geophysical and geological surveys with equipment and logistical assistance. The field services support program team assisted SOPAC scientists to conduct surveys in member countries. And play an extremely vital role in the execution of SOPAC's work program.

Field services are also involved in recommending, ordering and purchasing of new equipment and upgrading existing equipment. The section's personnel assist in the field and with equipment support and manpower.

In the past year staff assisted in four surveys in Solomon Islands, Western Samoa and two in Tuvalu; processed samples from Tuvalu, Cook Islands, Western Samoa and Fiji; and continued to help the

regional data centre with maintenance, repair and upgrades of the Secretariat's in-house computer hardware and the installation of the new PEACESAT terminal.

New equipment purchased for marine surveying included a Del Norte 1009+GPS navigation system, a SONTEK acoustic doppler profiler. The Seabird CTD was upgraded with a new pressure sensor and the logging memory increased to 2MB and recalibrated. The CTD can now operate to a depth of 1200 metres.



The PEACESAT outdoor ground station equipment being installed at the Secretariat by staff of the field support services program, who can be seen here fitting the feed to the 3-metre satellite dish. SOPAC made its first voice contact with other members of the PEACESAT network on 22 September 1995. The equipment to establish this new communication link with member countries was provided to SOPAC from the United States Department of State through assistance from the Bureau of Oceans and International Scientific Affairs.

M_{anagement and Corporate Services}

During 1995, management responded to the challenge of providing its Governing Council with a work program and budget that was easier to follow and more transparent. In recognising that the member countries needs must be paramount the process also allows for Council's inputs and the full opportunity to intervene. For the first time in 1995, the annual report and the future work program and budget have been integrated on the basis of the 1995-1999 Medium Term Plan. This final step succeeded the development of a system for forward planning and advanced consultation that took several years for SOPAC as a whole to routinely accept. Governing Council's adoption of the format will allow for further refinements.

The focus of management for 1995 was on the implementation of the Medium Term Plan. Experience of the changing needs of member countries and the priorities of SOPAC's traditional development partners warranted a considerable shift in project design and development towards clearer objectives and heightened visibility and accountability. In response, the planned restructuring over the next three years provides the flexibility to address the uncertainties of programs and funding. Greater emphasis was placed on reviewing most administrative systems with particular attention to program reporting. With the reduced number of professional staff, management was productive in streamlining the administration and enhancing program planning through the promotion of the Medium Term Plan.

SOPAC Secretariat played a full part in coordination of programs through the activities of SPOCC and bilaterally with other regional technical organisations. Regional programming meetings and in particular the development of the regional strategy received the Secretariat's attention. The demands of the independent reviews of the institutional arrangements for the Marine Sector, SPOCC Staff Terms and Conditions and Forum Secretariat continued to occupy management.

Planning

A key to SOPAC's viability is the success with which it can attract donor support. New proposals for funding continued to be prepared and submitted to the following countries and agencies for support: Australia, Canada, Commonwealth Secretariat, China, European Union, Japan, IOS, New Zealand, Norway, UKODA, UNDP and US State Department and DMA. SOPAC joined other SPOCC members in preparing a joint major proposal for Canadian funding under C-SPOD II. This particular exercise was considered fairly significant in that it was a test case for the "regional strategy development" process. The redrafting of the Medium Term Plan led to a reorganisation of the structure of the work program into a few priority program areas.

Funding

Overall total cash funding to SOPAC showed a decrease of about 8% over the 1994 figure, with a corresponding decrease in total expenditure. The major reduction in donor funding was noted in Canadian and European Union projects, both of which are coming to an end.

Australia, the largest single donor to SOPAC continues to provide support for three projects at SOPAC. The aggregates (coastal resources and mapping) project supports two professional and two technical support staff and is focussing on mapping alternate aggregate, especially sand deposits. The petroleum data management project supports one professional staff looking after the member countries databank in Canberra. The scholarship project continued and supported one student in 1995.

Fiji continued to support SOPAC with a generous annual special grant and also through ad-hoc support of various projects executed by SOPAC for the Fiji Government.

Canada (through its new executing/administrative agency, CORA), continued to provide funding largely to the coastal management, minerals and the human resources development programs. Canada supported one professional position in coastal work in 1995 (Marine Geologist) and a Coastal Geologist was seconded to the Secretariat from the Canadian Geological Survey (Atlantic Geoscience Centre) for a one year term with a second person to be seconded for a second year in the first quarter of 1996. Support for the SOPAC human resources development program continued with funds for scholarships, and computerised geological data management training.

The Commonwealth Secretariat reaffirmed their interest in supporting professional positions at the Secretariat and in continuing support of training activities. They approved SOPAC's request and provided an Aggregate Geologist in late 1995 for a three-year term. A request for a second professional position, Distant Education Officer, was also approved and the position is likely to be filled in 1996. The Commonwealth Secretariat continues its funding support for training especially the Certificate in Earth Science and Marine Geology.

China has agreed to provide an extension of its contract for a Coastal Geologist. The professional provided much needed assistance for coastal management studies in Tuvalu and Federated States of Micronesia. Support for the project also included duty travel and a significant value of small-scale equipment.

The European Union funded projects under Lome III, although in the final year funding, continued to have a major impact on the SOPAC work program with significant (cash) funding compared to other donor funding in 1995. European Union funding continued to support three professional and eight technical support positions at the Secretariat. It also provided major support to coastal field activities, computing through the regional data centre, hydrocarbon activities, and also a number of activities within the human resource development program, including workshops, fellowships and attachments.

