

APPENDIX 7

Summary Report of STAR

The STAR Meeting held in conjunction with the 25th Annual Session of the SOPAC Governing Council included 31 scientific papers presented orally, by poster, or by abstract (SOPAC Miscellaneous Report 237).

Keith Crook, the Chair of STAR welcomed participants.

Saimone Helu was re-elected as Vice Chair of STAR to serve until the end of the next Annual Session.

Some unprioritised highlights of scientific presentations made during the STAR sessions are noted below.

The Meeting recommended that TAG, in its consideration of the STAR Report agree that highlights of the STAR presentations and recommendations from Working Groups be included directly into the TAG report, under appropriate work program sections, for the benefit of Governing Council.

- The work of John Collen and Stephen Eagar on the contribution of foraminifera and other organisms to the supply of carbonate sands and gravels in tropical islands, is particularly notable both for its fundamental and innovative scientific contributions, and for its practical relevance to understanding the origins, movement and supply of sediment in low island coasts and lagoons. Additional work of this kind should be encouraged.
- The accuracy, reliability and utility of the satellite methods of lagoon bathymetric mapping described by Yann Morel, offers SOPAC and its member countries a way to make a significant contribution to the International Coral Reef Initiative (ICRI), donor-funding permitting. Data of this type are a basic prerequisite to assessment of the extent and health of coral reefs, and the management of coastal resources.
- Studies of the consequences of beach mining presented to STAR, lead convincingly to the conclusion that, in most studied cases, beach mining is unsustainable in the medium term, and that its direct and indirect consequences may eventually require costly remedial action. Exploitation of shelf or lagoon sand deposits, accumulated during lower stands of sea level, should be adopted as an alternative to beach mining.
- In the late 1970s and 1980s, SOPAC's deepsea minerals program was responsible for pioneering discoveries of seabed mineral occurrences and preliminary resource assessments. SOPAC also stimulated academic research that led to many additional discoveries of mineral occurrences. Papers presented to STAR showed that this process is continuing. Furthermore, SOPAC programs have served as a "pump-primer", moving this field forward from the stages of discovery and preliminary assessment of mineral deposits, to the stage of systematic resources assessment programs, such as those being undertaken by MMAJ in conjunction with SOPAC. Yoshitaka Hosoi reported the results of the MMAJ survey in Tonga waters in 1995, and introduced Japanese survey technology and research and development on deepsea minerals, and their strategy.
- The paper presented on behalf of Mike Bevis illustrated a very wide variety of applications of advances in differential GPS and advances in continuous GPS, many of which are applicable in the SOPAC region. Continuous GPS stations installed for scientific research purposes can, if properly maintained, serve as a very valuable resource for island nations. Precise mapping, precise location at sea, measurements of absolute vertical motions of coastal areas, and integrated GPS-GIS inventories are examples. The installation and maintenance of continuous GPS stations in the SOPAC region should be extended.
- AGSO activities in various aspects of hazards geoscience, presented by Wally Johnson, are of significant interest to the SOPAC region. The emphasis on vulnerability, and the need to combine social science and natural science inputs in devising responses to IDNDR, are important general aspects. Specific aspects, that SOPAC should note, include:

(a) the possibility of collaboration between the Pacific Geo CitiPlan and AGSO's Cities Project; and

(b) the relevance and advantages to the region of building relationships with volcano monitoring and hazard mitigation authorities in Philippines and Indonesia. This could be initiated during the SOPAC-IAVCEI/WOVO volcanological workshop, being planned for 1997.

