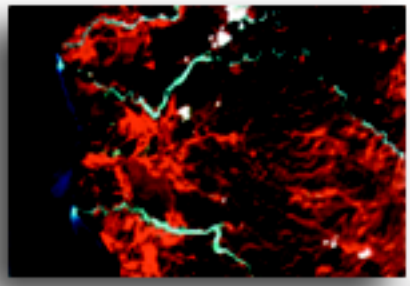
SOPAC

COUNTRY PROFILE



PNG

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SOPAC

PNG COUNTRY PROFILE

Our Vision

The improved health, well being and safety of the Pacific and its peoples

The South Pacific Applied Geoscience Commission (SOPAC) is an independent, intergovernmental, regional organisation established by South Pacific nations in 1972, and dedicated to providing geotechnical services to the countries it serves. Its Secretariat is located in Suva, Fiji, and has about 40 professional and support staff.

SOPAC's work for its member countries focusses on three key areas; resource development; environmental geoscience; and national capacity development in the geosciences. To effectively deliver these services SOPAC maintains a regional data centre, provides information services, and offers technical and field services for specific project work.

THIS COUNTRY PROFILE WAS PRODUCED TO PROVIDE A SNAPSHOT OF THE CURRENT ISSUES FACED BY THE COUNTRY AND SOPAC'S ROLE IN ASSISTING COUNTRIES TO ACHIEVE SUSTAINABLE DEVELOPMENT

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PNG COUNTRY PROFILE

Papua New Guinea : Our Future

"Meeting the challenge of sustainable development across all the facets of the environment and economy is the central concern of Forum island members. This includes, but is not confined to, integrated island management, increased emphasis on establishing baseline databases, higher priority for training, education and public awareness, development of both off-shore and in-shore resources management, implementing pollution and waste management programmes"

Mr W Noel Levi, CBE
Secretary General, South Pacific Forum Secretariat. (1999)

Capital:	*Port Moresby*
Population:	*4 692 400 (1999 est.)*
Land Area:	*462 243 sq. km*
Max. Height above Sea-level:	*4697 m (Mt Wilhelm)*
Geography:	*Largely volcanic high islands; land area includes the eastern half of the New Guinea mainland, the Bismark Archipelago, the northernmost Solomon Islands of Bougainville and Buka & the groups of islands of the eastern most part of the mainland*
EEZ:	*3 120 000 sq. km*
Climate:	*Two seasons; the southeast trade winds season (May to October) and northwest monsoon (December to March); slight seasonal temperature variation*
Rainfall:	*Average approximately 2 000 mm per annum*
Mean Temperature:	*26°C*
Economy:	*Diverse with strong industrial, service and agricultural sectors; exports include gold, silver, copper, copra, coconut oil, palm oil, coffee, tea, cocoa, tuna, trochus, green snail, bech-de-mer, pearl shell, cultured pearls, timber products*
GDP per Capita:	*US$ 1 196 (1998 est.)*
Currency:	*Kina*
Energy Sources:	*Biomass, hydro, solar, geothermal, wind*
Freshwater Sources:	*Groundwater, rainwater, surface water*
Natural Hazards:	*Cyclone, storm surge, coastal flooding, river flooding, drought, earthquake, landslide, tsunami and volcanic eruption*
Mineral Potential:	*On-land – hydrocarbons, gold, silver, copper, nickel; Offshore – polymetallic sulphides (gold, silver, copper, lead and zinc), hydrocarbons*
Languages:	*Pidgin, English plus more than 700 other languages spoken*
Government:	*Independent state and member of Commonwealth*
SOPAC Membership:	*Full member since 1971*
Country Representative:	*Secretary. Department of Mining*
	Private Mail Bag. Port Moresby Post Office
	National Capital District. Tel: (675) 321 1961
	Fax: (675) 321 7958
	Email: kuma_aua@mineral.gov.pg

Papua New Guinea

Papua New Guinea (PNG) comprises the eastern half of the New Guinea mainland, the world's largest tropical island, along with an archipelago of additional three islands and 600-odd lesser islets and atolls. It lies in the Southwest Pacific Ocean within an Exclusive Economic Zone (EEZ) of 3 120 000 sq km and has a total land area of 462 243 sq km. The islands are high islands of volcanic origin with a maximum height of 4 496 m above sea level. PNG has an extensive system of water bodies ranging from deltas, lagoons, rivers, marshes and over 5 000 lakes.