New proposals for support of two standby projects to support the human resources development program and the minerals program have been drafted for submission to the European Union for consideration under the First Protocol of Lome IV. Priority was also given to formulating projects which would address the key areas on coastal protection strategies, mineral resource assessment and management, and water resources and sanitation.

The French Government supported a project on coastal mapping which included three positions; Computer Mapping Geologist, Computer Geologist, and Computer Operator. This project specially

focussed on remote sensing and coastal mapping and also supported the establishment of computing facilities at the Secretariat. France, also through the Office of the Permanent Secretary to the Pacific made a significant contribution towards supporting the program management activities of the Secretariat. Support from French institutions such as IFREMER, and ORSTOM, remained strong with continuing in-kind support.

The Government of Japan provided substantial in-kind support for the offshore program, including the services of an Offshore Geologist. Under a special joint agreement, Japan also provides approximately 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. In 1995 work focussed on a survey in the exclusive economic zone of Tonga.

New Zealand continued its support of SOPAC's work program through funding of the Librarian position in the information services program. A significant amount of New Zealand's funds are contributed to the core budget as membership contribution and the balance is applied to special projects.

Support from the Norwegian Government through NORAD continued in 1995, with the funding for the maintenance of the SOPAC wave database and promotion of wave energy project.

The UNDP support was for the water supply and sanitation program (WASP). The program supports two professional positions, a Program Assistant and a UN Associate Expert. In mid-1995 the program also embarked on a one year UNEP funded project to produce a "Source book on technologies for augmenting fresh water resources in small developing states".

The United States through its Department of State and the Defence Mapping Agency provided support to the regional data centre by funding the environmental database development project and the procurement and establishment at the SOPAC Secretariat of the PEACESAT equipment, making SOPAC a PEACESAT hub site.

FINANCE AND ADMINISTRATION

As with any organisation subject to public scrutiny SOPAC strives to be fully accountable and transparent in all its operations. Financial controls have been put to the test by a full audit for the 1994 year-end, and the computerisation of accounting systems has been completed and is fully operational. Internal management and donor reporting particularly has been enhanced with the computerisation process. The provision of commercial services to SOPAC continues to be regularly reviewed to maintain the maximum benefit of available competition. Revision of the internal filing system was undertaken during the year and further work is required to address the development of electronic mail and the interface of electronic and hard copy filing. Personnel development and performance assessment was reviewed and further action identified. A comprehensive

revision of the draft Operations Manual was nearly completed and should be ready for printing in 1996.

The annual work program and budget document continues to be refined with emphasis on increased transparency and accountability. Presentation of funding and budgetary allocations in the budget is now broken down into three categories to denote status/security of funding.

New administrative systems previously put in place continue to be fine tuned. Administrative documentation and forms are now on the Secretariat computer network making them more readily accessible in an effort to improve efficiency. Staff performance and development assessment procedures have also been revised and fine tuned in order to become more focused.

Near Tafunsak village on the north coast of Kosrae, Federated States of Micronesia, mangrove trees have been removed at a small stream outlet. As a result erosion already being caused by past dredging of the reef flat nearby has been made much more severe. This area was investigated during a field survey of Kosrae (Technical Report 228) completed with funding support from the People's Republic of China.



Appendix 1: Publications for 1995

Technical Reports:

1. Smith, R. 1995: Sand and aggregate resources, Majuro Atoll, Marshall Islands. *SOPAC Technical Report 215*.
2. Smith, R. 1995: Bathymetric and physical monitoring of the Pilot Project dredging site in Funafuti Atoll, Tuvalu. *SOPAC Technical Report 216*.
3. Hosoi, Y. 1995. Executive Summary. "Ocean Resources Investigation in the Sea Area of SOPAC. Report on the Joint Basic Study for Development of Resources." Volume 5, Phase II. Sea Area of Republic of Vanuatu. *SOPAC Technical Report 219*.
4. Smith, R., Biribo, N. 1995. Marine aggregate resources, Tarawa Lagoon including current meter studies at three localities. *SOPAC Technical Report 217*.
5. Kroenke, L. 1995. A morphotectonic interpretation of SOPACMAPS 1:500,000 charts. *SOPAC Technical Report 220*.
6. Xu, C., Malologa, F. 1995. Coastal sedimentation and coastal management of Fongafale, Funafuti, Tuvalu. *SOPAC Technical Report 221*.
7. Lum, J., and others. 1995. Gold potential at the Matepono River mouth and adjacent areas, Solomon Islands. *SOPAC Technical Report 222*.
8. Smith, R. 1995. Sand and aggregate resources, Vaiusu Bay, Apia, Western Samoa. *SOPAC Technical Report 223*.
9. Mourits, L.J.M., Depledge, D. 1995. Handpumps in the South Pacific. *SOPAC Technical Report 224*.
10. Forbes, D., Hosoi, Y. 1995. Coastal erosion in South Tarawa. Report of mission to determine shoreline recession rates at Tungaru Central Hospital & King George V/Elaine bernacchi School, erosion and sedimentation along the Nippon Causeway, and coastal protection strategies in Kiribati, June-July 1995. *SOPAC Technical Report 225*.
11. Forbes, D.L. 1995. Coastal stability and sand transport, Aitutaki, southern Cook Islands. *SOPAC Technical Report 226*.
12. Pratt, C., Lum, J., Smith, R., Young, S., Vuibau, T. 1995. Detrital gold resources survey in the Nadi Bay area, Fiji, 21 November to 5 December 1994. *SOPAC Technical Report 227*.

