SOPAC

1997 Annual Report Summary

Cover pictures from top to bottom:
Solomon Islands students equipped for coasting mapping.
The ocean will be the focus of the global community in 1998, during the International Year of the Ocean.
Marie Muller, wife of SOPAC's Philipp Muller and Berenado Vunibobo, the Honorable Minister of Foreign Affairs, Fiji, cut the 25th Anniversary cake at a special dinner held in conjunction with the 26th Session of SOPAC in Nadi, Fiji.

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Foreword by the Director

Alf Simpson

Call it what you wish but there is no escaping that 1997 was an unforgettable year for SOPAC, not least amongst the memories was the fact the it was our 25th anniversary. However, it will probably be best remembered by those close to the organisation as the year when its members reassessed their needs, decided what they wanted from the organisation, gave it a vote of confidence, and a new lease of life. The Press Release issued by SOPAC's Governing Council at the end of its 25th Anniversary Session in Nadi in early October (reproduced in the Annual Report Summary) clearly reflects this position.

In was also significant in that it was the final year at the helm of a regional organisation for one of the region's longest serving regional civil servants. Philipp Muller's constant message during his time at SOPAC was not to be obsessed by science alone but to use science to serve the Pacific Island peoples. I trust that what we have put together between these pages demonstrate a little of that focus.

At first it seemed rather strange for me to be writing the foreword to an Annual Report Summary for a year when someone else was in command. I reconciled myself to performing this task with the thought that Philipp Muller's legacy during his last year as Director will be encapsulated in the body of this report and not diminished one iota by having someone else pen a few opening remarks.

No greater flag bearer for SOPAC and no stronger advocate for the application of geoscience to help the small island nations has existed over the past almost quarter of a century than in Sione Tongilava. Sione passed away in late October last year having been Tonga's National Representative to SOPAC since 1974. His service to his country and the region will not be easily forgotten.

In our 1996 report we attempted to produce a document which was not only informative but also understandable to as wide an audience as possible. From feedback received, we succeeded and we hope we have improved in the current report.

I think an Annual Report Summary not only serves as a historical record, but also should raise issues relevant for the future management and development of our region. To serve this purpose we have attempted to produce this report as early as possible so as it might be available prior to the annual circuit of regional meetings. Information delayed is ultimately information denied.

In conclusion, I leave with you the thought that whatever opinion you may have of SOPAC as an institution there can be no denying it is needs focussed and as this report will show it produces real results for those it was designed to serve.

I hope 1998 is a successful International Year of the Ocean for us all.

Alf Simpson
Director

May 1998

Introduction to SOPAC

What is SOPAC?

SOPAC is the South Pacific Applied Geoscience Commission. It is an Intergovernmental, regional organisation dedicated to providing geological services to the countries it serves. SOPAC's work is carried out through its Secretariat, based in Suva. The work program is reviewed annually by the Governing Council assisted by: Secretariat representatives (SOPAC), a Technical Advisory Group (TAG), and a Science, Technology and Resources Network (STAR). SOPAC is funded by member-country contributions with support from donors.

What does SOPAC do?

SOPAC's work focuses on providing assistance to its member countries in 3 key areas: mineral and energy resource identification, promotion, and development; environmental geoscience; and human resource development in the geoscience field. To effectively provide these services SOPAC maintains an information technology unit, provides publication and library services, and offers technical and field services for specific project work.

Who benefits from SOPAC?

Member countries are **Australia**, **Cook Islands**, **Federated States of Micronesia**, **Fiji**, **Guam**, **Kiribati**, **Marshall Islands**, **New Zealand**, **Niue**, **Papua New Guinea**, **Samoa**, **Solomon Islands**, **Kingdom of Tonga**, **Tuvalu**, and **Vanuatu**. **French Polynesia** and **New Caledonia** are associate members. Any island member country can request assistance from SOPAC.

"No greater flag bearer for SOPAC and no stronger advocate for the application of geoscience to help the small island nations has existed over the past almost quarter of a century than in Sione Tongilava." The late Sione Tongilava, in 1977 by the drilling rig for Kumimonu No.1, drilled by Webb Tonga Inc. on Tongatapu Island, Kingdom of Tonga.

Benefits accrue to member countries directly through the provision of basic geological knowledge, and indirectly through improvements in land and ocean use, leading to improved health through improved water and sanitation provision, wealth generation through the development of mineral resources, and more sustainable development, by taking into account the geo-environmental impacts of developments.

During 1997, all the member countries benefited from assistance SOPAC provides, either through a country-specific activity, or through a regional program activity.

Who pays for SOPAC?

SOPAC is funded by member-country contributions and supported by the following donors: **Australia**, **Fiji**, Canada, France, Israel, Japan, Korea, **New Zealand**, People's Republic of China, ROC-Taiwan, the United Kingdom, the United States, the Commonwealth Secretariat, the European Union, and the UN family. Where donors have provided assistance for specific activities in the work program, either at the regional or country level, this is acknowledged in this Annual Report Summary.

Participants at the official opening of the 25th Anniversary Session of SOPAC, Nadi, Fiji.

General Regional Assistance

Not all of the services provided by SOPAC are required by all countries. The resource-rich Melanesian countries generally request SOPAC's assistance to promote or develop their mineral or petroleum potential. The smaller Micronesian and Polynesian countries, which are commonly more isolated with fewer exploitable resources, have other needs, more often related to the assessment of causes of coastal erosion, groundwater and sanitation improvements.

Those activities in 1997 which have provided assistance to the region as a whole, or to groups of countries are reported in this section on regional assistance.

Resource Development Program

The resource development program covers a broad spectrum of activities including assisting countries in the search for viable mineral deposits including aggregates and hydrocarbons both onshore and offshore, assisting countries in the development of adequate quantities of safe drinking water and sanitation facilities, and investigating alternative sources of energy.

During 1997 arrangements were concluded for the transfer to SOPAC of the Forum Secretariat regional energy program with the transfer to take effect from 1 January 1998. Activities in ocean energy and geothermal energy during 1997 were restricted to continuing to promote the potential in the region.

Minerals

SOPAC's role is to identify and promote the onshore and offshore mineral potential (including aggregates and hydrocarbons) of its member countries and the region in general.

The onshore minerals activities are directed at **Fiji**, **Solomon Islands**, **Papua New Guinea** and **Vanuatu**. Generally, the Melanesian island countries have large natural resource endowments. However, most do not have the financial or technical resources to assess the extent and quality of their resources, or indeed, to promote their development. To provide general assistance to prospectors and explorers who are interested in developing the region's mineral wealth, SOPAC put substantial effort into creating a preliminary regional minerals database during 1997.

In addition to promoting the mineral potential of the region, SOPAC has been working towards mineral resource policy development in the region. In October of 1997, a resource economist funded by Overseas Development Institute (ODI) and Fiji Government was recruited by SOPAC.

Offshore minerals exploration gained substantial attention during 1997 with the granting of exploration licences for hydrothermal minerals in the Manus Basin in the **Papua New Guinea** exclusive economic zone.

A historical moment is recorded....part of the New York Times article that announced the first move to mine seabed minerals in Papua New Guinea waters, 21 December 1997.

The New York Times

NEW YORK, SUNDAY, DECEMBER 21, 1997

First Move Made to Mine Mineral Riches of Seabed

By WILLIAM J. BROAD

Nautilus Minerals Corporation

SEABED BONANZA Rocky volcanic deposits like these off Papua New Guinea are rich in gold and other metals. A cutaway of one "chimney," bottom, shows layers of dense inner metals.

For the first time, miners have laid claim to rich deposits of gold, silver and copper in the deep sea, foreshadowing a possible rush to open the oceans for metals and a possible fight with conservationists over exploitation of the sea's dark recesses.

The sea is considered a last frontier for the competing forces of industrial development and nature preservation.

The mining claim was made by Australians in the territorial waters of Papua New Guinea and covers an area of nearly 2,000 square miles. About a mile down, the site boils with volcanic hot springs whose rocky outcroppings are laced with iron, zinc, copper, silver and gold in high concentrations.

The miners say early assays show the claim holds the richest volcanic deposits ever found at sea and estimate their likely value at billions of dollars, enough, they say, to justify the considerable cost of extracting them. Sample ores contain up to 26 percent zinc, 15 percent copper, seven ounces of silver to the ton and about one ounce of gold — all unusually high grades by terrestrial standards.

"If you found this deposit on dry land, you'd call these bonanza figures," said Dr. Ray Binns, a scientist at the Australian Commonwealth Scientific Industrial Research Organization who helped discover the metal-rich zone.

The richness of the deposits, experts say, means that less processing on land will be needed to separate out the different metals and turn them into ingots.

The hot deposits are very different from the icy manganese nodules that litter the global seabed and first prompted dreams of mining the deep. In the 1970's, rich and poor countries clashed over visions of the potential

Continued on Page 8

As part of the ongoing work to promote and develop the region's offshore minerals, planning and implementation arrangements for the Hakurei-Maru No. 2 cruises in 1997 and 1998 were carried out. The Hakurei-Maru No. 2 cruises are part of the third 5-year joint Japan/SOPAC Deep-Sea Minerals Exploration Project. The Hakurei Maru No. 2 July-September 1997 cruise in the waters of the **Federated States of Micronesia** was carried out to assess the potential for deepsea mineral resources.

The Secretariat continued its efforts to promote the sale of the South Pacific Seafloor Atlas - a summary of the results from the first ten years of cruises carried out under the Japan/SOPAC cooperative study.