The population of Papua New Guinea was estimated at 4 692 400 in 1999[1]. It is scattered widely over the 19 provinces, with the greatest concentrations in the Highland provinces.

Situated in the southern tropics, the climate of PNG is tropical with a southeast, or trade-wind season, from May to October and the monsoon, or northwest season, from December through March. Rainfall in the country has an average of 2 000 mm per annum with wide variations in different parts of PNG, and the mean temperature is 26°C.

Primary activities such as mining and agriculture are the mainstays of the economy with mining being the major sector contributing to the export earnings of the country. Subsistence agriculture sustains a large segment of the population and provides enough for exports. These include coconut and palm products, coffee, tea, cocoa, fish and timber products.

There are several resource and environmental issues, common to island nations, affecting sustainable development in PNG. These include an array of issues from climate and sea-level variability, environmental degradation and pollution to resource management. More specific challenges to sustainable development include coastal erosion, water quality, water availability and sanitation. Sustainable management of resources such as aggregate, terrestrial and offshore minerals and renewable energy are other issues in PNG's quest for development.

Papua New Guinea is a founding member of the South Pacific Applied Geoscience Commission (SOPAC) since 1971. SOPAC is an independent, intergovernmental, regional organisation, which provides expert technical assistance, policy advice and information on the sustainable management of these natural resources. SOPAC also contributes to a variety of geoscientific training and educational opportunities at all levels to increase the country's capacity in science and resource management. Additional assistance is made by SOPAC through technical support for the establishment and maintenance of database information systems and for electronic exchange of information. Expertise in hazard assessment, disaster preparedness, mitigation and management is also provided.

Aerial view of coast of PNG

[1] SPC Demography Programme

Challenges to Sustainable Development and SOPAC's role in PNG

For developing nations, natural resource development and management holds the key to rapid economic development. Papua New Guinea is one of the largest countries in the region and its natural wealth is the main bulwark of the economy. Unwise exploitation of non-renewable resources and exploitation of renewable resources at a pace higher than the natural rate of replenishment could prove detrimental to the sustainable development plans of the country.

MINERALS

Papua New Guinea is a mineral-led economy with gold and copper being the leading export earners of the country since 1972. There are five gold and copper mines in the country with three of them being world class in size and output. The country has substantial reserves of petroleum as well. The potential for further mineral development has already been established. Offshore exploration within the EEZ of PNG has revealed the extensive presence of Polymetallic Massive Sulphides (PMS). These findings need to be further evaluated through the extension of research and exploration. In 1997, when PNG granted exploration licenses to Nautilus Corporation of Australia over the PMS deposits, it sparked off vigorous international interest in the resources of the Bismarck Sea. Papua New Guinea is developing an Offshore Mineral Development Policy to control and develop this new sector that offers immense growth potential for the nation.

Alluvial mining at Mt Kare

Mine site in PNG

SOPAC has been assisting PNG in addressing issues related to the development of mineral resources. Assistance has included field surveys, assessment studies, workshops, training sessions, public awareness campaigns and policy formulation. SOPAC has been undertaking exploratory surveys for petroleum in PNG since 1980[2]. Offshore reserves have been identified in the shallow waters around North and North-west New Ireland. However further exploration, research, feasibility and impact assessment are required before commercial exploitation can begin. In 1989[3], SOPAC with the assistance of EU funding conducted seafloor SWATH mapping to assess the potential for hydrocarbons and other minerals in the EEZ of PNG.

Data compilation and management is crucial for planning and administration of mineral development. SOPAC has initiated a project to maintain and update a mineral-industry database for all the Pacific Countries including PNG. An industry-level database enhances the ability of governments of developing states to negotiate with transnational mining companies. In 1993[4], SOPAC established a comprehensive Oil Company Database at the Secretariat to assist the member countries in their dealings with oil companies. This was a follow up to the consultancy that SOPAC offered in 1992[5], to promote the hydrocarbon potential of the South Pacific nations to the Oil Industry.