Cruise Report:

13. Goodliffe, A.M. 1995. Preliminary cruise report, Hakurei Maru No. 2, Lau Basin, Leg 1, 2 July - 4 August 1995. *SOPAC Cruise Report 144*.

Preliminary Reports:

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

15. Howorth, R., Woodward, P. 1995: Kiribati in-country seminar on beach monitoring, 22-26 January 1995. *SOPAC Preliminary Report 77*.
16. Woodward, P. 1995: Resurvey of Funafuti beach profiles, Tuvalu, 30 January - 1 February 1995. *SOPAC Preliminary Report 78*.
17. Lum & others 1995: Gold potential at the Matepono River Mouth and adjacent areas, Solomon Islands - an augering program. *SOPAC Preliminary Report 79*.
18. Smith, R., Young, S., Talia, L. 1995. Bathymetry, seismic and sand and gravel resource surveys, Apia, Western Samoa. *SOPAC Preliminary Report 80*.
19. Collen, J.D. 1995. Preliminary comment on visit to Funafuti, Majuro and Tarawa atolls, June-July 1995. *SOPAC Preliminary Report 81*.
20. Pratt, C., Lum, J., Smith, R., Vuibau, T. 1995. Detrital gold resources survey, Nadi Bay, Fiji, 21 November - 6 December 1994. *SOPAC Preliminary Report 82*.
21. Forbes, D.L., Kruger, J., Motuiwaca, S., Ratu, S. 1995. Coastal sedimentation and shore resources, Natadola Beach, Viti Levu, Fiji. *SOPAC Preliminary Report 83*.

Miscellaneous Reports:

22. Elaisi, A. 1995: Seafloor mapping in the West and Southwest Pacific, Lifou, Noumea, New Caledonia, 4-9 November 1994. *SOPAC Miscellaneous Report 185*.
23. Allinson, L. 1995. Recommendations for upgrade of the information system, Ministry of Marine Resources, Cook Islands. *SOPAC Miscellaneous Report 187*.
24. SOPAC Secretariat, 1995: SOPAC Medium-Term Plan 1995-1999. *SOPAC Miscellaneous Report 188*.
25. Accasina, G.; Allinson, L.; Walton, P. 1995: Proposal to become a PEACESAT Hub Site. *SOPAC Miscellaneous Report 189*.
26. Eade, J.V. 1995: Summary report of the Tuvalu Borrow Pit Infilling Pilot Project. *SOPAC Miscellaneous Report 190*.
27. Hosoi, Y. 1995: A report on the establishment of Phase III of the Japan/SOPAC Deepsea Mineral Resources Survey Program and associated activities. *SOPAC Miscellaneous Report 191*.