- Paul Taylor's poster on the Tofua Volcanic Arc emphasised the occurrence of volcanic processes and the associated hazards in Tonga.
- Kazuhiro Kojima's contribution on MMAJ's studies of recovery of metals from seabed nodules by smelting, prompted questions about utilisation of the resulting slag. Studies to utilise the tailings from other recovery methods are in progress, in Hawaii and elsewhere. Comparable studies are warranted on the utilisation of slag.
- Tetsuo Yamazaki's paper on the design of mining equipment for cobalt-rich manganese crusts highlighted the need for information on the nature and extent of substrates in crust-covered areas. Swath-mapping data need to be acquired as part of this information.
- Another aspect of manganese crust deposits is the potential impacts of disturbance on benthic fauna and fisheries. Habitat studies of the kinds envisaged by the STAR Habitat Working Group should be undertaken both before and after disturbance of any proposed test-mining sites. Carefully designed disturbance studies, that simulate effects of crust mining are warranted. These would be analogous to the study of planned disturbance of manganese nodule fields, referred to in Ulrich von Stackelberg's paper.
- The two presentations on marine rockfish habitats by Gary Greene and Gregor Cailliet and the poster by Tory O'Connell, based principally on data from Alaska and the US West Coast, highlighted the synergy arising from joint studies by marine geologists and benthic biologists. This work has important implications for the SOPAC region, that are further explored in the report of the Habitat Working Group.
- Philomene Verlaan's paper, on the implications of new seabed mapping technology and data sets to establishing territorial claims under the LOS Convention, is particularly relevant to several of SOPAC's island member states. It discussed the probable admissibility of outer shelf claims based on the prolongation of submarine ridges that are not continental in character.
- Loren Kroenke's analysis of spreading fabric in the Ellice Basin demonstrated the uses of satellite-derived gravity data to identify new research targets in sparsely surveyed offshore areas. Such data may also reveal previously unrecognised seamounts.
- Discussion of David Tappin's presentation of ODP Proposal 451 for drilling in the Tonga Forearc led to a recognition of the potential relevance of this project to the further assessment of the hydrocarbon potential of Tonga, and of Viti Levu, Fiji. This potential has been enhanced by discoveries in New Caledonia, described in a poster by Yves Lafoy and colleagues. The three areas were originally contiguous.
- A highlight of Don Montgomery's summary of future airborne and satellite radar surveys was the availability, by the year 2000, of digital topographic data, accurate to 5m elevation with 30m pixels, covering the planet from 60°N to 60°S. This will greatly facilitate the integration and management of combined land and seabed datasets in the SOPAC region.
- Than Aung's presentation on SW Pacific tsunamis and sea-level monitoring highlighted the need for long-term records for accurate assessment of the sea level trends of individual stations. It also demonstrated real-time measurements of small (<50cm) tsunamis at various stations. Discussion focused on the level of tsunami risk in the SOPAC region, arising from large trans-Pacific tsunamigenic earthquakes. Further work, including study of historic tsunami records from the region, will be required before agreement can be reached.
- Mike Cruickshank's overview "Waterworld – a 21st Century reality?" provided a perspective of our planet that differed radically from the conventional land-based one: Earth, as seen from the oceans, is now a reality, as a result of new technology. From this perspective, the need for acquisition of comprehensive data on the seabed was given.
- Results of the 1995 (France-Japan-Australia and Canada) New STARMER cruise, outlined by Jean-Marie Auzende, have improved our understanding of several hydrothermal sites and deposits in the Manus Basin, Papua New

Guinea, some of which have yielded very high values of gold. Indications of new hydrothermal sites on Munkalin axial volcano require further exploration. This is scheduled to take place later this year.

- Posters by Peter Halbach and colleagues and Steffan Richter and colleagues demonstrated further additions to our knowledge of seafloor hydrothermal mineral deposits in the SOPAC region, and new techniques for their investigation.
- Studies of manganese crusts near Tasmania, presented by Neville Exon, indicate that they have accumulated rapidly and may have some potential as a metals resource. One may speculate that they may also carry signals of oceanographic change; and this aspect may be relevant to studies of metaliferous crusts in the SOPAC region.
- Various posters by Geological Survey of Canada authors, (which are not listed in the SOPAC Miscellaneous Report 237), provided startling illustrations of the data-gathering capabilities of shallow-water swath-mapping systems and of the diverse interpretations that can be derived from these data. Data of this type are particularly relevant to the management of shallow-water areas in Pacific Island Countries.

During the 25th Annual Session, the following STAR Working Groups met, and their reports are included below.

- Geological Hazards (Tsunami Warnings); co-Chairs: Paul Taylor; Gajendra Prasad (who did not attend)
- Tectonics; co-Chairs: Loren Kroenke; Stevie Nion (who did not attend)
- Ocean Basin Mineral Resources and Technology; co-Chairs: Mike Cruickshank; Tevita Vuibau
- Habitat; co-Chairs: Gary Greene; Ian Wright (who did not attend)

In addition the following Working Groups, with co-Chairs as indicated, did not meet. They may resume work not later than three months before the next Annual Session or earlier as circumstances require.