[2] SOPAC Technical Report 27
[3] SOPAC Technical Report 108
[4] SOPAC Miscellaneous Report 146
[5] SOPAC Miscellaneous Report 141

Environmental pollution, adverse social impact and economic redistribution are the biggest concerns arising out of mining and mineral exploration. Air pollution, water pollution and deterioration of land quality are the primary damages inflicted by mining operations. The disposal of mine tailings is an arduous task for small, land-scarce islands. Mining also leads to loss of green cover and diminished aesthetic appeal of natural surroundings, and renders the land unsuitable for other applications, even long after the closure of the mine. Offshore mining could unleash a whole new host of problems ranging from the irreversible destruction of the fragile ecosystem to loss of fishing grounds.

ESMG students 2000

Mineral resource development often leaves indelible scars on the fabric of traditional societies through the resultant change in lifestyle, perceptions and values that it inevitably effects. While displacement and compensation for externalities form a complex range of issues on their own, the assignment of pecuniary or economic value to communally owned properties like land has often lead to social disharmony. The loss of land or fishing grounds deprives many of their traditional lifestyles and the resultant unemployment catalyses alcoholism, violence and crime in the affected societies. SOPAC understands the impact of these externalities on PNG's goal of sustainable development and has attempted to address them while framing policies.

To promote better management of the mineral wealth of the country, SOPAC has been encouraging the government to strengthen the systems and controls at the macro-level. SOPAC has provided assistance in developing policies and legislation for the mineral sector[6]. In 1999[7], SOPAC provided technical support in drafting a Greenpaper for offshore mineral policy. The policy has sought to be comprehensive in its coverage of issues such as the legal, environmental, social, fiscal and scientific regimes administering offshore mining. This policy is expected to provide the eclectic framework for PNG to promote and administer the private stakeholders in the sector. In 1999, SOPAC coordinated a workshop on offshore mineral policy at Madang in PNG that was hosted by the government of PNG. The workshop attracted experts from around the world; and the guidelines that have evolved are expected to be of benefit in the region as well as internationally. SOPAC has also been advocating environmental and social impact assessments besides social cost-benefit analysis for all mineral-sector projects in PNG. This year PNG has discussed the issue of SOPAC conducting the environmental impact assessment of Submarine Tailings Disposal (STD) sites in the Pacific Region in conjunction with the World Wide Fund for Nature (WWF) or other Non Government Organisations (NGOs) interested in the venture.

Capacity development in the member states is one of the top priorities of SOPAC. Training in the field for technical personnel from the member countries is an ongoing process with the aim of enhancing in-country capacity to undertake assessment studies and field surveys. This training is carried out through workshops and seminars and through the courses in the Earth Science and Marine Geology Certificate Programme, which has been undertaken for 21 years. In-country seminars concentrating on geology, hydrology and hydrogeology were held in Port Moresby for staff from several ministries including Petroleum and Energy and the Geological Survey of PNG and the Water Board in December 1997.

ENERGY

Energy is often the key constraint to island nations in their pursuit of development. Unlike the other South Pacific Island countries, Papua New Guinea is well

[6] Task Profile PG 98.038
[7] SOPAC Misc Report 323

endowed with an abundant supply of renewable energy sources. The problems have been either under-utilisation or unsustainability. Although the potential for hydroelectric power is ample, several projects have had to be closed or shelved owing to geotechnical problems. However, the high rainfall and the topography in the highlands provide several avenues for further development of this resource. PNG has ample potential for exploiting biomass, solar and geothermal energy as alternate sources. Currently, photovoltaic cells are used to a limited extend.

PNG also has adequate reserves of petroleum. At present, the petroleum is exported for refining, although plans have been made to construct a refinery to increase value addition within the country.

SOPAC's role in the energy sector has been limited and based more on request. SOPAC provides advisory services and information on avante garde energy technologies that are relevant to the needs of PNG. Reference material is also provided for developing the national database for the energy sector. In 1995, SOPAC did a survey of the geothermal resources in five Pacific Island nations including PNG to assess its scope as an alternative source of energy.

However, opportunities for assistance exist. Efficiency in production, transmission and consumption is essential to optimise available energy sources while new avenues are being explored. In future, demand side management might be a key priority to reduce wastage and promote efficiency. Targeting the end users through awareness campaigns is important. Popularisation of energy saving devices such as air conditioner timers and encouraging the energy rating of electrical appliances would be courses of action for the future. Development of the renewable sources of energy is another area where SOPAC can play a pivotal role.

WATER

Fresh water is a fundamental resource for small island nations. Most development plans depend on the availability of fresh water. Clean water and proper sanitation enhance the health and productivity of the work force and have particular implications for the children and future generations. Currently only 24% of the population of PNG have access to safe water and only 25% have access to sanitation. These two factors could have a bearing on the low life expectancy and high infant mortality in PNG. Increasing supply and reach would require proactive measures from the government, and these might be needed as the demand increases.