28. Howorth, R. 1995: Third Coastal Protection Meeting, 22-29 March 1995, Rarotonga, Cook Islands. *SOPAC Miscellaneous Report 192*.
 29. Walter, G., Strong, B. 1995. SOPAC Regional Data Centre database development. *SOPAC Miscellaneous Report 193*.
 30. Allinson, L. 1995: Final proposal for SOPAC to undertake mineral resources database project. *SOPAC Miscellaneous Report 194*.
 31. Allinson, L. 1995: Recommendations for Phase 2 upgrade of the Information System, Ministry of Natural Resources Development, Tarawa, Republic of Kiribati. *SOPAC Miscellaneous Report 195*.
 32. Allinson, L. 1995. Regional Information Technology Strategies, June 1995 Meeting, 5-8 June 1995. *SOPAC Miscellaneous Report 196*.
 33. Allinson, L. 1995. Recommendations for upgrade of the information system, Ministry of Marine Resources, Cook Islands. *SOPAC Miscellaneous Report 187*.
 34. Depledge, D.R., Dench, N.D. 1995. Geothermal resources of five Pacific island nations. *SOPAC Miscellaneous Report 198*.
 35. Mourits, L.J.M. 1995. Rainwater utilization for the world's people: Report on the 7th International Rainwater Systems Conference, Beijing, China, 21-23 June 1995. *SOPAC Miscellaneous Report 199*.
 36. Toatu, T. 1995. Final report for the position of Program Coordinator. *SOPAC Miscellaneous Report 200*.
 37. Crook, K.A.W., Howorth, R. eds. 1995. Abstracts of papers presented at the STAR session 1995. *SOPAC Miscellaneous Report 201*.
 38. Burke, E., Depledge, D. 1995. Report on a meeting to discuss the establishment of a Pacific Water Association, Apia, Western Samoa, 27-28 July 1995. *SOPAC Miscellaneous Report 202*.
 39. Martin, F. 1995. A description of electronic databases and catalogs maintained by the Regional Data Centre at the SOPAC Secretariat. *SOPAC Miscellaneous Report 203*.
 40. Larue, M. 1995. Use of a color scanner. *SOPAC Miscellaneous Report 204*.
 41. Williot, F. 1995. IDRISI for Windows evaluation: a GIS raster. *SOPAC Miscellaneous Report 205*. First Edition.
 42. Larue, M. 1995. MapBasic utilities. *SOPAC Miscellaneous Report 206*. First Edition.
 43. Hosoi, Y. 1995. Japan/SOPAC Deepsea Mineral Resources Program: a summary of the past 10 years, 1985-1994 and plans for 1995-1999. *SOPAC Miscellaneous Report 207*.
 44. Howorth, R. 1995. SOPAC Geoscience baseline studies in relation to disaster management in the Region, and the need for coastal hazard mapping presented at the "Fourth IDNDR Pacific Regional Disaster Reduction meeting", 18-20 September 1995, Rarotonga, Cook Islands. *SOPAC Miscellaneous Report 208*.
 45. Howorth, R., Elaise, A. 1995. Report to the European Union Review Team of SOPAC Training Activities supported by EU LOME III Funding. *SOPAC Miscellaneous Report 209*.
 46. Allinson, L. 1995. Implementation of the Pacific Regional Marine Resources Development Program under European Union funding by the Regional Data Centre, South Pacific Applied Geoscience Commission, 25 October 1995. *SOPAC Miscellaneous Report 210*.
 47. George, D. 1995. Follow-up visit to the Vanuatu Department of Geology, Mines and Water Resources Library, 20 February to 5 March 1995. *SOPAC Miscellaneous Report 211*.
 48. George, D. 1995. Librarian Information Program, February 1992 - December 1995, Final Report. *SOPAC Miscellaneous Report 212*.
 49. Depledge, D. 1995. Workshop on design of Civil and Hydraulic Structures for Micro-hydropower Plants, Forum Secretariat HQ, Suva, 20-24 November 1995. *SOPAC Miscellaneous Report 213*.
 50. Depledge, D. 1995. Workshop in hazards waste management in Pacific island countries, Suva Travelodge, Victoria Parade, Suva, Fiji, 2-6 October 1995. *SOPAC Miscellaneous Report 214*.
- ### Training Reports:
51. Deo, R. 1995: Use of satellite remote sensing data for study of wave climate, 30 January - 17 February 1995, OCEANOR, Trondheim, Norway. *SOPAC Training Report 67*.
 52. Elaise, A., Kitekei'aho, T. 1995. Report on courses for the Certificate in Earth Science & Marine Geology training program 1995. *SOPAC Training Report 68*.
 53. Depledge, D., Kerr, T., Arnold, P. 1995. SOPAC/NIWA Regional Training Course: hydrological software, TIDEDA, 21 August - 1 September 1995. *SOPAC Training Report 69*.
 54. Depledge, D., Romano, P. 1995. SOPAC/UNDDSMS Regional Training Course, Hydrogeological Software - Groundwater for Windows, 4-8 September 1995. *SOPAC Training Report 70*.
 55. George, D. 1995. Library Training attachment at the Secretariat, 3-13 April 1995 (for Janet Toa, Secretary, Vanuatu Department of Geology, Mines and Water Resources. *SOPAC Training Report 71*.
- ### Joint Contribution Reports:
56. Japan International Cooperation Agency, Metal Mining Agency of Japan, South Pacific Applied Geoscience Commission 1995. South Pacific Seafloor Atlas: Japan-SOPAC Cooperative Study on Deep Sea Mineral Resources in the South Pacific 1985-1994. 24 plates. *SOPAC Joint Contribution 102*.
 57. Fiji. Mineral Resources Department, SOPAC Secretariat. 1995. Seminar: negotiation issues and strategies - the Namosi Project, 6-9 March 1995. *SOPAC Joint Contribution 103*.
 58. Geothermal Energy New Zealand Ltd., SOPAC. 1995. South Pacific geothermal resources & development. GENZL: 39 p. 5 apps. *SOPAC Joint Contribution 104*.

59. Japan International Cooperation Agency, Metal Mining Agency of Japan. 1995. Report on the joint basic study for the development of resources: sea area of Republic of Vanuatu. JICA, Ocean Resources Investigation in the Sea Areas of SOPAC 5: 172 p.; figs, 10 app. (includes data volumes, microfilm, film and videocassettes). *SOPAC Joint Contribution 105*.
60. Proceedings of UNESCO/SOPAC/UNDDSMS Workshop, 1-8 June 1994, Honiara, Solomon Islands: Pacific Water Sector Planning, Research and Training. *SOPAC Joint Contribution 107*.

Prepared for external publication:

61. Forbes, D.L. 1995: Circulation and sand supply on Pacific Atolls: coastal management challenges at Tarawa (Kiribati) and Aitutaki (Cook Islands). Prepared for the Canadian Coastal Conference.

Routinely, the following were also published and distributed:

Proceedings of the 23rd Session, Majuro, Marshall Islands; Proceedings of the 24th Session, Suva, Fiji;

Annual Report Summary 1994;

4 issues of *SOPAC News*;

1 issue of *SOPAC Projects*;

5 issues of *GIS & Remote Sensing News*; and

30 Trip reports

The following external publications also passed through the SOPAC publishing process, were printed locally (Fiji), and shipped to proprietors:

1. Fisheries Legislative Profile: Republic of Kiribati. *FFA Report 95/2*.
2. Fisheries Legislative Profile: Kingdom of Tonga. *FFA Report 95/3*.
3. Fisheries Legislative Profile: Solomon Islands. *FFA Report 95/4*.
4. Metallic Mineral Deposits of Fiji. *Fiji Mineral Resources Department Memoir No.4*.

Maps and Charts:

SOPAC Coastal Series

1. Map 5: Coastal morphology of Marshall Islands - Rita, Majuro. Scale 1:5000. Sheet 1 of 3.
2. Map 5: Coastal morphology of Marshall Islands - Dalap, Majuro. Scale 1:5000. Sheet 2 of 3.

