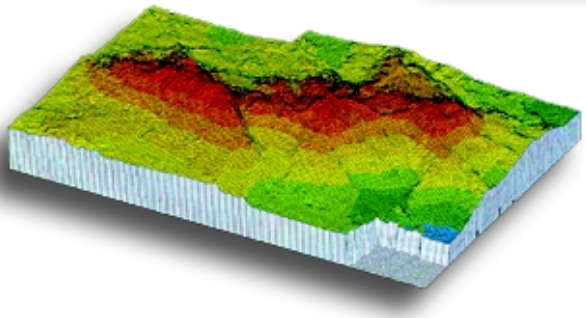
SOPAC

COUNTRY PROFILE



FSM

SOPAC Secretariat Private Mail Bag Suva Fiji.
Tel: (679) 381 377 Fax: (679) 370 040 http: //www.sopac.org.fj/

SOPAC

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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FSM COUNTRY PROFILE

Federated States of Micronesia : Our Future

"....the need to underpin any system of management with sound national capacity building on information/data gathering and enhancement of knowledge and understanding, ...are the building blocks ...in supporting us small Pacific island states."

Hon Sebastian Anefal
Secretary for the Department of Economic Affairs. (1998)

Capital:	*Pohnpei*
Population:	*116 400 (1999 est.)*
Land Area:	*701 sq. km*
Max. Height above Sea-level:	*791 m*
Geography:	*Over 600 islands (about 65 inhabited); geography extremely varied, ranging from isolated reefs and atolls rising barely above sea-level to peaks of several hundred meters on high islands of Pohnpei and Kosrae; four major island groups comprising Pohnpei (345.4 sq km), Kosrae (109.6 sq km), Yap (121.2 sq km), Chuuk group (118 sq km)*
EEZ:	*2.9 million sq. km*
Climate:	*Tropical; heavy year-round rainfall, especially in the eastern islands; located on the southern edge of the typhoon belt with occasional severe impact*
Rainfall:	*Rainfall is high, varying from about 3 000 mm on drier islands to over 10 000 mm per annum in Pohnpei*
Mean Temperature:	*27°C*
Economy:	*Dependent on fisheries, aid, agriculture, tourism; exports include fish, copra, trochus shell*
GDP per Capita:	*US$ 2 070 (1998 est.)*
Currency:	*US$*
Energy Sources:	*Biomass, solar, hydro, geothermal, wind*
Freshwater Sources:	*Surface water, groundwater*
Natural Hazards:	*Coastal flooding, drought, cyclone, storm surge, tsunami, earthquake and landslide*
Mineral Potential:	*On-land – phosphate; Offshore - cobalt-rich manganese crusts*
Languages:	*English (official and common language), Chuukese, Pohnpeian, Yapese*
Government:	*Associated with the USA in a Compact of Free Association till 2001*
SOPAC Membership:	*Full member since 1990*
Country Representative:	*Secretary. Department of Economic Affairs*
	PO Box 12, Palikir. Pohnpei
	Tel: (691) 320 2620. Fax: (691) 320 5854
	Email: fsmrd@mail.fm

The Federated States of Micronesia

The Federated States of Micronesia (FSM) is a young independent nation, which consists of over 600 islands, with a total land area of only 701 sq km. The islands are located in the western Pacific Ocean over an Exclusive Economic Zone (EEZ) of approximately 2.9 million sq km and a maximum height of 791 m above sea level.

Coast in FSM

There are four states which comprise FSM. From west to east they are Yap, Chuuk, Pohnpei and Kosrae. The population of these islands was estimated at 116 400 in 1999[1], with Chuuk being the most populous state.

FSM encompasses both mountainous islands with fertile volcanic soils and remarkably high rainfall, as well as low-lying atolls. It is endowed with abundant and varied marine resources and limited land-based resources.

The economy of FSM is quite reliant on foreign aid. Other mainstays include fisheries, agriculture and tourism. Copra, fish and trochus shell contribute to the export earnings of the country.

There are several resource and environmental issues, common to island nations, affecting sustainable development in the Federated States of Micronesia. 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, offshore minerals and renewable energy are other issues in FSM's quest for development.