Porgera country

Rainfall in PNG is extremely variable with precipitation reaching a maximum of 5 080 mm a year in certain areas[8]. Severe droughts such as the ones in 1972-'73, 1982-'83,1987-'88, 1991-'93 have exposed the inadequacy of the water supply system in PNG. The El Niño Southern Oscillation (ENSO) phenomenon has had detrimental effects on the economy and the environment. Water shortage is more severe in the rural areas, although water crisis is increasing in the cities.

SOPAC has been attempting to assist PNG in managing its water resources. In 1995[9], SOPAC conducted a tour of PNG to assist in water management and development. Recommendations made include:

- Strengthening the agencies in the water sector under the umbrella of the Water and Sanitation Committee.
- Organisation of workshops and training for officials and rural communities.
- Modifications of water permit legislation.

Several workshops have been organised by SOPAC to evolve strategies on water resource management and development. A regional consultation workshop on

[8] Pacific Islands Yearbook (1994)
[9] Trip Report 189

water resource management in the Pacific region was held in 1996. Some of the constraints that were identified are non-availability of data, inappropriate and underused equipment and lack of technical expertise. The same year SOPAC organised a workshop at the Secretariat on Technologies for Maximising and Augmenting Freshwater Resources in Small Islands. This workshop contributed towards a Source Book of Alternative Technologies for Freshwater Augmentation in Small Island Developing States to be published by SOPAC in a user-friendly format for application by water sector managers and planners in developing countries like PNG.

In 1997, SOPAC organised a workshop to review the photovoltaic pumping technology and determine the causes for their failure in the South Pacific. The workshop also looked at ways for making the technology more affordable to villages and households.

In addition to these, SOPAC has been running an Earth Science and Marine Geology Certificate Programme for technicians from PNG and the region for the past 21 years. Since 1995, when the Water and Sanitation Programme was first attached to SOPAC, a module relating to water issues has been added to the certificate course which is run by SOPAC at the University of the South Pacific.

HAZARDS & DISASTERS

One of the basic hurdles in the development path of the Pacific countries is their extreme vulnerability to natural disasters. The Pacific Zone bears a high risk of cyclones, tsunamis and volcanic eruptions. Papua New Guinea also lies in an active seismic area where large earthquakes and volcanic activity can bring about immense destruction. Rabaul in North New Britain is located in a volcanic caldera, which has several active volcanoes. Since 1937, 505 lives have been lost in the series of eruptions there[10]. The eruption in 1994 affected a total population of 53 000 and the total losses were estimated at K280 million. For a small developing country, such losses have a severe detrimental effect on future development plans as capital investment funds will have to be redirected for rehabilitation and reconstruction. The hazard is far more potent now as the population in the region has been growing at a dramatic rate. A major proportion of the current population of 70 000 lives within 15 kilometres of the centre of the caldera, and an eruption in any of the nearby volcanoes could lead to a major disaster[11].

Volcanic eruption

SOPAC has conducted several studies and surveys in the Rabaul caldera. In 1984, SOPAC undertook a survey to study the structure and sedimentation in the active caldera. This was followed by an investigation of the seafloor movement in Rabaul harbour[12]. The frequency of caldera seismic events indicates that magma is accumulating at a shallow depth; which could portend the birth of a new volcano.

In 1998, SOPAC undertook a survey of the potential geological hazards to a proposed sewer outfall in Joyce Bay[13]. Work undertaken included bathymetric surveying of the proposed pipelines routes, sub-bottom profiling to define subsurface sediments and sampling to define surficial sediment character.

PNG is also vulnerable to landslides and slips, given the intensity of the tropical rain in some parts of the country. SOPAC conducted training in disaster management in PNG in 1998[14]. Another training

[10] SOPAC Technical Report 39

[11] SOPAC Technical Report 39
[12] SOPAC Technical Report 87
[13] SOPAC Technical Report 93
[14] Task Profile RT 99.092

workshop was organised to help local officials in improving disaster management and response[15]. SOPAC also assists PNG in enhancing awareness and preparedness of communities living in high risk[16].