SOPAC Bathymetric Series

1. Map 6: Bathymetric Map of Cook Islands - Nearshore Avatiu/Avarua. Scale 1:10 000.
2. Map 7: Bathymetric Map of Tuvalu EEZ. Scale 1:500 000.
3. Map 8: Bathymetric Map of Federated States of Micronesia EEZ. Scale 1:3 500 000.

4. Map 9: Bathymetric Map of Marshall Islands EEZ. Scale 1:4 000 000.
5. Map 10: Bathymetric Map of Tonga EEZ. Scale 1:2 000 000.
6. Map 11: Bathymetric Map of Niue EEZ. Scale 1:2 500 000.
7. Map 12: Bathymetric Map of Cook Islands. Scale 1:4 200 000.
8. Map 13: Bathymetric Map of Tokelau EEZ. Scale 1:2 500 000.
9. Map 14: Bathymetric Map of Solomon Islands EEZ. Scale 1:4 000 000.
10. Map 15: Bathymetric Map of Kiribati - Gilbert Islands EEZ. Scale 1:4 800 000.
11. Map 16: Bathymetric Map of Kiribati - Phoenix Islands EEZ. Scale 1:4 500 000.
12. Map 17: Bathymetric Map of Kiribati - Line Islands EEZ. Scale 1:4 800 000.
13. Map 18: Bathymetric Map of Guam EEZ. Scale 1:2 000 000.
14. Map 19: Bathymetric Map of Pitcairn Islands EEZ. Scale 1:2 500 000.
15. Map 20: Bathymetric Map of Papua New Guinea EEZ. Scale 1:4 800 000.
16. Map 21: Bathymetric Map of Western Samoa EEZ. Scale 1:1 250 000.
17. Map 22: Bathymetric Map of American Samoa EEZ. Scale 1:2 200 000.
18. Map 23: Bathymetric Map of Wallis and Futuna EEZ. Scale 1:2 000 000.
19. Map 24: Bathymetric Map of Vanuatu EEZ. Scale 1:2 500 000.
20. Map 25: Bathymetric Map of Kiribati - Tarawa Lagoon Aggregate Resource Area. Scale 1:8500.
21. Map 26: Bathymetric Map of Kiribati - Tarawa Lagoon - Temaiku Bight. Scale 1:3 500.
22. Map 27: Bathymetric Map of Cook Islands - Mangaia Island. Scale 1:30 000.
23. Map 28: Bathymetric Map of Kiribati - Tarawa Lagoon. Scale 1:45 000.
24. Map 29: Bathymetric Map of Marshall Islands - Eastern Majuro Lagoon. Scale 1:5000.

SOPAC Region

1. Map of South Pacific Region Maritime Limits. Scale 1 cm = 140 km at 0°.
2. Seven (7) Morphotectonic SOPACMAPS Interpretation Charts were also prepared covering areas in the Solomon Islands, Tuvalu, Vanuatu and Fiji.