The Federated States of Micronesia has been a full member of the South Pacific Applied Geoscience Commission (SOPAC) since 1990. SOPAC is an independent, intergovernmental, regional organisation, which provides expert technical assistance, policy advice and information on the sustainable management of these non-living 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 available 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.

Resource Development & Management

For Small Island Developing States (SIDS), natural resource development and management holds the key to rapid economic development. 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

Offshore exploration is still at a nascent stage in FSM. Exploratory surveys, however, have revealed the extensive presence of cobalt-rich crusts in the EEZ of the country. The future exploitation of this mineral

[1]SPC Demography Programme

resource has the potential to provide great economic benefits to the country. Research organisations have expressed interest in these findings and therefore a further survey is currently being formulated to assess the scope and potential for development.

ENERGY

As developing countries become more industrialised there is an increasing demand for energy. FSM is currently totally reliant on the use of imported fossil fuels for its electricity and transportation requirements. Diesel electricity-generating plants in each state supply the main urban centres and surrounding areas.

The use of renewable energy sources such as hydro-electric and solar power is undeveloped in FSM. Thus, the potential for these renewable energy sources to replace petroleum fuels in the short to medium term is limited. However, in Pohnpei the use of hydro schemes to supplement diesel electricity generation is increasing. In addition, in the outer islands and remote rural areas, some solar power is being generated.

The management, production, distribution and maintenance of the states' electricity utility require substantial improvement. Importing fuel to generate energy places an increasing strain on the economy of FSM. Therefore, the use of renewable resources is considered to be essential to the development of the country.

WATER & SANITATION

Fresh water is a fundamental resource for small island nations. Most development plans are pivotal 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.

The basic environmental health issues related to water and sanitation in FSM includes safe drinking-water supply, solid and hazardous waste disposal, and domestic and commercial wastewater disposal.

Several areas are responsible for shortcomings in these areas.There is limited awareness and understanding of water use and conservation issues in FSM. A significant amount of water, which is available to the user, is lost through poor usage practices.

Distribution of water in each state is the responsibility of the public works. Public water-distribution mains exist around the major urban centres. Individual rainwater catchment systems supplemented by rivers, streams and springs supply the rest of the population.

In addition to this, on the atolls, where there is no available surface water, the shallow and fragile groundwater lens serves as the main source of drinking water. However, due to their poor location near refuse tips and latrines, the groundwater wells are often contaminated. Thus, waterborne and water-associated diseases are a common cause of illness in the nation. Saltwater intrusion is also common when wells are used excessively, beyond their recharge rates.

Sanitation is a major concern in the urban centres and the outer islands, especially in the atolls, where the high water tables prevent the effective use of septic

Sanitation is a major concern

systems. Other systems used include water sealed toilets, pit toilets and over-water benjos. Marine pollution is an increasingly important issue due to inadequate sewage disposal in FSM. Therefore, considerable development of infrastructure in the sanitation sector is required for proper waste treatment and disposal.

Challenges to Sustainable Development and SOPAC's role in FSM

MINERALS

SOPAC has been assisting FSM in addressing issues related to the development of mineral resources. Assistance has included field surveys, workshops, training sessions, public awareness campaigns and policy formulation.

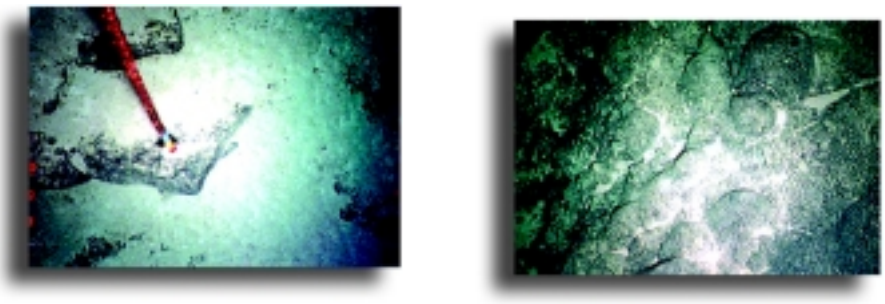
Deep-sea mineral resources such as cobalt-rich crusts have great potential and economic significance for future prosperity of FSM. To realise the full potential of these resources requires detailed exploration and assessment within the FSM EEZ.

In 1993[2], SOPAC in partnership with Japan, conducted a survey to assess the potential for cobalt-rich crusts. A further series of explorations was undertaken in 1998[3]. However, because further extension of research was required, SOPAC signed another three-year contract with the Japanese government in February 2000.