During the year, the offshore minerals manganese nodules and cobalt-rich crusts databases were maintained and a hydrothermal minerals database was developed.

On-the-job training with the objective to achieve a national capacity for self reliance in the minerals sector continued to be an integral part of the work program in 1997. During the year there were attachments to the Secretariat of natural resource personnel from **Papua New Guinea**, **Fiji**, **Solomon Islands** and **Vanuatu** focusing on data analysis and report writing. Advice to member countries was given with the assistance of other agencies on organising training courses on policy issues including negotiations with the private sector.

SOPAC convened a Mining Section (two days of papers plus a field visit to Vatukoula) during the Pacific Science Inter-Congress held 13-19 July 1997 at the University of the South Pacific in Fiji. The mining section addressed issues on mineral exploration and mining in the South Pacific with the aim of strengthening economic sustainability of the countries in the region, attracting investors to the region, discussing aspects of natural resource development and presenting and discussing new data and ideas. Twenty five papers were presented by sixty participants from ten countries.

The work on aggregates in the region is largely site specific and hence reported under the country projects. Recognising the problems of the supply of construction material in many member country states, a collaborative project between the British Geological Survey in the United Kingdom and SOPAC on "Aggregates on Small Limestone Islands in the Pacific: Problems and Remedies" was prepared and presented at the Pacific Science Inter-Congress.

The petroleum potential of the South Pacific region continues to attract interest of investors. So, despite the extremely limited resources available for the hydrocarbon program, work continued to be carried out by the part-time manager of the SOPAC Petroleum Data Bank based in Canberra. SOPAC pursued its mandate to assess and promote the petroleum potential of the region by updating its petroleum databases and undertaking limited promotional activities for **Solomon Islands**, **Vanuatu**, **Fiji** and **Tonga**.

The Petroleum Data Bank continued to catalogue the extensive data collection of seismic tapes, transparencies, reports, and maps held at the data bank.

The water resources and sanitation activities aim to improve the health of those in member countries, by improving the available quantity and quality of potable water resources.

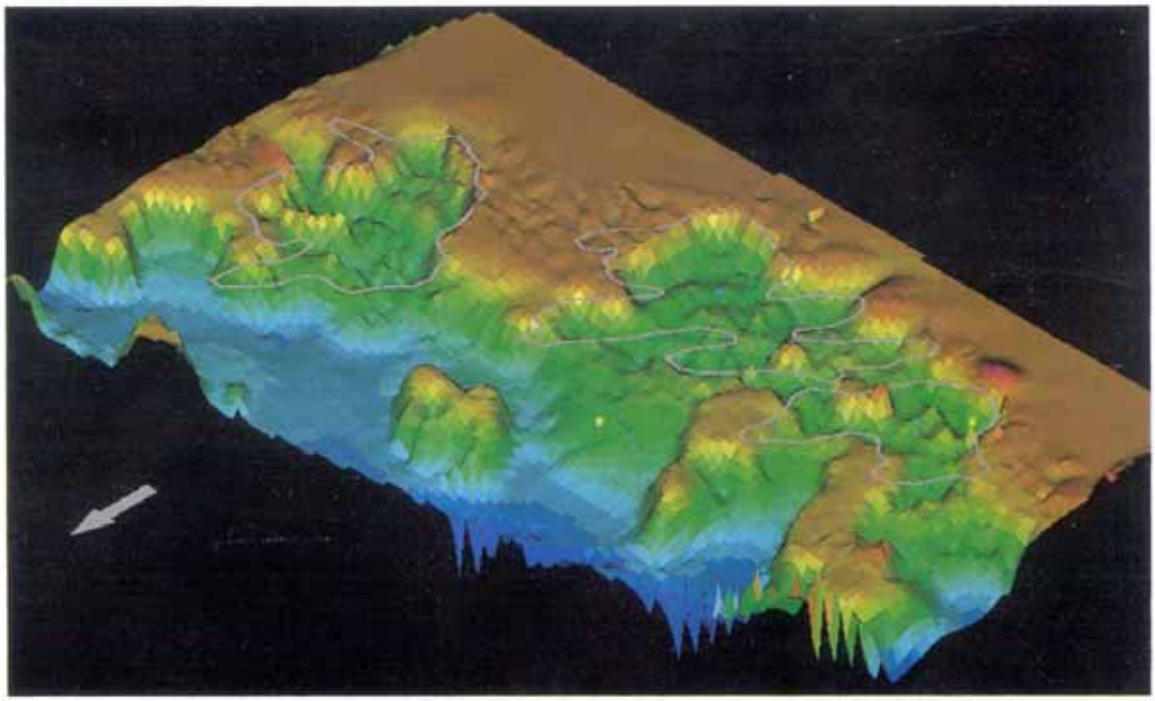
During 1997, SOPAC continued to act as the coordinating centre for water and sanitation activities in the region, developing plans for appropriate programs on relevant activities with SPC (health and sanitation), SPREP (solid waste management), and others. Activities included representation at several regional and international meetings and publication of the SOPAC Water and Sanitation Newsletter.

Several networking activities were established during the year, these included the development of a Web Page together with the establishment of a virtual library at the Secretariat.

SOPAC continued to act as interim Secretariat for the Pacific Water Association (PWA) and activities included the preparation and distribution of a newsletter, the development of a PWA Web Page and general invoicing and collection of PWA fees. SOPAC also hosted the PWA Steering Committee meeting in November which was attended by participants from **Fiji**, **Vanuatu**, **Samoa** and American Samoa.

Training activities for the reporting period included the hosting of several workshops:

- Small Island Water Information Network (SIWIN) Workshop was attended by 28 people from 12 Pacific countries to discuss and implement a water and sanitation information network. The Commonwealth Science Council funded this workshop;



A 3-D digital elevation model of a resource area for offshore carbonate sand mining in Fiji. This type of modern rendering of analysed data helps users who may find it difficult to mentally visualise terrain as shown by traditional contour maps. The blue represents deeper water in the lagoon and the brown represents the reef.

- SIDS Water Supply and Sanitation Collaborative Council (WSSCC) Working Group Meeting at the Secretariat was attended by 25 people from 12 Pacific countries to develop strategies to promote improved water and sanitation conditions at the WSSCC 4th Global Meeting held in Manila in late 1997; and
- Solar Pumping Workshop in Suva was attended by 29 people from 12 countries to promote and learn about the use of solar energy in the supply of freshwater to rural communities.

Resulting from the Appropriate Sanitation Workshop held in 1996, two reports were completed for distribution in 1997; "Design Examples of Waterless Composting Toilets" and "Sanitation Guidelines for Small Islands."

Environmental Science Program

Ocean Management

During 1997 SOPAC and IOC/UNESCO signed an agreement establishing a formal relationship and this includes recognition of SOPAC as the Global Ocean Observing Systems (GOOS) contact point in the South Pacific. Towards the end of the year planning commenced for a workshop to promote GOOS in the Pacific to be held early in 1998.

In relation to ocean observing systems and data collection, a major initiative during the year involved negotiation with JAMSTEC on ways and means of cooperating in the JAMSTEC TRITON buoy deployment program.

Stream flow measurements, Turangi Stream, Rarotonga, Cook Islands.

A workshop on Marine Benthic Habitats was held in November in New Caledonia and was attended by some 200 participants from 12 member countries and various other scientific organisations. The conference brought together geologists and biologists studying the relationship between marine geology and marine living resources, including marine biodiversity and fisheries to provide a synthesis of the technology

available to study and monitor the benthic submarine environment. The ultimate goal was to facilitate a technology transfer to Pacific Island countries, so as to assist with the characterisation and subsequent management of seabed habitats and their living resources, ensure their sustainable utilisation where appropriate, and secure the maintenance of their biodiversity.

The offshore mapping program is specifically intended to assist the member countries gain a greater understanding of the submarine mineral and living resource potential of the exclusive economic zone areas to enable those countries to promote and if feasible, develop those resources. To develop that greater understanding of these resources, the offshore mapping section should be undertaking seabed mapping, cruise coordination, and data collection, as well as providing information on exclusive economic zones to member states.

Without an Offshore Mapping Coordinator, the work of offshore mapping has been substantively reduced. Nonetheless, in 1997 SOPAC continued to coordinate the activities of research vessels and geoscientific cruises in the region and assist member country nationals participate in these cruises. This means that the data is being collected but no analysis is being undertaken. It is the analysis of this data which is critical if the data can be used to assist the member countries. At present, the new bathymetry data collected during these cruises is incorporated into the SOPAC databases, and SOPAC continues to reproduce and distribute CD-ROMs of the SOPACMAPS data.

During the year, SOPAC continued its collaboration with GEBCO, and the Deputy Director continued as GEBCO Reviewer for the Southwest Pacific.

Most of the countries have implemented national programs under French bilateral funding for the use of satellite imagery to extract bathymetry/oceanographic maps. The Secretariat received copies of new bathymetric maps produced using satellite altimetry by Seafloor Imaging Inc. The areas covered included the exclusive economic zones of **Fiji**, and Yap State of the **Federated States of Micronesia**.

Satellite image showing the nearshore reefs and the northwest corner of Viti Levu, Fiji. The image is 40 kilometres across. Originally bought for a national forest inventory in 1991 by the Forestry Department, the image is now made accessible through GIS computer tools for similar inventories in other sectors.