Appendix 2: Secretariat Staff List

	NAME	COUNTRY OF ORIGIN	DATE JOINED	CONTRACT START	CONTRACT END
MINERALS PROGRAM					
1. Marine Geologist	Robert Smith	Australia	Oct 88	Jul 92	Jun 96
2. Marine Geologist	Jackson Lum	Fiji	Nov 92	Nov 92	Nov 95
3. Chief Cartographer	Phil Woodward	Australia	Aug 88	Aug 94	Jul 97
4. Program Assistant	Litia Waradi	Fiji	Apr 89	Jan 91	Permanent
5. Offshore Geologist	Yoshitaka Hosoi	Japan	Aug 93	Aug 93	Aug 95
HYDROCARBONS PROGRAM					
6. Petroleum Coordinator	vacant				
7. Petroleum Geophysicist	vacant				
COASTAL MANAGEMENT & GEOHAZARDS PROGRAM					
8. Coastal Geologist	Don Forbes	Canada	Jan 95	Jan 95	Jan 96
9. Coastal Geologist	Xue Chunting	China	Sept 94	Sept 94	Sept 95
10. Aggregate Geologist	Graham Shorten	Australia	Oct 95	Oct 95	Oct 97
COASTAL MAPPING PROGRAM					
11. Mapping Geologist	Michel Larue	France	Oct 92	-	Oct 94
12. Computer Geologist	Fabrice Williot	France	Jan 95	Jan 95	June 96
13. Computer Operator	Bougainville Toloi	Fiji	Jan 88	Permanent	-
OFFSHORE MAPPING PROGRAM					
14. Offshore Coordinator	vacant				
WATER RESOURCES PROGRAM					
15. Project Manager	Ed Burke	New Zealand	Dec 94	Dec 94	Nov 96
16. Hydrogeologist	Derrick Depledge	New Zealand	Oct 94	Oct 94	Oct 96
17. Associate Expert/Engineer	Ulla Morgansen	Denmark	Oct 95	Oct 95	Oct 96
18. Program Assistant	Aliti Sema	Fiji	Jan 95	Jan 95	Dec 96
HUMAN RESOURCE DEVELOPMENT PROGRAM					
19. Training Coordinator	Russell Howorth	New Zealand	Oct 86	July 92	Jul 96
20. Assistant Training Coordinator	Fuka Kitekei'aho	Tonga	Nov 91	Nov 94	Nov 96
21. Program Assistant	Anna Elaise	Fiji	Jul 90	Nov 90	Permanent
REGIONAL DATA CENTRE PROGRAM					
22. Computer Systems Manager	Les Allinson	Australia	Nov 92	Jan 93	Dec 95
INFORMATION SERVICES PROGRAM					
23. Publications Coordinator	vacant				
24. Assistant Editor	Mereseini Bukarau	Fiji	Nov 85	Oct 94	Sep 96
25. Librarian	Dillie George	PNG	Dec 90	Feb 92	Dec 95
26. Program Assistant	Sunita Prasad	Fiji	May 89	Jan 91	Permanent
27. Information/Publications Asst.	Laisa Baravilala	Fiji	Jul 87	Permanent	-
FIELD SUPPORT SERVICES PROGRAM					
28. Senior Electronics Technician	Simon Young	Fiji	Jan 93	Jan 93	Jan 96
29. Electronics Technician	Peni Musunamasi	Fiji	Jun 89	July 92	Permanent
30. Marine Mechanic	Joe Mausio	Fiji	Mar 89	Dec 89	Nov 95
31. Workshop Assistant	Setareki Ratu	Fiji	Oct 86	Permanent	-
32. Technical Support Assistant	Graeme Frost	Fiji	Mar 92	Mar 92	Mar 96
33. Senior Geology Technician	Sekove Motuiwaca	Fiji	Apr 80	July 92	Permanent
MANAGEMENT PROGRAM					
35. Director	Philipp Muller	W/Samoa	Jan 92	Jan 95	Jan 98
36. Deputy Director	Alfred Simpson	Fiji	Feb 95	Feb 95	Jan 98
37. Finance & Administration Controller	Umar Farook	Fiji	Apr 91	Apr 94	Apr 97
38. Personal/Travel Assistant	Lavenia Kamali	Fiji	Mar 89	Jan 91	Dec 95
FINANCE & ADMINISTRATION PROGRAM					
39. Accountant	Mohinish Kumar	Fiji	Mar 95	Mar 95	Mar 98
40. Administrative Assistant	Nazmeen Whippy	Fiji	Jul 86	Permanent	-
41. Assistant Accountant	Atesh Narayan	Fiji	Jan 93	Permanent	-
42. Secretary/Clerk	Annette Olssen	Fiji	Oct 90	Permanent	-
43. Registry Clerk	Aseri Tokalaulevu	Fiji	Jan 93	Permanent	-
44. Receptionist/Clerk	Unaisi Bainiloga	Fiji	Feb 87	Permanent	-
45. Driver/Clerk	Enele Gaunavou	Fiji	Jul 88	Permanent	-
46. Office Assistant Cleaner	Salestino Niu Daurewa	Fiji	Sep 87	Permanent	-
PROGRAM COORDINATION PROGRAM					
47. Special Fund Coordinator	vacant				

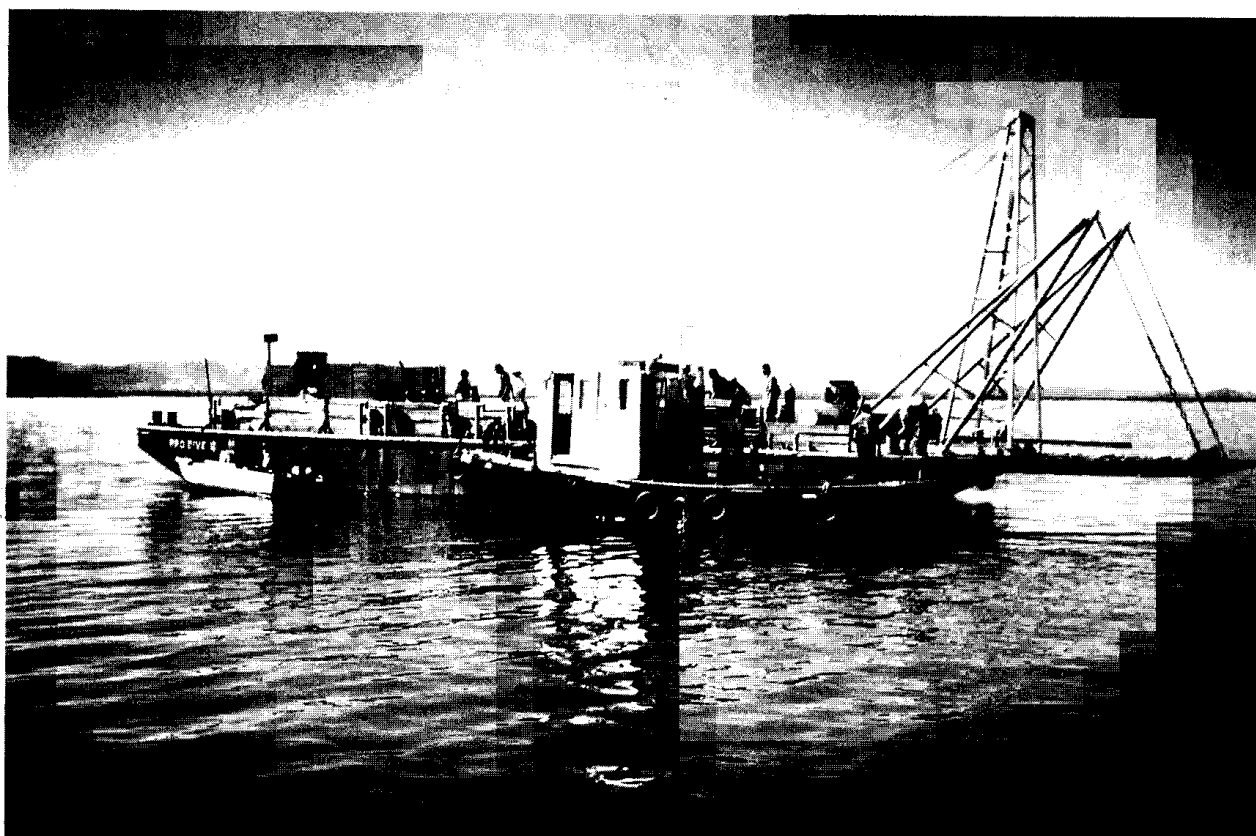
Appendix 3: 1995 Revised Budget & 1996 Approved Budget