- Law of the Sea (Lindsay Parson, Grant Boyes)
- Information Exchange (Hervé Dropsy, Bruce Davies)
- Seafloor Mapping (Chuck Helsley, Yves Lafoy)

- Coastal and Nearshore Resources and Processes (Graham Shorten, Naomi Atauea)
- Ocean Drilling (Gary Greene, Rowena Duckworth)
- Hydrocarbons (Neville Exon, Donn Tolia)
- Geodesy and Precise Navigation (Mike Bevis, Barma Nand)

STAR GEOHAZARDS WORKING GROUP

Participants

Paul Taylor (Chair)
 Trevor Sankey (Rapporteur)
 Anne Felton Wally Johnson
 Atunaisa Kaloumaira Siyuan Malolo
 Steven Solomon Stanley Temakon

Although the Working Group was set up in 1995 with a particular emphasis on tsunami warning, the Working Group agreed that all geoscience aspects of natural hazards should be included, and recommended that it be known simply as the STAR Geohazards Working Group.

The Working Group noted the plans for SOPAC to organise a SOPAC-IAVCEI/WOVO Workshop on Volcanic Hazards and Emergency Management in the Southwest Pacific, in Port Vila, Vanuatu, 24-28 February 1997. The Working Group warmly supported this, and endorsed its focus only on emergencies directly related to volcanism. The Working Group stressed that the workshop concentrate on practical needs of SOPAC member countries, particularly for effective assessment and monitoring of volcanic hazards.

The Working Group expressed concern that the absence of a strategic approach to the collection of digital datasets on geological hazards (and related community-vulnerability characteristics) might lead to unnecessary redundancy and incompatibility in data collection and content. The Working Group recommended that the SOPAC Secretariat liaise with other bodies working on geohazards in the Pacific to coordinate data collection and encourage sharing of data, in order to obtain the maximum benefit from the effort put in.

The Working Group was pleased to note the volcano safety recommendations put forward by IAVCEI, and suggested that SOPAC member countries bring these to the attention of all persons visiting active volcanoes and strongly encouraged compliance.

The UNESCO representative sought the views of the Working Group on the use of US\$5200 available (subject to confirmation) in 1997 for training in natural disaster reduction. Noting that the SOPAC-IAVCEI/WOVO Workshop would contribute to training, the Working Group suggested that if the workshop has a funding shortfall, the UNESCO funding should be given to it. If sufficient funds are obtained from other sources, the UNESCO funding could be held over towards other geohazard-related training needs to be determined in consultation with the SOPAC Secretariat.

The UNESCO representative informed the Working Group that for 1998-1999 the Apia Office had proposed a high-profile project on "Youth Leadership for a Culture of Peace in the Pacific. A youth forum "Growing up in a World of Change" would bring together youth representatives and eminent personalities and would be followed by national youth gatherings and the production of a video. As the need for public awareness of all sections of the community has been repeatedly emphasised, UNESCO proposes to use 1998-1999 funding to include disaster reduction in this exercise. The whole project will work closely with existing youth structures such as the Commonwealth Youth Program, and with UNDHA and SOPAC for the disaster reduction part. The Working Group welcomed this innovative approach and noted that it would complement other disaster awareness programs.

The SOEST representative informed the Working Group that multi-disciplinary studies of submarine landslides and tsunamis are being initiated in SOEST; information will be circulated to the Working Group.

The Commonwealth Science Council representative informed the Working Group that they are going to support a proposal from Victoria University of Wellington, New Zealand to set up a centre to disseminate information on seismic hazard mitigation for non-engineered structures.

STAR OCEAN BASIN MINERALS AND TECHNOLOGY WORKING GROUP

Participants

Michael Cruickshank (Co-Chair)	
Tevita Vuibau (Co-Chair)	
Jackson Lum	Kazuhiro Kojima
Robert Smith	Yoshitaka Hosoi
Tetsuo Yamazaki	Takeshi Ogitsu

Stuart Kingan	Jacquie Evans
Ulrich von Stackelberg	Gary Greene

The Working Group met and formulated the following recommendations.