SOPAC has been developing a comprehensive multi-hazard risk-management geographic information system (GIS) database under the Pacific Cities Project. Lae on the East Coast is under consideration for inclusion. Under this, zonation of all hazards, their distribution frequency and likely impact on the city will be presented. The database will be vast in its coverage and even information on all buildings in high-disaster-risk areas is to be included to prepare the response structure to wide range of hazards like cyclone, earthquake and sea level rise. Training of technical personnel in risk analysis, disaster mitigation and civil protection measures will also be undertaken as part of the project.

All these contribute towards SOPAC's vision of strengthening PNG's capability to assess natural and man-made hazards and improve post-disaster rehabilitation.

COASTAL MANAGEMENT

PNG has very distinctive coastal areas comprising features such as fringing reefs, lagoons, natural beaches and mangroves. There have been rapid changes in the coastal geography associated with increasing reclamation as a part of urbanisation. To protect reclaimed land from the onslaught of the sea, various protection systems such as concrete walls, groynes, jetties and riprap revetments have been constructed haphazardly. However, the success of these protection structures has been minimal owing to a lack of understanding of the wave and current pattern around the islands, and the misconception that coasts are inherently and eternally stable. Poor construction and development practices, indiscriminate reclamation and aggregate mining in the reef areas cause coastal instability and beach erosion. In addition, coastal pollution damages and destroys reef biota.

Water-front houses in PNG - erosion threats are high

Coastal area

SOPAC has been assisting PNG in addressing the coastal-erosion issue through coastal-zone field surveys, coastal mapping workshops and public awareness workshops. SOPAC/CCOP organised a workshop in PNG in 1987[17] that evaluated:

- the effect of tsunami on coastal geology;
- the effects of cyclones and floods on coastal geomorphology;
- the dynamics and economics of seawall construction and coastal development; and
- impact of natural hazards and ENSO on coastal erosion.

In 1990[18], SOPAC undertook an investigation of seven Manus Wharf sites. The beach profiling and the study of the wharf sites made it possible to assess feasibility and potential designs.

Several recommendations have been made by SOPAC to tackle coastal erosion and manage sand aggregates in the Pacific Islands:

- implementation of appropriate environmental policies and legislation;

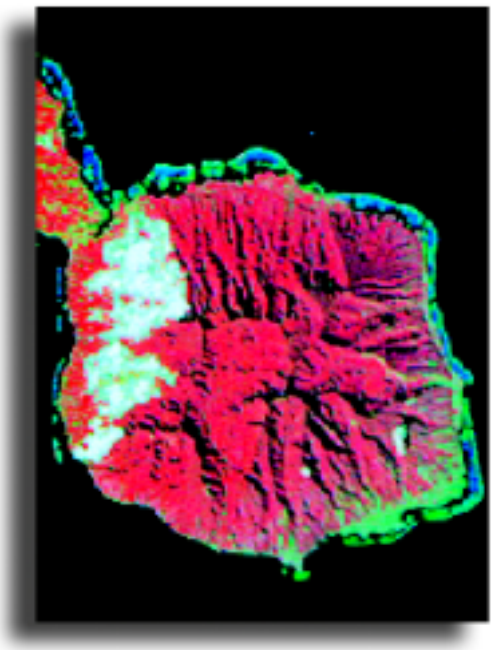
[15] Task Profile RT 99.094
[16] Task Profile PG 99.005
[17] CCOP/SOPAC-IOC Joint Contribution 34
[18] SOPAC Joint Contribution 60

- use of advanced technology for shoreline protection;
- management and maintenance of coastal structures;
- better monitored reclamation and shorefront development; and
- identification of alternative coastal resources using remote sensing and ground surveys.

SOPAC also conducted a coastal workshop in 1990 to train technical personnel in survey and analytical skills. Given the critical importance of sustainable development in PNG, SOPAC will continue to play an important role in coastal preservation and the development of sound policies to ensure better management of resources.

STEPS INTO THE FUTURE: INFORMATION TECHNOLOGY & COMMUNICATION

For effective resource management and planning, the storage and processing of timely and accurate scientific data is critical. Island nations face the fundamental crisis of geographic isolation and high cost of communication between the various islands.



Remote sensing is a valuable tool for mapping

IT training

Low human capital endowment further complicates the situation. These factors have remained a constraint in PNG's pursuit of rapid growth. The weak human resource base has led to the dearth of skilled personnel to support certain key technical functions.