To enable its member countries to claim further sea resources, SOPAC collaborated with the Forum Fisheries Agency to produce guidelines for the establishment of continental shelf extensions beyond 200 nautical miles for the SOPAC countries.

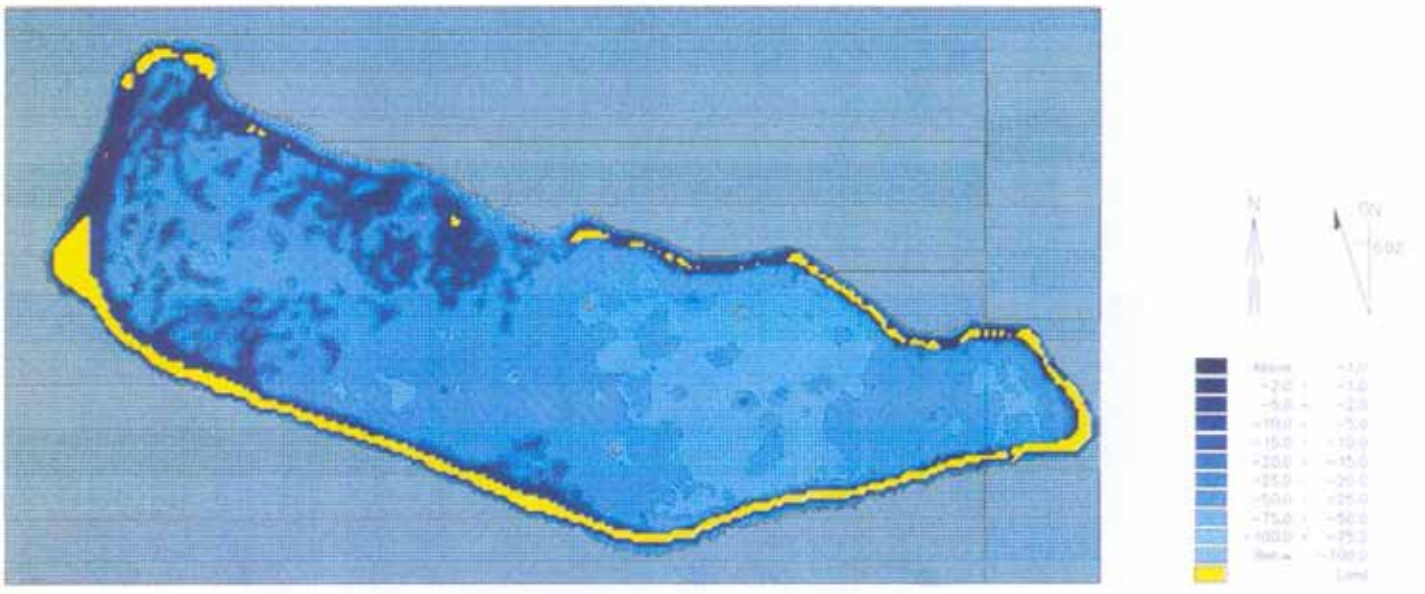
It is important that SOPAC member countries be appraised of and be able to act in response to their rights and obligations under Law of the Sea. Of particular concern to SOPAC members are matters relating to marine scientific research in areas under national jurisdiction, the delimitation of the continental shelf and the work of the International Seabed Authority. During 1997, SOPAC undertook a review of the impact of the Law of the Sea on its work program. The review outlined possible strategies for consideration by member countries with a view to strengthening SOPAC's capacity to respond to Law of the Sea issues and make a more substantial contribution to national capacity building in this vital area. In light of the importance attached by Governing Council to the delimitation of maritime areas under the Law of the Sea, the Secretariat developed a framework proposal for addressing delimitation issues. SOPAC also provided input to SPOCC in connection with a regional framework for coordination of activities relating to the Law of the Sea.

In August, SOPAC was given observer status at the ISA. In addition, Alf Simpson is a member of the Legal and Technical Commission which is currently preparing a draft mining code for polymetallic seabed mineral resources.

Coastal Management & Geohazards

Almost all the Pacific Island countries, with the exception of **Papua New Guinea**, are physically small in size, remote, and in some cases, widely scattered. Natural disasters besiege the islands. Hurricanes, earthquakes, floods, tidal waves, tsunami, storm surge, volcanic eruptions, and landslides affect almost all the islands. While some countries are particularly vulnerable to hurricanes, which destroy vital natural resources, as well as infrastructure, the coral atoll islands are subject to tidal wave damage, coastal erosion and the effects of climate change and sea level rise.

Threats to the Pacific Island countries also come from human activities such as sand mining and dredging which can cause coastal erosion and sedimentation of river areas.



Digitised model of the water depth in Majuro Lagoon, Marshall Islands, one of the largest lagoons in the region.

Jiba Kabua (left), Minister, Resources & Development, Works, Republic of Marshall Islands pictured at the first sign put up on a beach on Majuro prohibiting the removal of sand. This UNDP-funded coastal zone management project makes extensive use of data collected by SOPAC.

All of these problems can cause substantial disruption to the developing economies of the region, particularly as the coastal regions are generally the most heavily populated, often the location of most of the country's infrastructure and the area of greatest economic activity.

Consequently, the focus of the coastal management and geohazards activities at SOPAC, is to promote an understanding of the threats to the Pacific Island countries' coastal areas. The work program approaches the problems by means of an 'identify, inform, improve' approach. The issues, causes and solutions are first identified, then the information is disseminated to enable affected people to work towards improving their circumstances.

A Workshop on "Volcanic Hazards and Emergency Management in the Southwest Pacific" was held in Port Vila, Vanuatu in February. It was attended by disaster managers and geoscientists and sponsored by SOPAC, UNESCO and France. Twenty (20) recommendations for further work were described in a Project Proposal for Strengthening volcano-surveillance, volcanic-hazard assessments, and volcano emergency-management capabilities in selected Pacific Island Countries.

During the year, SOPAC Pacific GeoCities Plan was incorporated into the new Pacific Cities project. This is a major new collaboration between SOPAC and the Australian Geological Survey Organisation (AGSO) including other Pacific agencies, aimed at mapping the vulnerability of six Pacific urban centres, initially, for the effects of damaging natural hazards. The urban areas considered most vulnerable in terms of risk to life and property are: Apia, **Samoa**; Honiara, **Solomon Islands**; Lae, **Papua New Guinea**; Nuku'alofa, **Tonga**; Port Vila and Luganville, **Vanuatu**; and Suva, **Fiji**.

For **Fiji**, **Solomon Islands**, **Tonga** and **Vanuatu**, studies were initiated to determine the characteristic earthquake ground-response and geotechnical parameters for Suva, Honiara, Nuku'alofa and Port Vila to help in the development of a

microzonation of the cities to enable adequate design of infrastructure against earthquake resonance effects across a range of foundation conditions. A MapInfo database relating to a wide range of hazards was also completed.

A project "Seismic Zonation of Suva Central City and Simulation of Tsunami Risk in the Harbour" was accepted by the French Pacific Fund and funding approved by the French Government. This project dovetails neatly into the Pacific Cities project, and will provide for two more local staff to be employed specifically on the hazard problems of Suva, **Fiji**.

Island counterparts from **Fiji**, **Samoa**, **Solomon Islands**, **Tonga**, and **Vanuatu** spent four-weeks at SOPAC in October attending and contributing to, in succession, the Geophysical Institute of Israel (GII)-USAID sponsored Seismic Microzoning Workshop, the first Danish Hydraulics Institute (DHI) MIKE21 Hydrodynamic Modelling Training Session, and the Pacific Cities Building and Assets Trial Survey of Suva.

The Danish Government, through UNDP has provided MIKE21 software from the Danish Hydraulics Institute (DHI) to SOPAC. The first, week-long training session was carried out in October by a member of the DHI staff, and was attended by five member country staff and three SOPAC staff. Three more advanced sessions were carried out by separate DHI trainers during late November-early December. SOPAC requested member countries originally involved to return their staff for these sessions. The Commonwealth Secretariat provided some funding for each of the four countries involved on a bilateral basis. MIKE 21 software will underpin large-scale hydraulic, pollution, erosion and sea-level rise hazard studies in a wide variety of applications throughout the atoll nations and other countries of the Pacific.

A joint project between SOPAC and Victoria University of Wellington is ongoing in **Fiji** (Viti Levu), **Marshall Islands** (Majuro), **Kiribati** (Tarawa) and **Tuvalu** (Funafuti) to study the biological components of carbonate sediments. The study involves determination of the sediment composition and the processes controlling sediment accumulation. As part of an attempt to quantify sediment production and also to investigate the effects of habitat modification, the distribution, abundances, life cycles and growth rates of the foraminiferal and ostracod microfauna in the sediments are being investigated. The University of the South Pacific has been collaborating with the Fiji aspect of this. Further field work has also been carried out in all areas during the year.

Existing programs were maintained and new programs established in coastal management and hazard assessment with UNDHA, SPREP, APEC, SEAGRANT/PIN and ESCAP. This was facilitated by SOPAC staff participating in meetings organised by these agencies. Collaborative ventures were explored with James Cook University of North Queensland through one of its specialist research centres.

National Capacity Development Program

Human Resources Development

Human resource development is vital to the sustainable development of the region. If skills are not transferred from SOPAC staff to country nationals, and the in-country institutions are not strengthened, then skills will continually need to be imported and projects in that sense will not be sustainable.