- SOPAC encourage donor and cooperating countries to continue their very excellent efforts in the study of deepsea minerals in the SOPAC region.
- SOPAC express appreciation to all those countries who have been involved in these outstanding efforts.
- SOPAC strongly encourage future deepsea mineral studies in the region to include simultaneous examination of biological and physical systems in the study area.
- SOPAC note Japan's offer to interested countries to acquire selected components of the Japanese mining system following Japan's mining system test of June 1997.
- SOPAC consider the invitation of Japan that future pilot mining tests may take place in SOPAC member countries EEZ with their cooperation.
- SOPAC strongly encourage Japan to pursue the continuance to Phase IV of the present Japan/SOPAC Deepsea Mineral Resources Survey Programs.
- SOPAC strongly encourage the continuance of minerals cruises by donor and cooperating nations noting that Germany has scheduled three cruises of the RV Sonne beginning early 1998 in the SOPAC region, and that Japan has similarly scheduled in 1997 a cruise to Micronesia, in 1998 to Micronesia and Marshall Islands, and in 1999 to Fiji.
- SOPAC continues the deepsea minerals database development and mapping activities and incorporate all new data and information as acquired.

STAR TECTONICS WORKING GROUP

Participants

Loren W. Kroenke (Chair)	
Jean-Marie Auzende	Keith Crook
Neville Exon	Anne Felton
Gary Greene	Saimone Helu
Uilou Samani	Robert Smith
Dave Tappin	

The Tectonics Working Group reviewed progress on previous recommendations, work in progress, and suggested new lines of geological/geophysical investigations that might have an impact on SOPAC member countries' development. In this regard the Working Group encouraged member country representatives, as well as other interested scientists to participate in discussions on regional tectonic problems that may ultimately be relevant to resource assessment, geohazards, territorial claims, and resource management.

Ongoing and Recently Completed Research

The Working Group was informed that French teams from IFREMER, INSU, and ORSTOM are continuing their studies of back-arc basin spreading systems in close cooperation with teams working nearby onland, studying arc volcanism, seismicity, and relative motion with the GPS. Over the past several years, this research has focused on two main areas. In the North Fiji Basin, the NOFI cruise (1994) was devoted to the study of the northern part of the spreading system of the NFB and its relationship to the NFFZ and the Lau Basin. The HYFIFLUX cruise was devoted to the qualitative and quantitative evaluation of hydrothermal deposits at the 16° 50'S triple junction of the NFB in relation to fracture and fissure development. The French partners in these cruises are respectively, Japan in the framework of the New STARMER Project and Germany in the framework of the HYFIFLUX Project. In the Manus Basin, the Manus Flux cruise (1995) and the planned Manus Flux II (BioAccess) cruise (November 1996) both have the goal of studying the spreading system and the associated processes in the Manus Basin. The French partner in this cruise is Japan in the framework of the New STARMER Project. The Working Group welcomed the news of the continuation of these studies and expressed the hope that they would continue.

The Working Group noted the undertaking of the Boomerang 8 cruise, on the RV Melville, during which the Tonga Ridge was surveyed in support of the proposed ODP drilling proposal 451. The scientific focus of the cruise was on the dynamics of extensional convergent margins and the origin of supra-subduction zone ophiolites. The preliminary results of the cruise will be presented at AGU in December.

The Working Group heard with interest that a major cruise was undertaken late in 1995 that was relevant to the initiative proposed last year entitled "Evolution of the Melanesian Border-

land Collision Zone" (focussing on fundamental tectonic processes ranging from those involved in the early stages of the initiation of subduction, through commencement of back-arc basin formation, to obduction of immense thrust sheets). During this cruise, MCS and OBS surveys were undertaken on board the RV Ewing over the southeastern-most edge of the Ontong Java High Plateau, concentrating on the Malaita Anticlinorium. The Working Group looked forward to the presentation of results from these surveys that is scheduled for the 1996 Fall AGU Meeting in San Francisco.