To evolve a comprehensive framework for preparing Offshore Mineral Policies in the South Pacific, SOPAC coordinated an Offshore Mineral Policy Workshop in February 1999 in Madang, Papua New Guinea.

Adverse social impact and economic redistribution are the biggest concerns arising out of mineral exploration. Offshore mining could unleash a whole new host of problems ranging from the irreversible destruction of the fragile ecosystem to loss of fishing grounds.

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 affects. 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 fishing grounds has often lead to social disharmony. The loss of 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 FSM's goal of sustainable development and has attempted to address them through formulation of appropriate policies. Social cost benefit analysis and



Photographs of the seafloor

[2]JICA DMR 1998

[3]JICA DMR 4-2 1999

social and environmental impact assessments are advocated for all mining projects in FSM.

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 courses in the Earth Science and Marine Geology Certificate Programme, which has been undertaken for 21 years.

ENERGY

The Federated States of Micronesia relies mostly on imported fossil fuels for its energy generation. This is placing an increasing strain on the economy.

SOPAC has assisted FSM in the identification of renewable energy sources to reduce the dependence on imported fossil fuels. It has undertaken training workshops to strengthen the country's capacity to evaluate new and renewable energy sources and appropriate energy supply policies. A national energy database has also been compiled by SOPAC for Kosrae[4], Pohnpei[5], Chuuk[6] and Yap[7] states.

Currently, a national energy-sector policy is being developed[8]. The World Bank Pacific Regional Energy Assessment report of 1992 identified the absence of comprehensive national energy sector policies as one of the major obstacles to the effective management and planning of the national energy sectors. In a country like FSM where individual states are autonomous, national policies are critical to ensure consistency and that concerted efforts are directed towards common national objectives.

SOPAC realises the need to assist FSM in:

- identification of alternative renewable energy sources;
- development of electrification policies and guidelines;
- modification and maintenance of energy databases; and
- strengthening of human resource base in energy sector.

WATER & SANITATION

SOPAC has attempted to assist FSM with the water and sanitation issues through field surveys, assessments and capacity building through training programmes and workshops.

ESMG students out in the field

In 1996[9], an engineering assessment of the Paies water supply system on Pohnpei was conducted by SOPAC. This study enabled improvement of the infrastructural facilities in the area. A similar study was carried out in the same year for the Nan Mandol water supply system on Pohnpei[10].

To improve human resource capacity in the water sector, SOPAC conducted a regional consultation workshop in

[4]SOPAC Miscellaneous Report 338
[5]SOPAC Miscellaneous Report 339
[6]SOPAC Miscellaneous Report 343
[7]SOPAC Miscellaneous Report 344
[8]Task Profile FM 99.006

[9]SOPAC Technical Report 230
[10]SOPAC Technical Report 241
[11]SOPAC Miscellaneous Report 229

1996[11], based on water resources development and management in the Pacific region. Another workshop was also organised, in 1996[12], by SOPAC at the Secretariat. It focused 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 FSM.

Assistance was provided by SOPAC, in 1997[13], to FSM's Office of Planning and Statistics (FSMOPS) situated in Kosrae in the designing of short-term drought-mitigation measures. In addition to this, design enhancements for Kosrae's surface water intake was also provided.

A demand management and conservation project was undertaken in 1999, to reduce wastage of fresh water. This would in turn make more water available for environment enhancement and for future generations.

Coastal erosion

CLIMATE & SEA-LEVEL VARIABILITY

Global climate variability has triggered more-frequent and more-severe cyclones, interspersed with scorching droughts. The impact of this variable climate has been harsh on ecosystems and coastal, terrestrial and marine bio-diversity. Economically, the impact has translated into decreased agricultural yield, death of livestock, and decrease and loss of marine biodiversity. This has caused loss of revenue, which can have detrimental effects on the social and economic system of SIDS and developing economies. As the majority of the people dependent on these sources of income are poor, the poverty implications of variable climate are high.