SOPAC promotes human resource development by directly teaching educational courses, subsidising education of member country nationals and providing hands-on training.

The Certificate in Earth Science and Marine Geology completed its second year of a three-year cycle in 1997. Twenty participants from **Cook Islands**, **Fiji**, **Kiribati**, **Papua New Guinea**, **Solomon Islands**, **Tonga**, and **Vanuatu** attended the two Advanced Courses in 1997. Computer-aided teaching methods were introduced in the Certificate program for the first time in 1997, and distance education resources were also reviewed and introduced where relevant.

SOPAC, USP and some Suva-based member country representatives continued their consultations regarding the future direction of the Certificate in Earth Science and Marine Geology during 1997. A working group meeting was held in April where the consensus reached was that at least one more three-year cycle should be followed before a final decision on course integration into the USP is made. In the interim period, issues relating to course content and admissions policy will be reviewed.

Two students, one from **Tonga** and a second from **Vanuatu** continued their studies for a degree in Earth Science at the University of the South Pacific funded by the SOPAC Scholarship Scheme.

Sixteen (16) SOPAC Fellowships were awarded during 1997. The attachments were for periods between two weeks to two months. Once again it was noted that there were obvious benefits of having two individuals from the same country together. Countries benefiting include **Cook Islands** (1), **Fiji** (2), **Federated States of Micronesia** (2), **Papua New Guinea** (1), **Samoa** (1), **Solomon Islands** (2), **Tonga** (3), and **Vanuatu** (4).

Training at places other than the Secretariat is now incorporated into the Fellowship Scheme. Several individuals from the island member countries would participate in the STAR Meeting. Of particular note was senior government participation in conferences, assisting with the promotion of SOPAC and its work. Organisations other

Computer modelling software Mike 21 trainees (which included member country nationals and Secretariat staff) and their Danish tutors at the intensive course held at the Secretariat in October 1997.

than the Secretariat continued to support the Training Program, and two (2) attachments during the past year included individuals from two (2) member countries: **Tonga** and the **Federated States of Micronesia** to MMAJ, Japan.

During the year, Regional workshops continued to be implemented to support activities of SOPAC programs and are reported elsewhere in this Annual Report Summary.

Assistance was provided to the University of the South Pacific in the Ocean Resources Management Program, and four SOPAC staff contributed the majority of lectures and laboratory classes for the SC301: Applied Geology Course.

Information Technology

During 1997, SOPAC continued to support member countries in the development, installation and maintenance of appropriate Information Technology (IT) systems. These systems are essential for improving the effectiveness of government departments by providing timely access to accurate information.

The objectives include the provision of relevant and effective IT systems to assist member countries in discharging their obligations under resource management objectives.

Within the Secretariat, a more robust tape backup system, ArcServe 6.5, was installed and users were transferred from the Microsoft Mail Server to the Exchange Server 5.0. Continuing enhancements were also being done to the web site. In addition, cabling replacement and upgrading of the new PABX system was undertaken with hardware upgrades and equipment repair an ongoing activity.

Students from Cook Islands, Fiji, Kiribati, Papua New Guinea, Solomon Islands, Tonga and Vanuatu on receiving their second year certificates from the Earth Science and Marine Geology course.

SOPAC continued to produce a large amount of data in digital form. GIS technology provides opportunities to organise and secure it following completion of digitisation and quality checking.

SOPAC continued to support all member countries in the use of GIS and Remote Sensing technology, particularly by way of the development of databases and training of in-country technicians involved in the development of GIS related work.

During the year, SOPAC completed two IT projects for the International Seabed Authority (ISA), Jamaica, to develop an appropriate information system and a GIS-based database of deep-sea mineral exploration. It is envisaged that the overall outcome of these projects for the ISA will be beneficial to SOPAC's member countries. The projects have involved three visits to ISA by SOPAC staff to develop specifications, implement the information system with full Internet access plus Web Site and finally to develop the Polymetallic Database (PolyDat).

SOPAC researched and developed a system that provides affordable Internet for development organisations in Fiji through cost sharing a single connection to the Internet. In addition, all organisations or partners developed or are developing their

own web sites to allow interconnection (the Intranet), information sharing and technical cooperation. The partners include international and regional development organisations, trade and tourism, health and education, and legal and resource management. The association has been titled the Fiji Internet/Intranet Group (FIG).

The system has been developed as a scaleable and transferable model that will enable it to be replicated in member countries where partners will include government, regional and international, NGOs and other organisations that focus on development within the region.

Extensive testing was undertaken in the use of PEACESAT terminals for Internet access as there are PEACESAT terminals in most member countries. Unfortunately, while it is possible to operate at speeds of up to 64 kbps the downtime was found to be approximately 50%.

Publications and Library

A total of over 93 internally-produced reports passed through the SOPAC publishing system during 1997, of which about half were technical reports containing analysed and processed data from recent SOPAC field surveys and work program activities.

In addition to publications reported elsewhere in this Annual Report Summary, SOPAC Technical Bulletin 10, collating the results of the *RV Tui* 1986 cruises was finally printed. Also completed was Technical Bulletin 9, the latest update of regional coastal geology and geomorphology.

Technical summaries and promotional material published include the 1996 *Annual Report Summary*, two issues of *SOPAC Projects* and two issues of *SOPAC News*.

External publishing assistance was given to UNDHA-SPPO for two manuals on Public Awareness Campaigns and Economic Impact of Disasters in the South Pacific.

Involvement with Pacific Science Inter-Congress saw a Women and Water display set up as part of the ECOWOMAN/SPACHEE tent. The inventions and knowledge of formal and non-formal women scientists combined to present appropriate technology in a meaningful way to women visitors of all levels.

Library Services continued to be maintained by interlibrary loan, reference and reader services, particularly for Secretariat staff and on request from member countries.

Maintaining the SOPAC bibliographic database is an ongoing service, and through the Pacific Islands Marine Resources Information System (PIMRIS), SOPAC continued to assist the region with marine resources information, particularly in the geosciences.

This assistance to member countries with their geoscience reference collections and libraries is currently still on hold in the absence of a full-time Librarian.

Drafting Services continued to be provided throughout the reporting period to all SOPAC programs. Eighty (80) figures and diagrams for various SOPAC Technical Reports were produced. Seven (7) maps were prepared for publishing. A similar number of figures were drafted for individuals publishing in their professional capacity (e.g. USP academics).

Assistance was provided to numerous member countries, regional organisations, private companies and individuals and local authorities with map reproduction, map copying and aerial photography planning.

Maintenance and upkeep of SOPAC airphoto and map collections continued with the addition of 50 new maps and 200 new airphotos from external sources. The collection of exclusive economic zone maps has been made digital, and coloured maps of Tuvalu and Marshall Islands were also printed.

Field Support Services

In support of the field studies new equipment purchases and upgrades included: 3 sonic releases for coastal deployment and retrieval of current metres; a high gain hydrophone receiver for high resolution single-channel seismic data acquisition; an upgrade of the Seabird CTD for measuring conductivity, temperature and depth, with a dissolved oxygen sensor for water quality and circulation studies; a 24 volts DC power supply to drive the Del Norte GPS system was designed and built in an effort to reduce the number of lead-acid batteries (and cost) used during a survey; and a new 30HP Yamaha was purchased for survey purposes.

The research vessel *Yautalei*, a joint SOPAC-MRD cooperative exercise for coastal studies saw a number of new additions and upgrades completed by the field support unit with the installation of Radar, GPS and dedicated echosounder.

The program continued to support an Electronics Workshop and a Mechanical Workshop for repair and maintenance of the Secretariat's inventory of equipment. Survey equipment continued to be operated under extreme conditions and undergo rugged treatment in the field. This required all in-house and survey equipment to be maintained to a high level of reliability and accuracy on an ongoing basis.

Workshop staff assisted in 5 field surveys during this reporting period (**Cook Islands**, **Vanuatu** and **Fiji** (3). Sand samples from **Kiribati**, **Federated States of Micronesia**, **Marshall Islands** and **Fiji** were processed.

New equipment for shallow water field surveys acquired in 1997. On the left, three sonic releases and controller; on the right, the upgraded Seabird CTD.

Cook Islands

Surface and groundwater studies were carried out in Rarotonga and work included the preparation of both surface water and groundwater monitoring networks and investigations proposal plus staff training in low-flow stream gauging techniques. Gauging equipment was loaned to enable continuation of low-flow stream monitoring.

In support of an Asia Development Bank study of pearl aquaculture in Manihiki Lagoon, a report was released following the completion of a field survey in late 1996 of tides, currents, water mass properties and bathymetry in late 1996.

SOPAC participated in an in-country workshop related to a Tourism Vulnerability Study being initiated by the Cook Islands Disaster Management Office and UNDHA-SPPO in late August.

Students determining grain size distribution and composition from beach sands on the ESMG course.

Federated States of Micronesia

A report on the field survey, appraisal of the sand mining operations on the northern rim of Pohnpei Lagoon was completed. Two nationals from Pohnpei were attached to the Secretariat to complete a report detailing the initiatives to be taken by SOPAC to co-ordinate studies of the nearshore dredging which will lead not only to an assessment of the impact of this method of mining for coral and rubble detritus, but also the development of dredging guidelines to be implemented by November 1998.

A resurvey of beach profiles on Kosrae was completed. During the visit a briefing seminar was conducted with twelve state government staff to explain the outcomes of recent SOPAC coastal work on coastal erosion sedimentation and management. SOPAC also participated in the 2-day Sea Grant Environmental Workshop held in Pohnpei for representatives from all states.