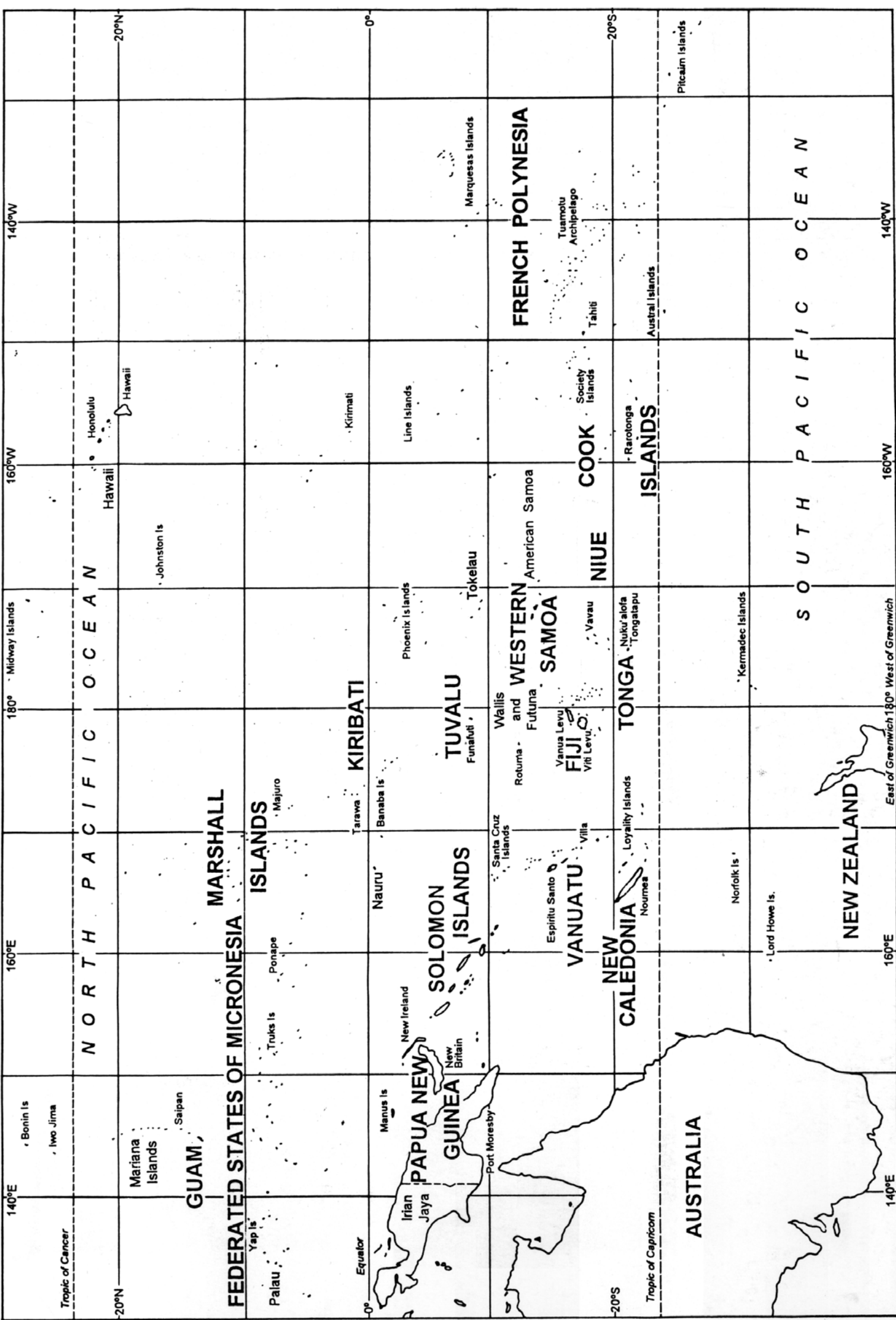
1995 Revised Budget & 1996 Approved Budget

SUMMARY OF ANTICIPATED INCOME (INCLUDING IN-KIND SUPPORT CONTRIBUTION) AND EXPENDITURE BY PROGRAMS

	1995 REVISED BUDGET F\$	1996 APPROVED BUDGET F\$
Mineral & Energy Resources	886,553	1,069,200
Environmental Geoscience	1,322,225	1,904,000
Capacity Building	706,000	598,000
Technical Services	843,400	558,000
Corporate Services	1,263,600	1,127,500
TOTAL	5,021,778	5,256,700

Surveying for detrital gold resources in the Nasivi River delta, north Viti Levu in Fiji took place during December 1995. The photo shows the vibro jet-airlift sampling system ready for deployment from a barge which was used as the "drilling platform". The tow-tug is standing by in the foreground. Twenty-six holes were drilled and sampled to a depth of 12.5 m below the seabed (Technical Report 231). The survey was funded by the Government of Fiji with additional support from Australia and Canada.