The Intergovernmental Panel on Climate Change (IPCC) predicts that there will be a 10-30 cm rise in sea level by the year 2030 and a further 30-100 cm rise by the end of the 21st century[14]. This has serious implications on sustainable development of FSM. Coastal erosion and limited freshwater resources are current problems faced on the atolls, thus, the impacts of climate warming on limited water resources and marine ecosystems is of great concern for the low-lying atolls of FSM[15]. Atolls and small islands will experience accelerated coastal erosion, loss of land and saltwater intrusion, which will cause even greater scarcity of already limited freshwater resources.

In addition, damage to infrastructure by coastal inundation, wave run-up and tidal surges could be immense. The social and economic impact of this on a developing economy is tremendous, and can lead to persistent poverty.

Although SOPAC has not provided FSM any assistance to date with the issue of climate and sea-level variability, the increasing importance of this issue and its implications to the survival and livelihood of the

[12]SOPAC Miscellaneous Report 223
[13]SOPAC Miscellaneous Report 276

[14]SOPAC Miscellaneous Report 332 & 333
[15]SOPAC NR 79

country will certainly require future assistance from SOPAC. Experience and expertise in coastal management, environmental vulnerability assessment, mitigation and adaptation strategy development are all part of SOPAC's capabilities and technical resources that it is able to provide countries to help address this issue.

COASTAL MANAGEMENT

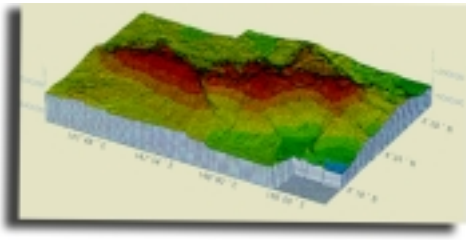
The Federated States of Micronesia has very distinctive coastal areas comprising features such as fringing reefs, lagoons, natural beaches, seagrass beds and mangroves. There have been rapid changes in the coastal geography associated with increasing reclamation as a part of burgeoning urbanisation. To protect reclaimed land from the onslaught of the sea, various protection systems such as concrete walls, groynes and riprap revetments have been constructed haphazardly. However, the success of these protection structures has been minimal owing to limited understanding of the wave and current pattern around the islands and the misconception that coasts are inherently and eternally stable[16]. Poor construction and development practices, indiscriminate reclamation and aggregate mining in reef areas cause coastal instability and beach erosion[17 &18]. In addition, coastal pollution damages and destroys reef biota.

Being a country of mainly low-lying atolls, FSM is entirely coastal and has limited land resources except for the larger main islands. Therefore, the loss of any land has great significance to the future economic and social development of the atoll country.

SOPAC has assisted FSM in addressing some of these issues through field surveys and technical assessments and coastal mapping workshops. A coastal mapping workshop was conducted in FSM by SOPAC in 1992[19]. This included coastal mapping of Lelu Island in Kosrae and measurement of beach profiles on Joy Island, Pohnpei. SOPAC resurveyed these beach profiles in 1998[20], to assess the changes along the beach.

In 1996[21], SOPAC undertook a coastal sedimentation, erosion and management study on Kosrae. This survey consisted of measurements of beach profiles, study of coastal processes in the area and the development of appropriate coastal management strategies.

To further assist the country in coastal management and planning, SOPAC conducted an aerial photo survey of Pohnpei coastal areas in 1996[22]. In addition to this, in 1997[23] SOPAC formulated a strategy for a work programme, which would assist in the development of guidelines and legislation for Pohnpei lagoon dredging. Mining of sand and coral rubble by dredging in Pohnpei Lagoon has been an ongoing activity for more than 15 years[24]. Follow-up work was carried out in 1998[25] to assess the effects of mining in greater detail.



Bird's eye view of bathymetry of deep-sea sea-mount

[16]SOPAC Technical Report 268
[17]SOPAC Technical Report 310
[18]SOPAC Preliminary Report 111

[19]SOPAC Training Report 47
[20]SOPAC Preliminary Report 92
[21]SOPAC Technical Report 228
[22]SOPAC Preliminary Report 86
[23]SOPAC Miscellaneous Report 247
[24]SOPAC Technical Report 301
[25]SOPAC Technical Report 257

SOPAC assessed coastal erosion problems in the outer islands of Pohnpei, Chuuk and Yap States in 1998[26]. Aggregate mining in the nearshore areas of FSM and its impacts were observed. The present locations of all dredge sites were identified and mapped, and criteria developed for selecting new dredge sites. Monitoring controls were also developed for future implementation. Together with these, training in dredge-site monitoring was also provided and dredging guidelines for framing legislations were drafted.