Pohnpei and Kosrae were visited to assist with rural water supply systems. In Kosrae a new spring source was developed to increase supply capacity.

Assistance was provided to the Pohnpei Environmental Protection Agency to implement a GIS-based information system for organising and analysing coastal data.

The Secretariat assisted in the implementation of the Hakurei Maru No. 2 July-September 1997 cruise in the waters of the Federated States of Micronesia to assess the potential for deepsea mineral resources as part of Phase III of the Japan/SOPAC cooperative study on deep sea minerals.

Fiji

Advisory assistance was provided to Fiji during the development of the Fiji Minerals Policy Report.

Rural water supply advice together with aquifer testing and analyses of data for Labasa groundwater investigations was completed.

A resource assessment of lagoon sand resources in Laucala Bay was completed for Fiji Industries Limited. Results of this study confirm at least 5 years of sand exists in the current licence area. Following recommendations from the report the company has implemented GPS to better manage the resource and the quality of the final product.

Investigations and studies of the evolution of Natadola Bay southwest Viti Levu its beach- and dune ridge-ridge sequence landward of the modern beach continued with the interpretation of seismic data in the subsurface of the bay combined with additional C_{14} of shell found insitu. to provide the foundation for good coastal zone management.

Beach monitoring, Tarawa, Kiribati.

A substantive joint MRD–SOPAC field program in the third quarter of the year to assess the offshore potential for placer gold Yanawai River was completed. A data base of bathymetry, high resolution seismic profiling, conductivity temperature and depth profiling provide the basis for a more complete environmental assessment of likely impacts associated with mining and logging in the lower reaches of the Yanawai River west of Savusavu Bay.

Also for Fiji, field work was completed and report submitted on vulnerability and adaptation assessment, coastal impact of sea-level change on Suva Peninsula and vicinity. The objectives of the study were to assess the physical effects of Accelerated Sea Level Rise (ASLR) and to investigate potential response options which could mitigate these effects.

A continuing dialogue is maintained with the Mineral Resources Department of Fiji (MRD) and the intra-Governmental Suva Earthquake Risk Management Project. Results have been obtained for the independent series of microtremor measurements commissioned by MRD for quantifying the zonation of earthquake-shaking.

Seismic reflection investigations were carried out for the site for the proposed new Rewa River bridge and a report was completed.

Data conversion and CD-ROM writing assistance was given to the Mineral Resources Department. Equipment procurement and upgrade assistance was also given to the Management Services Division of the Forestry Department.

Guam

Guam tends to receive direct technical support from the United States, and the University of Guam, and therefore submits no requests for country-specific assistance from SOPAC. Guam has contacts with the other small Pacific Island Countries through its membership of SOPAC, and receives the benefits of the other programs that operate in the region. It also has access to all of SOPAC's databases.

Kiribati

For Kiribati, in conjunction with the UNESCO/SOPAC groundwater recharge study collaborated on modelling groundwater to assist in the sustainable management of the groundwater resource. Also, assistance was provided to the UN Outer Island Project and in the preparation of a Community Health and Education Manual and a Hand and Solar Pumping Manual to be used with the UN Outer Island Project.

Field work was carried out and report completed to assess the vulnerability of Betio in South Tarawa to accelerated sea-level rise. As a complement to previous work, the coast of Betio was mapped and coastal processes affecting it were evaluated. Further work was also carried out on the monitoring of beaches in Tarawa along profiles constructed in earlier projects.

SOPAC bathymetric data was used in a model study for the southeast of Tarawa Lagoon to assist in the calculated assessment of the possibility of re-opening the Temaiku Bight. This work was carried out for the Royds Consulting Limited as part of an Asia Development Bank funded Sanitation and Public Health Project. Also studied was the potential aggregate resource from the channel project.

A one-week MapInfo training workshop was also provided in Kiribati and a GIS and Remote Sensing User Group was formed.

Marshall Islands

The Secretariat had lengthy discussions with KORDI (Korea Ocean Research and Development Institute) on their survey area in the Marshall Islands exclusive economic zone in 1997 to avoid any overlaps with the Japan/SOPAC cruise of 1996.

In the Marshall Islands, a third period of field survey work related to the assessment of alternate lagoon aggregate resources took place during 1997 and included lagoon water circulation studies.

It was anticipated that water sector programs for the Marshall Islands recommended in the Water Action Plan would be developed however this did not occur due to lack of response from government.

The report of the 1996 cruise of the Hakurei Maru No. 2 in the exclusive economic zone of the Marshall Islands was completed and delivered to the Government. Manganese cobalt-rich crusts were discovered on many seamounts. The report also contains detailed bathymetric data of the cruise.

Field work was completed for a study of coastal erosion and implications for coastal management on Majuro Atoll. The work included a compilation of all known existing historical data. Coastal mapping of Urban Majuro was completed for the third and final sheet of Urban Majuro. Compilation and publication of the three sheets was completed.

Also on Majuro, a beach monitoring survey in the DUD area of Urban Majuro and Laura established nineteen new beach profile sites and provided training for two nationals. A short briefing seminar was held to explain the impacts of coastal erosion to landowners in the DUD area and staff of Majuro Local Government. This work was carried out in collaboration with a UNDP Project for establishing a coastal zone management plan for Majuro Atoll.

Support was provided to Marshall Islands Embassy, Suva, by establishing full Internet services via dial-up as well as upgrading equipment.

The Marshallese version of the SOPAC Coasts of Pacific Islands booklet was finalised and printed together with three Marshallese leaflets to accompany the booklet.

New Caledonia

For New Caledonia, assistance was provided in the production and organisation of coastal data as well as retrieval of offshore data.

New Caledonia was also host to the Habitats Conference which is summarised in the Environmental Science Program section of this report.

Measuring water flow in a pipeline in Patamea Village, Savai'i, Samoa.

Niue

In Niue, preliminary work was initiated with the digitising of the Royal New Zealand Navy Hydrographic bathymetry to generate a digital elevation model for numerical modeling studies related to harbour developments. The digital data has been incorporated into MapInfo format.

Assistance was also provided to consolidate within GIS databases currently held by the government including existing marine resource information generated by SOPAC on Niue, and its exclusive economic zone.

Papua New Guinea

For Papua New Guinea, two in-country seminars were conducted in late November/early December: (i) Geological Seminars using Computer Aided Learning Modules and (ii) Basic Hydrology and Hydrogeology. The seminars were attended by seven participants from the Mineral Resources and Petroleum and Energy departments.

Financial assistance was also provided to the University of Papua New Guinea to fund a student attachment onboard the ocean research vessel Franklin to cruise in the Manus Basin.

The survey clearly demonstrated that the water supply situation can be significantly improved at minimal costs, if the roof catchment option is fully developed and utilised.

Samoa

For Samoa, a water resources survey of Manono Island was completed in late November with staff from the Samoa Water Authority and the Apia Observatory.

Training for Samoa was provided for individuals attending regional workshops, as described in the Coastal Management and Geohazards section of this report. Also for Samoa, information technology and GIS training was provided with a two-week attachment for a scholarship student in early December 1997.

Solomon Islands

Advisory assistance was provided to the Solomon Islands during the negotiations and development of Gold Ridge Mine.

A visit to Honiara to advise and collect data on mining and waste disposal activities that may affect groundwater quality and to prepare appropriate project proposals was carried out in November. Advice and training was provided in database applications for groundwater assessment.

Existing borehole information was entered into the database for the Honiara Risk Assessment Project.

A one week refresher course was held in Honiara for three of the four participants to the Earth Science courses.

Tonga

In Tonga, a field program in Vava'u to assess existing sand resources at Holeva and develop a management strategy to ensure site rehabilitation with the assistance of a geologist seconded from KIGAM was carried out and preliminary results reinforced the need to look offshore for long term supply of construction aggregate, as the current resources are finite and unsustainable.

Support for the technical component of a GIS for the Tonga Electric Power Board (TEPB) was provided. This is a joint project between Pacific Regional Energy Program, Forum Secretariat, TEPB and SOPAC under EU funding to provide a scaleable and transferable GIS-based Information System to assist the power utilities of member countries. There was an initial meeting in Tonga at TEPB headquarters in June 1997 to promote information and technology sharing in GIS amongst government and other relevant sectors with a recommendation to create a national GIS and remote sensing user group to achieve these objectives.

Physical base maps of Nuku'alofa have been digitised and a database of digitised aerial photographs and power distribution information has been added courtesy of the Tonga Electric Power Board.

Tuvalu

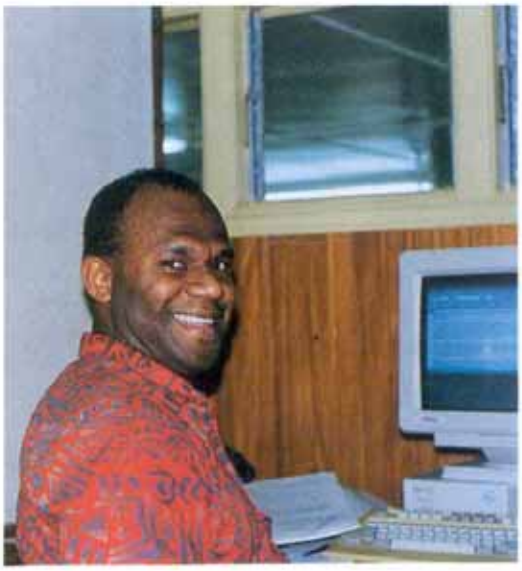
For Tuvalu, assistance was provided for the preparation of a proposal to increase government storage facilities of rainwater. Also, in conjunction with SPREP, a Solid Waste Management Plan for Funafuti was developed during 1997 to deal with all aspects of solid waste disposal.