Assessing the Potential for Petroleum in Tonga and Fiji by Backtracking Allocthonous Accreted Terrains

Noting the inclusion of a poster on petroleum potential in New Caledonia, (including the discovery of oil seeps), the Working Group was informed that plate tectonic reconstructions in the hotspot frame of reference might provide some insight into the source and origin of petroleum seeps reported to occur in some SOPAC member countries. The group heard that, following a major change in Pacific and I-A plate motions and initiation of southward subduction along the Melanesian (Manus-North Solomon Island-Vitiaz) Trench at ~43 Ma, much of the New Caledonia volcanic arc and backarc was detached from the northern side of New Caledonia and began to move eastward into the South Fiji Basin, driven by ongoing Loyalty Basin spreading. From 40 to 27 Ma, spreading in the South Fiji Basin, presumed to be continuous with spreading in the Loyalty Basin, caused the continued eastward displacement of 'Eua across the South Fiji Basin into the proto-Tonga Forearc. At 27 Ma, a change occurred in I-A plate motion that coincided with the onset of subduction along the proto-Tonga-Kermadec and Trobriand trenches. At 25 Ma spreading ended in the South Fiji Basin, and volcanism began along the Lau-Colville (proto-Tonga-Kermadec) Arc. From 25 to 10 Ma, convergent motion was accommodated along the proto-Tonga-Kermadec and Trobriand trenches, presumably joined by a long transform fault that extended from the northeastern end of the Trobriand Trench to the northern end of the proto-Tonga Trench. At 10 Ma, Trobriand subduction ended, South Solomon (New Britain, San Cristobal, New Hebrides) Arc volcanism began, and spreading was initiated in the North Fiji Basin. North Fiji Basin spreading appears to have been quite complicated. As basin dilation began at 10 Ma, half of the Fiji Platform (Viti Levu) was attached to the Vitiaz Arc on

the Pacific Plate. From 10 to 7 Ma, the New Hebrides Arc moved to the southwest. Toward the end of this period (~8 Ma), Fiji also began to move with the rest of the New Hebrides Arc. Just before 7 Ma, the other half of the Fiji Platform (Vanua Levu) formed, and clockwise rotation of the New Hebrides Arc was initiated as the Central North Fiji Basin (CNFB) triple junction developed. Once initiated, this rotation continued to the present. Between 6 and 5 Ma, Viti Levu, Fiji collided with the northern end of the Tonga Arc and the Fiji Platform was split-off from the New Hebrides Arc by the southern limb of the CNFB triple junction. During this collision a fragment of the 'Eua Ridge, then residing in the Tonga Forearc, was probably transferred to Viti Levu.

In view of the portrayal of these events the Working Group considered that back-tracking of allochthonous terrains through plate tectonic reconstructions might be a viable method for helping in the assessment of petroleum potential in Tonga and Fiji. Accordingly, the Group recommended that a concerted effort be made to refine and improve these reconstructions through refinement of the Australia and Pacific hotspot plate motion models and inclusion of new survey data and geological syntheses.

Using Satellite-Derived Gravity Data To Identify New Research Targets in Sparsely Surveyed Offshore Areas

The Working Group noted that ocean floor structure can often be deduced from satellite-derived gravity data, as well as, topography in areas where topographic data are sparse or lacking. The gravity fabric also can be overlain on existing bathymetric datasets, such as those contained in the ETOPO-5 or the GEBCO databases, to enhance topographic trends and highlight structural relationships. For example, as revealed in the satellite-derived gravity data, some intriguing structural trends appear to be present in the Lyra Basin, Ontong Java Plateau, Stewart and Ellice basins, all of which are mostly unsurveyed, as well as most of the Southwest Pacific Basin east of the Tonga Kermadec Trench. The gravity and topographic fabric in these areas are strongly suggestive of previously unrecognised ocean floor spreading patterns which, if correctly identified, could provide answers to some perplexing questions regarding the tectonic development of the surrounding region. This is also true of the area bounded by the South Rennell Trough, San Cristobal Trench and New Hebrides Trench.

Considering the enormous benefit that might be accrued if small, narrowly defined, areas could be identified in which major tectonic problems might be addressed, the Group recommended that, based on satellite-derived gravity data, key areas be targeted for detailed surveying with modern bathymetric swath mapping, SCS/MCS profiling and magnetic mapping techniques.