SOPAC has been assisting PNG in improving its human capital base through training programmes, workshops, seminars and courses run at the University of the South Pacific. Improving its management systems and training personnel in information technology in the Pacific region has been another priority with SOPAC. SOPAC has been developing access to Internet services through commercial (Public Switched Telephone Networks) and non- commercial satellite services (PeaceSat). SOPAC has also been providing assistance in the development of Internet and Intranet services within the region. Training in the use of Geographical Information System (GIS) has also been provided in PNG. Local officials have been trained in using GIS for remote-sensing (RS) development and in power utilities[19].

A computing unit for GIS and remote sensing work was provided by SOPAC to PNG in 1993 through funding under Lome III. Technical assistance, hardware and support continues to be an integral part of SOPAC's workplan for PNG.

As a regional data centre, SOPAC has been compiling geographic data on Papua New Guinea.

[19] Task Profile PG 98.009

Future directions in Papua New Guinea

In future, SOPAC will continue its partnership with Papua New Guinea, to overcome the hurdles in the path of sustainable development. SOPAC will use its key 'ownership advantage' –the expertise in the applied sciences - to help PNG manage and develop its non-living resources sustainably.

SOPAC will further its partnership with PNG in developing terrestrial and offshore resources for minerals and hydrocarbons. Policy formulation will be one of the key areas that SOPAC will develop as one of its core professional activities. Development of appropriate legislation to manage coastal erosion will be a priority in the near future.

Sustainable development, conservation and management will be the guiding principles in the water and energy sectors. Policy development will be an activity in both these areas as well. Training programmes, workshops and seminars will be organised regularly to assist PNG in creating a national capacity in geo-science. SOPAC will continue its work to reduce PNG's vulnerability to natural disasters and improve preparedness.

Island systems management will be a future area of focus given its ability to improve database management and decision-making processes. SOPAC intends to support the development of information technology and communication infrastructure in Papua New Guinea to achieve this.

By performing its functions as the specialised scientific organization that it is, SOPAC has been addressing some of the fundamental factors that have impeded the development process.

Reference Materials

SOPAC provides access to a variety of information relating to Papua New Guinea. This can be assessed through the library database, PIMRIS and the Internet.

- Maps of Papua New Guinea
- Project Reports
- Videos (deep-sea mining)
- Geological samples
- Deep-sea mineral database
- General reference materials

Please refer to the Papua New Guinea Bibliography for full reference and material listing.