A report was completed on shoreline movements, shore-zone geology and coastal processes in Vaitupu.

Assistance was provided to enable LAN/WAN connectivity for Tuvalu, this involved a desk study and two-week visit to Funafuti.

Vanuatu

Three booklets with illustrative cartoons in colour were produced to assist Vanuatu address possible landowner and mining company problems associated with exploration in the country. Misunderstanding and the lack of information is causing distrust by landowners towards mining companies. These booklets will be distributed to landowners and to schools throughout Vanuatu.



Chris Ioan, at the Secretariat during his 5-month attachment to the Secretariat.

Assistance was provided to Vanuatu through supervision and training of staff from the Department of Geology, Mines and Water Resources during a soil geochemical field survey in the eastern part of Santo over a magnetic anomaly defined in a recent country-wide aeromagnetic survey funded by Australia. The anomaly is located beneath a limestone cover and was previously not known. Results of the soil geochemical survey have been interpreted.

Also for Vanuatu, an offshore field survey was completed for Port Vila Harbour as part of the earthquake microzoning study.

Chris Ioan was attached to SOPAC from July through November on a British aid assisted project to widen his experience, before moving completely under Pacific Cities funding during the October workshops. During July-September, water resources sector documents were reviewed. He also worked on the Port Vila MapInfo GIS database, particularly on the interpretation and entering of borehole information.

For Port Vila, a preliminary earthquake-shaking map has been prepared for onshore areas and a program of microtremor measurements for quantifying the zonation of earthquake-shaking.

Management and Corporate Services

Without a doubt on the management side of the SOPAC Secretariat, the year 1997 was dominated by the Council review of the future role and direction of the organisation. Immediately after New Year, the Interim Standing Committee of Council began its work following on from that of the Subcommittee of Council. The work of the Interim Standing Committee continued, together with referrals to the members, until well into preparation time for the Annual Session.

The end-product was a strong endorsement by Council at the 25th Anniversary Session held in Nadi in early October of a new future role and direction. This included a new work program and organisation structure (see Press Release issued by Governing Council reproduced in Appendix 4).

Umar Farook, outgoing Finance and Administration Controller of the SOPAC Secretariat.

As part of this process, work on the incorporation of regional energy and disaster reduction programs into SOPAC continued. For the energy program, discussions with Forum Secretariat were completed in readiness for the transfer to be effected on the 1 January 1998. For the disaster reduction program, discussions continued through participation in the Regional Disaster Management Subcommittee.

Management staff undertook their yearly tasks of visiting member countries, fund raising and liaison with other regional and international organisations. In order to foster closer ties with other organisations, to ensure that all were working towards the same goals, SOPAC collaborated with the many partners. For 1997, a particular note of the following new or renewed partnerships is made: Intergovernmental Oceanographic Commission of UNESCO, particularly the sub commission for the Western Pacific, the International Hydrological Program of UNESCO, the United Nations Environment Program, Sea Grant/PIN, the Metal Mining Agency of Japan, the Japan Marine Science and Technology Centre, the Korean Ocean Research and Development Institute, the British Geological Survey, IFREMER and ORSTOM, the National Oceanographic and Atmospheric Administration (United States).

Finance

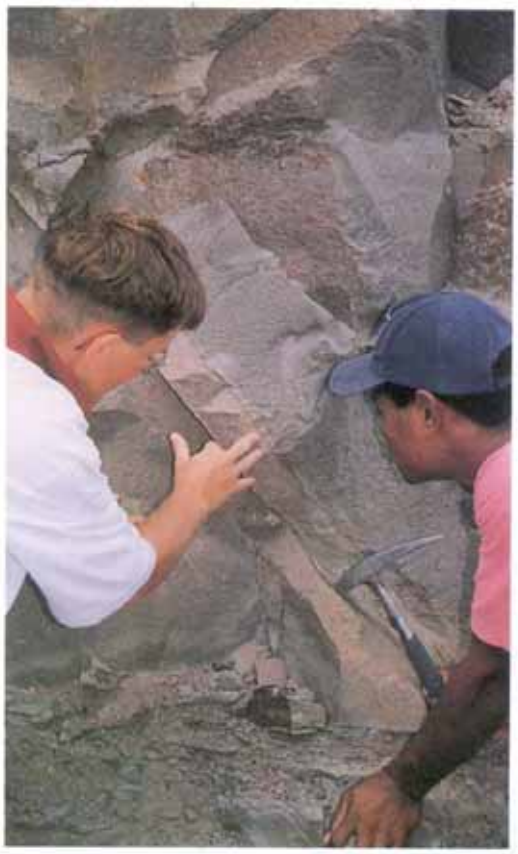
Total funding to SOPAC in 1997 was about F$4.2 million (Appendix 3), a slight increase over 1996. This was largely due to: increased extra-budgetary contributions from donors; 5% increase in membership contribution, and a surplus in the general funds in 1997. Voluntary grants from New Caledonia, French Polynesia and a special grant from Fiji, also provided funding towards SOPAC'S core budget.

Total cash expenditure was F$3.1 million, a decrease of F$0.6 million over 1996.

Samoa's Philipp Muller, outgoing Director of the SOPAC Secretariat.

Funding and Donor Support

Australia's total grant to SOPAC for 1997 remained at the 1996 level of A$720,000. This included Australia's membership contribution under the existing scale of assessment and its annual regular funding to the special purpose budget. Likewise, New Zealand's total grant for 1997 remained at the 1996 level of NZ$500,000, which included its membership contribution under the existing scale of assessment as well as the special purpose funding.



CFTC-funded Distance Education Training Officer at the 'cliff face' with a student during the Earth Science and Marine Geology course.

The Fiji Government continued to support SOPAC with an annual special grant based a formula which refunded a large part of the income tax payment made by local SOPAC staff to the Fiji Government's Inland Revenue Department. The Government of Fiji also provided funding for various ad-hoc projects, mainly to minerals and coastal activities. The total support received from the Government of Fiji amounted to about F$248,000.

The European Union funding under the Lome III was due to conclude and phase out by the end of the first quarter of 1997 but given that funds were still available in the work program component, an extension to the end of the year was granted by the European Union.

Canadian funding to SOPAC, as part of the final phase of CSPOD-1 continued to support four remaining projects. Two of the projects, Coastal Development Program and the Workshop Training in Computerised Geological Data Management Systems of the South Pacific, concluded during the year while the Nearshore Minerals Prospecting Program and the ICOD/SOPAC Scholarship Program continued to the end of the year and will conclude in 1998.

During the year, the French Government's direct support to SOPAC was significantly reduced. Through its in-kind support, the French Government continued to provide a Computer Geologist for Coastal Mapping and related work program activities. IFREMER and ORSTOM also continued their in-kind support.

The Commonwealth Secretariat increased its support to SOPAC by providing in-kind and cash assistance with particular emphasis on the Earth Science and Marine Geology training course, water and sanitation activities and the provision of expert personnel including an Aggregate Geologist, a Hydrogeologist and a Distance Education Training Officer. Also during the year approval was given for the support of a Coastal Geologist, recruitment was underway at the end of the year.

Funding from the United Nations through UNDP, UNEP and UNESCO have been directed mainly at the water and sanitation activities. The UNDP funded Water and Sanitation program finally concluded at the end of December 1997

During the year SOPAC received funds from two new sources, the Government of Korea through the Korea Ocean Research & Development Institute (KORDI) and the Korea Institute of Geological Mining and Materials (KIGAM) provided support to the Minerals Program. The Government of ROC-Taiwan approved support to assist with the establishment of the Disaster Reduction Unit information system.

China, Japan, Israel, USA and Asian Development Bank also continued to support SOPAC during the year, either directly through the provision of funds or through in-kind assistance including staff positions.

Appendix 1: Completed Reports and Publications for 1997

PUBLICATIONS

Annual Report Summary 1996

Proceedings of the Twenty-sixth Session, Nadi, Fiji Islands, 29 September – 4 October 1997.

Lum, J., Temakon, S. 1997. Mineral development and the rights of landowners (English)/Divelopment blong ol minerals mo ol raet blong ol landowner (Bislama). SOPAC Miscellaneous Report 259: 16 p.

Lum, J., Temakon, S. 1997. Exploration and mining (English)/Exploration mo mining (Bislama). SOPAC Miscellaneous Report 260: 16 p.

Lum, J., Temakon, S. 1997. Mega mine or never mind: benefits and woes of mining (English)/Benefits and woes o ol gudfala mo rabis saed blong mining (Bislama). SOPAC Miscellaneous Report 261: 16 p.

Depledge, D. 1997. Sanitation for small islands: guidelines for selection and development. SOPAC Miscellaneous Report 250: 28 p.

Sherwood, A.M. (comp.) 1997. Coastal and environmental geoscience studies of the Southwest Pacific Islands. SOPAC Technical Bulletin 9: 265 p.

SOPAC, Majuro Atoll Local Government, UNDP 1997. Kabbe ko ilo aelon in Pacific in: 40 p. (SOPAC Joint Contribution. 117). Note: Translation from the English of "Coasts of Pacific Islands" (SOPAC Miscellaneous Report 222) by Danny Jack.