More recently, alternative sources of construction aggregate were identified from geotechnical assessments in Pohnpei[27 &28]. Further work is being done to assess the use of on-land material for construction engineering[29].

SOPAC has also been providing advice to Pohnpei State on Environmental Impact Assessment (EIA) for a power generation facility at a reclamation site on Pohnpei[30]. The results of several of SOPAC's studies have been presented to the office of the President and Secretary (National Government) of FSM, and more recently to Pohnpei State legislature and the office of the Governor of Pohnpei State[31].

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. Given the small size of these nations, technology providers are reluctant to supply cutting-edge technology owing to poor economies of scale and difficulties in monitoring. Low human capital endowment further complicates the situation. These problems are a constraint in FSM's pursuit of rapid growth.

SOPAC has been assisting FSM to improve its management systems and train personnel in Information Technology. A proposal was prepared in 1997[32] by SOPAC to implement the Pohnpei Environmental Protection Agency Geographical Information System (PEPA-IS). A Geographical Information System (GIS) workshop was also conducted during this project to teach the basics of GIS and Remote Sensing (RS) to various departments including the PEPA-IS.

As a regional data centre, SOPAC has been compiling geographical data on the Federated States of Micronesia.

In future, the focus will be on:

- Developing appropriate, economic and scaleable technologies.
- Increasing the number of IT professionals in the local population.
- Improving Internet access.
- Further development of GIS and Remote Sensing techniques.

Training workshop

[26]SOPAC Technical Report 268
[27]SOPAC Technical Report 301
[28]SOPAC Preliminary Report 111
[29]SOPAC Technical Report, in preparation
[30]SOPAC Technical Report, in preparation
[31]Task Profile FM 99.008

[32]SOPAC Miscellaneous Report 248

Future Directions in FSM

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

SOPAC will further its partnership with FSM in developing offshore resources. 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 and regulate aggregate mining 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 FSM in creating a national capacity in the applied sciences. SOPAC will continue its work to reduce FSM'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 FSM to achieve this.

By performing its functions as the specialised scientific organisation 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 FSM. This can be accessed through the library database, PIMRIS or the Internet. SOPAC also holds at its Secretariat:

- Maps of FSM (coastal, aerial, bathymetric)
- Project reports
- Educational/Awareness pamphlets
- Videos
- Deep-sea Mineral Database
- Geological samples
- General reference material on FSM

Please refer to the FSM Bibliography for SOPAC's full reference and material listing.