Gold panner, Mt Kare

For more information please contact:
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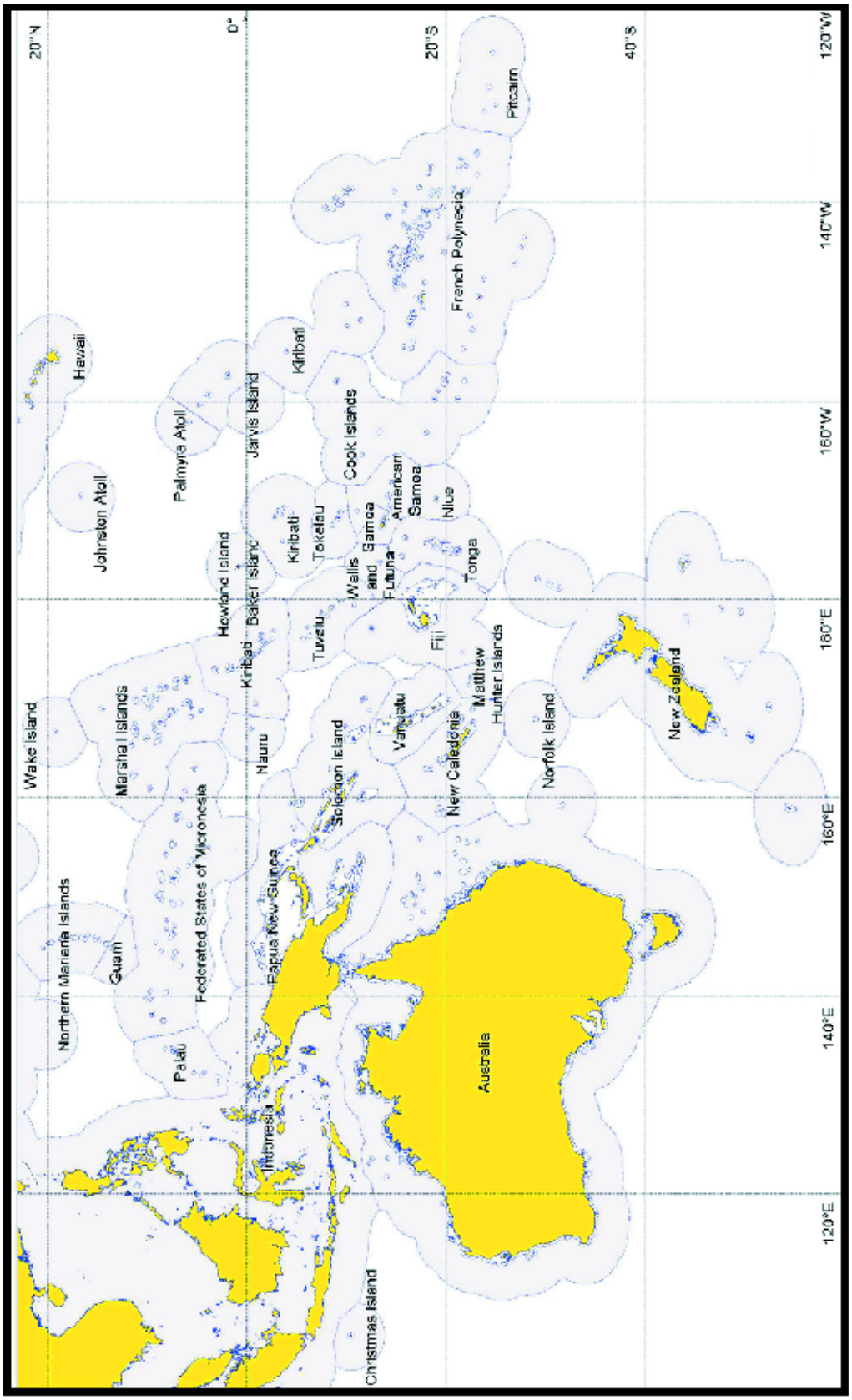
Issues and SOPAC's Responses for Further Development

ISSUES	CONSTRAINTS	RESPONSES FOR FURTHER DEVELOPMENT
Water & Sanitation	· Supply problems during droughts · Water supply unreliable in rural areas · Lack of public awareness of water conservation practices · Economic and financial constraints · Lack of monitoring and data acquisition	· Institutional strengthening of agencies involved with the water sector · Development of resource policies and legislation · Conducting workshops and training for officials and rural communities · Carrying out further research and feasibility studies and pilot projects
Coastal Management	· Poor land management · Unmanaged aggregate mining · Inappropriate coastal development and protection works	· Educating people about coastal degradation and management through workshops and technical training · Locating an economically viable, alternative source of aggregate · Dialogue with the government and private sector on coastal development and management
Minerals	· Inadequate marine scientific research to define full potential of offshore resources	· Assessing the potential of petroleum prospects · Assist government in strengthening an offshore mineral policy · Continues to assist in strengthening human resource capacity towards sustainable management and development of mineral resources · Encourage further research
Energy	· Under-utilised renewable energy sources · Where utilised, resources not run on sustainable basis · Lack of public awareness on management of energy sources	· Providing information on current status of relevant energy technologies and applications · Conducting educational programmes on efficient use of energy · Development of energy supply and demand database · Enhancing the skills required by local staff for management and operation of energy sector through workshops and appropriate training
Hazards & Disasters	· Prone to large earthquakes, volcanic activity, climate change, ENSO impacts, cyclones and landslides · High population growth rate combined with large resident population near caldera · Communities lack awareness of the impacts of natural hazards, and measures to mitigate the impacts	· Investigating movement of the seafloor in Rabaul harbour · Conduct training workshops on disaster management and response for disaster managers and the wider community · Raise awareness of hazards and assist with preparedness and mitigation actions of vulnerable communities
Information Technology & Communication	· Limited availability and poor access to information · Lack of skilled personnel in IT sector · High cost	· Assisting in development of Internet and Intranet services · Conducting training of technicians in GIS · Training of local staff in information technology
Human Resource Development	· Weak human resource base · Limited financial and institutional resources · Limited expertise	· Conducting workshops and technical training programmes to improve national capacity in the geosciences · Running the Earth Science and Marine Geology course to improve the human resource base · Fellowship attachments



South Pacific Region Maritime Limits

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