SOPAC News: 2 issues

SOPAC Projects: 1 issue

REPORTS

Technical Reports

Xue, C. 1997. Coastal erosion and management of Vaitupu Island, Tuvalu. SOPAC Technical Report 243: 31 p.; 2 annexes

Smith, R., Edward, A., Shorten, G. 1997. Sand dredging, Nett Municipality, Pohnpei Lagoon, Federated States of Micronesia: resource assessment and environmental considerations. SOPAC Technical Report 244: 32 p.; 6 app.; 11 figs

Smith, R., Vuibau, T. 1997. Detrital gold resources survey, Momi Bay, west Viti Levu, Fiji, 5 December - 20 December 1996. SOPAC Technical Report 245: 23 p.; 7 figs

Solomon, S. 1997. Circulation studies in Manihiki Lagoon, Cook Islands. SOPAC Technical Report 246: 67 p.; 3 app.; 28 figures

Howorth, R. 1997. A review of non-living resources and threats in the Pacific region: prepred for consideration by the Regional Task Force established to guide the development of a strategic action program for the international waters focal area of the GEF. SOPAC Technical Report 247: 56 p.

Burke, E., Ricci, G. 1997. Comment on the groundwater resources, surface water resources and water supply of Rarotonga, Cook Islands: report of a visit, including field investigations: 13-21 November 1996. SOPAC Technical Report 248: 44 p.

Smith, R. 1997. Seismic investigation, proposed new Rewa bridge site, Viti Levu, Fiji. SOPAC Technical Report 249: 17 p.

Solomon, S. 1997. Assessment of the vulnerability of Betio (South Tarawa, Kiribati) to accelerated sea level rise. SOPAC Technical Report 251: 67 p.

Lodge, M. 1997. Regional coordination of Law of the Sea issues in the South Pacific: Report by the Director of SOPAC to the South Pacific Organisations Coordination Committee. SOPAC Technical Report 252: 29 p.; 4 annexes

Ioan, C., Lum, J. 1997. Soil geochemistry mobile metal ion survey on Eastern Santo, Vanuatu. SOPAC Technical Report 253

Xue, C. 1997. Coastal sedimentation erosion and management of Majuro Atoll, Republic of the Marshall Islands. SOPAC Technical Report 254: 81 p.

Preliminary Reports

Woodward, P., Howorth, R. 1997. Beach monitoring in Dud and Laura, Majuro Atoll, Republic of the Marshall Islands. SOPAC Preliminary Report 88: 10 p.; 2 annexes

Kroenke, L.W., Woodward, P., Smith, R. 1997. South Pacific Applied Geoscience Commission shallow-water bathymetry database. SOPAC Preliminary Report 89: 34 p.

Miscellaneous Reports

Allinson, L. 1997. Pacific Sustainable Development Network Programme Phase 2. SOPAC Miscellaneous Report 242: 32 p.

Allinson, L. 1997. Information system requirements of the International Seabed Authority, Kingston, Jamaica. SOPAC Miscellaneous Report 243: 25 p.

Burke, E. 1997. Water Supply and Sanitation Collaborative Council Small Island Development States (SIDS) Working Group Meeting on water held at the SOPAC Secretariat, Suva, Fiji. SOPAC Miscellaneous Report 244: 32 p.; 6 attachments

Howorth, R., Elaise, A. 1997. Workshop on Volcanic Hazards and Emergency Management in the Southwest Pacific, 24-28 February 1997. SOPAC Miscellaneous Report 245: 26 p.

Bukarau, L., Atauea, N. 1997. Workshop on a public awareness campaign on Kiribati coastal erosion problems, 17-21 March 1997. SOPAC Miscellaneous Report 246: 43 p.

Edward, A., Hellan, E., Smith, R., Howorth, R. 1997. Pohnpei lagoon dredging: strategy for developing a work program to assist with the development of guidelines and legislation. SOPAC Miscellaneous Report 247: 12 p.; 2 figs.

Allinson, L. 1997. Proposal to implement the Pohnpei Environmental Protection Agency Geographic Information System (PEPA -IS). SOPAC Miscellaneous Report 248: 6 p.; 2 attachments

Depledge, D. 1997. Waterless composting toilets - some thoughts on their design in tropical islands. SOPAC Miscellaneous Report 249: 30 p.

Scholzel, H. 1997. SOPAC workshop on photo-voltaic pumping (PVP) - systems. Suva, Republic of Fiji, 21-23 May 1997. SOPAC Miscellaneous Report 251: 56 p.; 9 app.; 3 tables; 2 figs.

Burke, E. 1997. Water demand management and conservation in the Pacific region. SOPAC Miscellaneous Report 252.

Scholzel, H. 1997. Sub-regional workshop on wind energy utilisation. 23-27 June. Suva, Fiji. SOPAC Miscellaneous Report 253: 11 p.; 4 app.

Allinson, L. (et al) 1997. IT-PACNET 97: Regional Information Technology Strategies Meeting 1997. 22-24 April 1997. SOPAC Miscellaneous Report 254: 26 p.; 8 app.

Martin, F. [1997]. Fiji INTERNET Group developments: the virtual library. SOPAC Miscellaneous Report 255: 7 p.

Martin, F. 1997. POLYDAT: Poly-Metallic nodules GIS. SOPAC Miscellaneous Report 256: 46 p.

Forstreuter, W. 1997. Pacific Regional Energy Programme: GIS for power utilities: summary report. SOPAC Miscellaneous Report 257

Howorth, R. 1997. SOPAC's experiences in geohazards over the past 25 years. Paper presented at the Natural Disasters Session of the Pacific Science Inter-Congress, 13-19 July 1997, Suva, Fiji. SOPAC Miscellaneous Report 258: 17 p.

1997. Report of the Interim Standing Committee to Council. SOPAC Miscellaneous Report 262: 30 p.

Crook, K.A., Howorth, R. 1997. Abstracts of papers presented at the STAR Session 1997. SOPAC Miscellaneous Report 263

Hautefeuille, B. 1997. Internet via peacesat test. SOPAC Miscellaneous Report 264: 8 p.

Allinson, L. 1997. Internet access and pricing in Fiji (initiatives for small island states). SOPAC Miscellaneous Report 266: 7 p.

Martin, F., Allinson, L. 1997. Report on the information system, Regional Office, UNDP, Suva, Fiji. SOPAC Miscellaneous Report 267: 4 p.; 3 attachments

Burke, E. 1997. Pacific Power Association Steering Committee held at SOAPC Secretariat, Suva, Fiji, 21 November 1997. SOPAC Miscellaneous Report 268; PWA Committee Report 1

Martin, F. 1997. VSAT Internet Service for the Pacific. SOPAC Miscellaneous Report 270: 6 p.

Martin, F., Allinson, L. 1997. Report on the inforamtion system: Regional Right Resources Team, Suva, Fiji. SOPAC Miscellaneous Report 273: 4 p.; 2 attach.

Burke, E., Simpson, A. 1997. Water Supply and Sanitation Collaborative Council: 4th Global Forum: water and sanitation for all, Manila, Phillipines, 3-7 November 1997. SOPAC Miscellaneous Report 274: 9 p.; 7 attachments

Scott, D. 1997. Water and sanitation sector development assistance visit to the Solomon Islands, 25 November - 9 December 1997. SOPAC Miscellaneous Report 275: 21 p.

Forbes, D.L., Solomon, S.M. 1997. Approaches to vulnerability assessment on Pacific island coasts: examples from Southeast Viti Levu (Fiji) and South Tarawa (Kiribati). SOPAC Miscellaneous Report 277: 21 p.

Hautefeuille, B. 1997. Government of Tuvalu Wide Area and Local Area Computer Network specifications. SOPAC Miscellaneous Report 283: 26 p.: 6 app.

Joint Contributions

Japan International Cooperation Agency (JICA), Metal Mining Agency of Japan (MMAJ) 1997. Report on the cooperative study project on the Deepsea Mineral Resources in selected offshore areas of the SOPAC region (volume 2) sea area of the Republic of the Marshall Islands. JICA. [s.l.]. Deepsea Mineral Resources in Selected Offshore Areas of the SOPAC Region 2 (SOPAC Joint Contribution. 114).

Asian Development Bank (ADB) 1996. Sanitation and public health project: Republic of Kiribati. Addendum: Temaiku Passage reopening. scoping study. November 1996. Royds Consulting Ltd. [s.l.]: 23 p. (SOPAC Joint Contribution. 115). Note: Report prepared by Royds Consulting Ltd in association with KPMG Peat Marwick (NZ), Kalo Benki & Associates; prepared for ADB, Philippines.

Intergovernmental Oceanographic Commission (IOC), SOPAC 1997. Marine benthic habitats and their living resources: monitoring and application to Pacific Island countries: final report from the conference held in Noumea, New Caledonia: 10-14 November 1997.: 53 p. (SOPAC Joint Contribution. 116)

SPREP, SOPAC 1998. Tuvalu solid waste management plan. Opus International Consultants Limited, [s.l.]: 32 p. (SOPAC Joint Contribution. 118)

MAPS

SOPAC Coastal Map Series

Tappin, D.R., Sallenger, A.H. 1997. Coastal Morphology of Tonga – Tongatapu. Scale 1: 10 000. SOPAC Coastal Series Map 10.