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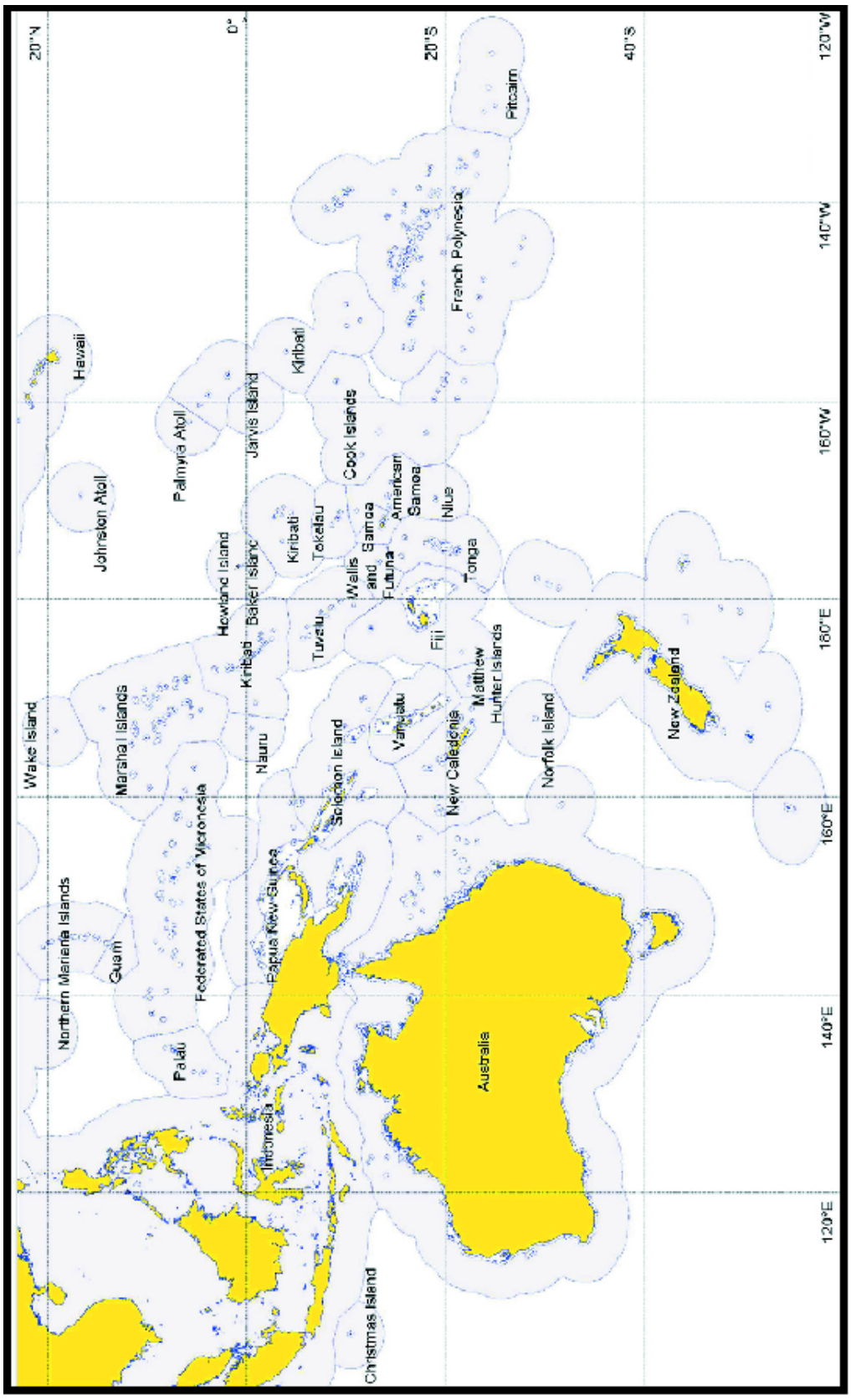
Issues and SOPAC's Responses for Further Development

ISSUES	CONSTRAINTS	RESPONSES FOR FURTHER DEVELOPMENT
Water & Sanitation	· Limited fresh water supply · Inadequate catchment and storage facilities · Contamination of shallow groundwater lens by adjacent refuse tips and latrines · Water wastage through poor demand and conservation practices · Insufficient infrastructure in sanitation sector · Lack of sewage disposal facilities · Overcrowding	· Development and implementation of policy and legislation · Advising on improvement of infrastructure within the water and sanitation sector · Undertaking of pilot projects, research and feasibility studies · Increasing public awareness on sustainable water management through training and workshops · Educating the public on safe sanitation and waste-disposal practices at all levels
Coastal Management	· Unmanaged aggregate mining · Inappropriate coastal development and protection works · High population growth rate putting increasing strain on coastal areas · Lack of environmental knowledge on coastal-zone management · Absence of appropriate coastal management policies and legislation	· Identification of alternative potential aggregate resources · Dialogue with the government and private sector on coastal development and management · Educating people about coastal degradation through workshops, technical training etc.
Minerals	· Inadequate scientific research to define the full potential of resources · Absence of legislature regime for offshore areas · High risks and costs associated with acquisition of data	· Assessing the potential of cobalt-rich crusts in FSM's EEZ · Development of resource policy and advise on the management and development of offshore minerals · Encourage further research
Energy	· Reliance on imported fossil fuels to generate energy placing an increasing strain on the economy · Inadequate public awareness on renewable energy sources	· Identification and use of viable renewable energy sources · Development of appropriate energy policies · Enhancing the skills required by local staff for management and operation of the energy sector through workshops and appropriate training
Information Technology & Communication	· Limited availability and poor access to information · Lack of skilled people to manage the IT sector · Lack of relevant regional and local data · High costs	· Assisting in the development of Intranet and Internet in FSM · Training of local staff in information technology and GIS/RS · Development of improved software and GIS facilities · Coordination, compilation and creation of standardised geographic data sets
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.