Testing the Hypothesis of an Incipient Micronesian Trench

The modern Southwest Pacific appears to be a clutter of rifted continental fragments, abandoned arcs, and oceanic plateau. In fact, with the present-day convergent geometry, very little I-A abyssal area remains that is capable of being subducted without great difficulty. The New Britain-New Hebrides Trench appears to be in the throes of shutting down. Collision once again has occurred along northeastern Papua New Guinea. This time the Schouten Island part of the New Britain Arc has rammed into the Adelbert-Finnessterre-Saruwaged allochthon, depressed the intervening Solomon Sea Basin lithosphere (of which little is left) and reactivated a segment of the old Miocene Wewak-Trobriand subduction zone, as evidenced by the Quaternary shoshonitic volcanism in the Central and Eastern Highlands and northern Fly Platform of Papua New Guinea. To the east, hot, buoyant Woodlark Basin lithosphere is pushing into the South Solomon Forearc, shoving the volcanic arc northward and reactivating a segment of the old Oligocene North Solomon subduction zone which probably has resulted in the Pleistocene volcanism on Choiseul (Cooper and Taylor, 1985), and the recent volcanism on Savo, and is forcing the southwestern margin of the Ontong Java Plateau to fold and overthrust the southeastern Solomon Islands (i.e., the Malaita Anticlinorium of Kroenke, 1972). Further east, the West Torres Plateau is entering the north New Hebrides Trench, the D'entrecasteaux Ridge is uplifting the central New Hebrides Forearc, and the Loyalty Ridge is impinging on the south New Hebrides Trench. Indeed, there is some evidence that stress is once again being transferred northward. Intra-plate seismicity is occurring in southern Kiribati southeast of Arorae Atoll (Lay and Okal, 1983), in the central Nauru Basin around 2.5°N, 170°E and near Kosrae (Walker and McCreery, 1985), and in the vicinity of Pohnpei Island (Walker, pers. comm.). Farther to the west, the well-mapped seismicity along the northern side of the Caroline Ridge completes the circuit. This

seismicity, perhaps, may foreshadow another shift in the I-A, Pacific convergent boundary, a precursor, as it were, to the development of a new subduction zone beneath the northeastern margin of the Ontong Java Plateau. (i.e., the Micronesian Trench of Kroenke and Walker, 1986).

Albeit highly speculative, the Working Group recommended that the hypothesis of a developing or incipient Micronesian Trench be tested, in part because of the potential for increased levels of seismic activity in its vicinity and in part because of the potential for the vertical changes in seafloor relief that might accompany its development. The Working Group further recommended that a new initiative should be developed to test the hypothesis.

STAR HABITAT WORKING GROUP

Participants

Gary Greene, (Co-Chair)	
Keith Crook	Anne Felton
Julian Dashwood	Grant Boyes
Steve Solomon	Jean-Marie Auzende
Sandy Macfarlane	Dick Pickrill
Jim Eade	Bill Erb
Yann Morel	Robert Smith
Gregor Cailliet	Tory O'Connell
Tevita Vuibau	Barbara Keating
Neville Exon	Don Montgomery
Charles Helsley	

At the 1995 SOPAC Session, the U.S. Delegation briefly summarised recent marine habitat investigations, mainly funded by NOAA's National Undersea Research Program (NURP), in North America. With the support and enthusiasm of SOPAC donor and member countries alike, it was strongly recommended that a habitat workshop be organized for a future SOPAC meeting. The U.S. agreed to take the lead assisting SOPAC in developing the workshop and a preliminary plan for this workshop was drafted early 1996.

More recently, interest in the workshop has been indicated by New Zealand, Canada, France, the United Kingdom and Australia. Also, several South Pacific organisations have expressed interest, including the South Pacific Regional Environmental Program (SPREP), the South Pacific Commission Fisheries Program (SPCFP), the Forum Fisheries Agency (FFA).

Two main objectives for such a workshop have been identified. The first is to provide a synthesis of the in situ technology available to

study the benthic submarine environment. The second is to bring together geologists and biologists in studying the relationship between marine geology and living marine resources, including marine biodiversity and fisheries. The ultimate goal is technology transfer.

Biodiversity is a subject of international concern. In the marine environment, it is relatively poorly known, especially in highly diverse areas such as the South Pacific and in deep water. It is thought, however, to suffer from anthropogenic processes. To comprehensively understand this critical environmental problem, intense studies of marine habitats need to be undertaken.