Xue, C. 1997. Coastal Geology of Marshall Islands – Majuro. Scale 1:10 000. SOPAC Coastal Series Map 11 (4 sheets).

OTHERS

8 Trip reports

Appendix 2: Secretariat Staff List (as at 31 December 1997)

SECTIONS	NAME	COUNTRY OF ORIGIN	DATE JOINED	CONTRACT START	CONTRACT END
MINERALS PROGRAM					
1 Marine Geologist	Robert Smith	Australia	Oct 88	Jul 96	Jun 98
2 Marine Geologist	Jackson Lum	Fiji	Nov 92	Nov 95	Nov 98
3 Chief Cartographer	Phil Woodward	Australia	Aug 88	Aug 94	Jul 97
4 Offshore Geologist	Takeshi Ogitsu	Japan	Sep 96	Sept 96	Sept 98
5 Resource Economist	Helena McLeod	UK	Oct 97	Oct 97	Oct 98
6 Program Assistant	Litia Waradi	Fiji	Apr 89	Jan 91	Permanent
HYDROCARBONS PROGRAM					
7 Petroleum Coordinator	vacant				
8 Petroleum Geophysicist	vacant				
9 Data Manager	Peter Butler(P/time)	Australia			
COASTAL MANAGEMENT & GEOHAZARDS PROGRAM					
10 Coastal Geologist	recruiting				
11 Coastal Geologist	Xue Chunting	China	Sept 94	Sept 95	Sept 98
12 Aggregate Geologist	Graham Shorten	Australia	Oct 95	Oct 95	Oct 98
COASTAL MAPPING PROGRAM					
13 Mapping Geologist	vacant				
14 Computer Geologist	Olivier Duperray	France	Jan 98	Jan 98	Jan 99
15 Computer Operator	Bougainville Toloi	Fiji	Jan 88	Permanent	-
OFFSHORE MAPPING PROGRAM					
16 Offshore Coordinator	vacant				
WATER RESOURCES PROGRAM					
17 Project Manager	Ed Burke	New Zealand	Dec 94	Dec 94	Dec 98
18 Hydrogeologist	David Scott	New Zealand	Jul 97	Jul 97	Jul 98
19 Associate Expert/Engineer	Harald Schoëlzel	Germany	Mar 97	Mar 97	Mar 99
20 Assoc Expert/Hydrogeologist	Giovanni Ricci	Italy	Oct 96	Oct 96	Oct 97
HUMAN RESOURCE DEVELOPMENT PROGRAM					
21 Dist.Education/Trg Coordinator	Andrew Butcher	United Kingdom	Feb 97	Feb 97	Feb 99
22 Assistant Training Coordinator	vacant				
23 Program Assistant	Anna Elaise	Fiji	Jul 90	Nov 90	Permanent
REGIONAL DATA CENTRE PROGRAM					
24 Information Tech. Manager	Les Allinson	Australia	Nov 92	Nov 95	Nov 98
25 Database Development Officer	Franck Martin	France	Sep 93	Apr 97	Apr 99
INFORMATION SERVICES PROGRAM					
26 Publications Coordinator	Lala Bukarau	Fiji	Nov 85	Oct 94	Sep 98
27 Technical Editor	Russell Howorth	New Zealand	Nov 86	Feb 97	Jul 98
28 Librarian	vacant				
29 Draftsman	vacant	Fiji	Jul 92	Permanent	-
30 Personal/Offshore Assistant	Laisa Baravilala	Fiji	Jul 87	Permanent	
31 Library/Program Assistant	Sunita Prasad	Fiji	May 89	Jan 91	Permanent
FIELD SUPPORT SERVICES PROGRAM					
32 Senior Electronics Technician	Simon Young	Fiji	Jan 93	Jan 96	Jan 99
33 Electronics Technician	Peni Musunamasi	Fiji	Jun 89	July 92	Permanent
34 Marine Mechanic	vacant				
35 Workshop Assistant	Setareki Ratu	Fiji	Oct 86	Permanent	-
36 Technical Support Assistant	Graeme Frost	Fiji	Mar 92	Mar 96	Permanent
37 Senior Geology Technician	Sekove Motuiwaca	Fiji	Apr 80	July 92	Permanent
MANAGEMENT PROGRAM					
38 Director	Philipp Muller	Samoa	Jan 92	Jan 92	Jan 98
39 Deputy Director	Alfred Simpson	Fiji	Feb 95	Feb 95	Jan 98
40 Finance & Admin. Controller	Umar Farook	Fiji	Apr 91	Apr 94	Apr 98
41 Personal/Travel Assistant	Lavenia Kamali	Fiji	Mar 89	Jan 91	Permanent
FINANCE & ADMINISTRATION PROGRAM					
42 Accountant	Mohinish Kumar	Fiji	Mar 95	Mar 95	Mar 98
43 Administrative Assistant	Nazmeen Whippy	Fiji	Jul 86	Permanent	-
44 Assistant Accountant	Atesh Narayan	Fiji	Jan 93	Permanent	-
45 Secretary/Clerk	Annette Warbrooke	Fiji	Oct 90	Permanent	-
46 Registry Clerk	vacant				
47 Receptionist/Clerk	Unaisi Bainiloga	Fiji	Feb 87	Permanent	-
48 Driver/Clerk	Enele Gaunavou	Fiji	Jul 88	Permanent	-
49 Office Assistant Cleaner	Niu Daurewa	Fiji	Sep 87	Permanent	
PROGRAM COORDINATION PROGRAM					
48 Special Fund Coordinator	vacant				

Appendix 3: 1997 Revised Budget and 1998 Approved Budget

Summary of Anticipated Income (Including in-kind support contribution) and Expenditure by Programs

	1997 Revised Budget F$	1998 Approved Budget F$
PROGRAM HEADS		
Resource Development Program	1,169,428	2,325,000
Environmental Science Program	789,050	1,082,000
National Capacity Development Program	1,191,965	1,032,500
Corporate Services Program	1,009,000	758,000
Work Program Management Program	97,000	222,000
TOTAL	**4,256,443**	**5,419,500**

Appendix 4: Governing Council Press Release at the 25th Anniversary Session

Mr Bhaskar Rao, Chairman of the Annual Session of the SOPAC Governing Council and National Representative for Fiji, reported from Nadi that the meeting was a tremendous success ensuring a bright future for SOPAC.

The Governing Council reaffirmed its support for the work of SOPAC and recognised the importance of the technical support and services provided by SOPAC in underpinning the economic and social development of island member countries. Such support and services were essential for planning the development and management of their natural resources and for the protection of national assets. Council provided clear confirmation of its support by agreeing to significantly increase the member countries' financial support for SOPAC's work program.

International and regional scientists and engineers reviewed recent advances in geosciences in the South Pacific and the SOPAC future work program. The fundamental importance of freshwater was emphasised and SOPAC's strategic role as regional coordinator in the sector was recognised. Donors and supporting countries and institutions present indicated their support. New Zealand in particular expressed hope that it would be possible to consider additional support for essential projects in the water sector. Scientists promoted recommendations relating to a wide range of issues including exploration for new offshore aggregate resources, deep-sea mineral exploration, hazard assessment and national capacity development.

All SOPAC member countries were represented as follows: Australia, Cook Islands, Federated States of Micronesia, Fiji, Guam, Kiribati, Marshall Islands, New Zealand, Niue, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu. Associate member New Caledonia attended as well as observers from Canada, France, Japan, China, Korea, UK and the USA. The 26th Annual Session is celebrating SOPAC's 25 years of service to the region and this will be marked by the Anniversary Dinner.

Following a year of intensive review the future role of SOPAC now appears secure with a sharper focus on its work programs and the promise of additional support from member and supporting countries and institutions.

The Chairman took the opportunity to thank Mr Philipp Muller, the outgoing SOPAC Director, for his outstanding service to SOPAC and the region over the last six years and wished him well for the future. He congratulated the incoming Director, Mr Alf Simpson, on his appointment and looked forward to working closely with him and SOPAC over the next year.

Appendix 5: Some Abbreviations used in this Report

APEC	-	Asian-Pacific Economic Commission
CTD	-	Conductivity, Temperature and Depth
GIS	-	Geographic Information System
ESCAP	-	Economic and Social Commission for Asia and the Pacific
ESMG	-	Earth Science and Marine Geology Course
GEBCO	-	General Bathymetric Chart of the Oceans
GPS	-	Global Positioning System
IOC	-	Intergovernmental Oceanographic Commission (of UNESCO, Paris)
ISA	-	International Seabed Authority
JAMSTEC	-	Japan Marine Science and Technology Center
LAN	-	Local Area Network
MMAJ	-	Metal Mining Agency of Japan
PABX	-	Private Area Branch Exchange
PEACESAT	-	Pan-Pacific Education and Communications Experiment by Satellite
SIDS	-	Small Island Developing States
SOPAC	-	South Pacific Applied Geoscience Commission
SPACHEE	-	South Pacific Action Committee for Human Ecology and Environment
SPC	-	Secretariat of the Pacific Community
SPOCC	-	South Pacific Organisations Coordinating Committee
SPREP	-	South Pacific Regional Environmental Program
TRITON	-	Triangle Trans-Ocean Buoy Network
UNDHA/SPPO	-	United Nations Department of Humanitarian Affairs/South Pacific Program Office
UNESCO	-	United Nations Educational Scientific and Cultural Organisation
WAN	-	Wide Area Network