Appendix 2: Secretariat Staff List

	NAME	COUNTRY OF ORIGIN	DATE JOINED	CONTRACT START	CONTRACT END
MINERALS PROGRAM					
1. Marine Geologist	Robert Smith	Australia	Oct 88	Jul 92	Jun 96
2. Marine Geologist	Jackson Lum	Fiji	Nov 92	Nov 92	Nov 95
3. Chief Cartographer	Phil Woodward	Australia	Aug 88	Aug 94	Jul 97
4. Program Assistant	Litia Waradi	Fiji	Apr 89	Jan 91	Permanent
5. Offshore Geologist	Yoshitaka Hosoi	Japan	Aug 93	Aug 93	Aug 95
HYDROCARBONS PROGRAM					
6. Petroleum Coordinator	vacant				
7. Petroleum Geophysicist	vacant				
COASTAL MANAGEMENT & GEOHAZARDS PROGRAM					
8. Coastal Geologist	Don Forbes	Canada	Jan 95	Jan 95	Jan 96
9. Coastal Geologist	Xue Chunting	China	Sept 94	Sept 94	Sept 95
10. Aggregate Geologist	Graham Shorten	Australia	Oct 95	Oct 95	Oct 97
COASTAL MAPPING PROGRAM					
11. Mapping Geologist	Michel Larue	France	Oct 92	-	Oct 94
12. Computer Geologist	Fabrice Williot	France	Jan 95	Jan 95	June 96
13. Computer Operator	Bougainville Toloi	Fiji	Jan 88	Permanent	-
OFFSHORE MAPPING PROGRAM					
14. Offshore Coordinator	vacant				
WATER RESOURCES PROGRAM					
15. Project Manager	Ed Burke	New Zealand	Dec 94	Dec 94	Nov 96
16. Hydrogeologist	Derrick Depledge	New Zealand	Oct 94	Oct 94	Oct 96
17. Associate Expert/Engineer	Ulla Morgansen	Denmark	Oct 95	Oct 95	Oct 96
18. Program Assistant	Aliti Sema	Fiji	Jan 95	Jan 95	Dec 96
HUMAN RESOURCE DEVELOPMENT PROGRAM					
19. Training Coordinator	Russell Howorth	New Zealand	Oct 86	July 92	Jul 96
20. Assistant Training Coordinator	Fuka Kitekei'aho	Tonga	Nov 91	Nov 94	Nov 96
21. Program Assistant	Anna Elaise	Fiji	Jul 90	Nov 90	Permanent
REGIONAL DATA CENTRE PROGRAM					
22. Computer Systems Manager	Les Allinson	Australia	Nov 92	Jan 93	Dec 95
INFORMATION SERVICES PROGRAM					
23. Publications Coordinator	vacant				
24. Assistant Editor	Mereseini Bukarau	Fiji	Nov 85	Oct 94	Sep 96
25. Librarian	Dillie George	PNG	Dec 90	Feb 92	Dec 95
26. Program Assistant	Sunita Prasad	Fiji	May 89	Jan 91	Permanent
27. Information/Publications Asst.	Laisa Baravilala	Fiji	Jul 87	Permanent	-
FIELD SUPPORT SERVICES PROGRAM					
28. Senior Electronics Technician	Simon Young	Fiji	Jan 93	Jan 93	Jan 96
29. Electronics Technician	Peri Musunamasi	Fiji	Jun 89	July 92	Permanent
30. Marine Mechanic	Joe Mausio	Fiji	Mar 89	Dec 89	Nov 95
31. Workshop Assistant	Setareki Ratu	Fiji	Oct 86	Permanent	-
32. Technical Support Assistant	Graeme Frost	Fiji	Mar 92	Mar 92	Mar 96
33. Senior Geology Technician	Sekove Motuiwaca	Fiji	Apr 80	July 92	Permanent
MANAGEMENT PROGRAM					
35. Director	Philipp Muller	W/Samoa	Jan 92	Jan 95	Jan 98
36. Deputy Director	Alfred Simpson	Fiji	Feb 95	Feb 95	Jan 98
37. Finance & Administration Controller	Umar Farook	Fiji	Apr 91	Apr 94	Apr 97
38. Personal/Travel Assistant	Lavenia Kamali	Fiji	Mar 89	Jan 91	Dec 95
FINANCE & ADMINISTRATION PROGRAM					
39. Accountant	Mohinish Kumar	Fiji	Mar 95	Mar 95	Mar 98
40. Administrative Assistant	Nazmeen Whippy	Fiji	Jul 86	Permanent	-
41. Assistant Accountant	Atesh Narayan	Fiji	Jan 93	Permanent	-
42. Secretary/Clerk	Annette Olssen	Fiji	Oct 90	Permanent	-
43. Registry Clerk	Aseri Tokalaulevu	Fiji	Jan 93	Permanent	-
44. Receptionist/Clerk	Unaisi Bainiloga	Fiji	Feb 87	Permanent	-
45. Driver/Clerk	Enele Gaunavou	Fiji	Jul 88	Permanent	-
46. Office Assistant Cleaner	Salestino Niu Daurewa	Fiji	Sep 87	Permanent	-
PROGRAM COORDINATION PROGRAM					
47. Special Fund Coordinator	vacant				