Marine habitat studies are critical to understanding the processes that control biodiversity and the abundance and distribution of economically valuable living resources such as fisheries. With the decline of fisheries throughout the world, the study and understanding of habitats is important for establishing harvest refugia and management plans for these fisheries, especially in the small island states of the South Pacific.

Considering the interest and importance of habitat characterisation and biodiversity associated with geology as displayed during the Habitat Working Group meeting, and considering that SOPAC has an extensive database pertinent to characterisation of fisheries and benthic habitats and has the capability to undertake habitat characterisation studies, the Working Group recommended that SOPAC consider and investigate the possibility of using their datasets and expertise to assist South Pacific fisheries organisations in habitat characterisation.

Further considering that the modules of the Gold Ocean Observing System (GOOS) living resources and coastal directly relate to habitat studies, the Working Group decided that development of a Marine Habitat Workshop should take place in conjunction with the Intergovernmental Oceanographic Commission. The purpose would be to enable the initiation of long-term systematic monitoring of habitats including coral reefs.

The Working Group noted that in addition to IOC involvement in the proposed Marine Habitats Workshop, other collaborative SOPAC-IOC activities in the near future might include:

- (i) GOOS Workshop: to address ocean monitoring;
- (ii) HOTO Workshop: to evaluate the capability of the South Pacific region to partici-

pate in the Health of Oceans module of GOOS

- (iii) GOOS Capacity Building Workshop: to assess the capability of PICs to participate in GOOS. This may be done in conjunction with (i) above.
- (iv) HAB Workshop: examine the occurrence and impacts of Harmful Algal Bloom (HAB) outbreaks in the South Pacific region.

The Working Group therefore recommended that SOPAC, in conjunction with IOC and with cooperation from interested fisheries and marine ecology organisations co-sponsor a workshop on fisheries habitats to take place just prior to the next SOPAC annual meeting, venue to be determined.

The Working Group suggested speakers be invited from both temperate and tropical areas who have successfully combined geophysical techniques and biological investigations. They will present summaries of their research on marine habitat characterisation and how it relates to biological associations. Talks should concentrate on habitats and living resources that are similar to those encountered in the South Pacific so that technology transfer is enhanced. To maximise benefits to workshop participants, South Pacific SPOCC organisations, (including SOPAC, FFA, SPCFP, and SPREP), should work together to assemble existing geophysical and living resource data sets for the region which would be utilized by workshop participants.

Potential funding sources were identified and included, at least the following: IOC/WESTPAC, United Kingdom (Commonwealth Fund for Technical Cooperation (CFTC)), ODA, Canada (CIDA), France (IFREMER), Sweden (SAREC), Denmark (DANIDA), Australia (AusAID), the United States (NURP, and Sea Grant).

A list of possible topics that could be covered in such a workshop were discussed and include:

FOCUSES

Lagoons and Bays
Shallow Reefs
Deep Reefs
Shelf and Slope
SeaMounts and Ridges

TECHNOLOGY AND METHODOLOGY TO ASSESS HABITATS AND RESOURCES

Geophysical Techniques (sub-bottom profiling, bathymetry, side-scan sonar, etc.)

Direct Observations (snorkling, SCUBA, DOVs, etc.)

Remote Sensing (ROVs, satellite images such as SPOT, aerial photography, etc.)

Optical Imaging (landscaping)

Hydro-Acoustics

Extractive Sampling (trawls, cores, dredges, etc.)

Physical and Chemical Oceanography (salinity, temperature, oxygen, nutrients, chlorophyll, etc.)

MANAGEMENT AND CONSERVATION OF HABITATS AND RESOURCES

Characterisation and Quantification of Habitats

Use of Habitats by Organisms (food, shelter, movements, etc.)

Sustainability of Resources

Life History Studies of Dominant, Habitat-Specific Organisms

Effects of Natural and Anthropogenic Impacts (extraction, sedimentation, erosion, predator outbreaks, etc.)

Harvest Refugia

INTERPRETATION AND ANALYTICAL TECHNIQUES

Geographical Information Systems (GIS)
Computer Interfacing and Analysis
Mathematical Modelling
Visualisation Techniques
Environmental Impact Analyses

REPORT AND PROPOSAL WRITING

Write Report of Workshop
Write Proposal to Initiate Work from Workshop
Evaluate Funding for Future Work
Submit to Sponsors