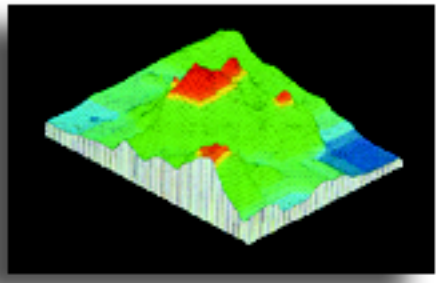
SOPAC

COUNTRY PROFILE



KIRIBATI

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

SOPAC

KIRIBATI 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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KIRIBATI COUNTRY PROFILE

Kiribati: Our Future

"…the object of the exercise of 'sustainable development' is to survive on the atolls for ever… Sustainability is the idea that we can survive from day to day, and…ever after!"

Hon. Ieremia Tabai, GCMG
President (1988)

Capital:	*Tarawa*
Population:	*88 600 (1999 est.)*
Land Area:	*811 sq. km*
Max. Height above Sea-level:	*87 m (Banaba)*
Geography:	*Consists of 33 islands (20 inhabited); islands are low-lying atolls with the exception of Banaba; the 3 main island groups are the Gilberts, Phoenix and Line Islands plus Banaba*
EEZ:	*3.6 million sq. km*
Climate:	*Tropical; marine, hot and humid, moderated by tradewinds*
Rainfall:	*Varies considerably from group to group; 1 000 (southern group) to 3 000 mm (northern group) per annum*
Mean Temperature:	*29°C*
Economy:	*Dependent on fishing, subsistence, agriculture, remittances and copra; exports include fish and copra*
GDP per Capita:	*US$ 702 (1998 est.)*
Currency:	*AUD$*
Energy Sources:	*Biomass, solar, wind*
Freshwater Sources:	*Groundwater, rainwater, surface water*
Natural Hazards:	*Coastal flooding, drought, tsunami, storm surge, cyclone, earthquake and landslide*
Mineral Potential:	*On-land – phosphate, gypsum; Offshore – Manganese nodules and cobalt-rich manganese crusts*
Languages:	*English (official), Gilbertese*
Government:	*Independent republic and member of Commonwealth*
SOPAC Membership:	*Full member since 1979*
Country Representative:	*Secretary*
	Ministry of Natural Resources Development
	PO Box 64. Bairiki. Tarawa
	Tel: (686) 21 099.
	Fax: (686) 21 120

Kiribati

Children of Kiribati

The Republic of Kiribati comprises 33 low-lying coral atolls (except Banaba), which are divided into three main island groups; the Gilbert group, the Phoenix group and the Line islands. Its total land area is about 811 sq km within an equatorial Economic Exclusive Zone (EEZ) of some 3.6 million sq km in the Central Pacific. The maximum height above sea-level for Kiribati is 87 m.

The population of Kiribati was estimated at 88 600 in 1999[1], of which over 90% live in the Gilbert group, mostly on Tarawa atoll, the capital and commercial centre of Kiribati.

Situated in the dry belt of the equatorial oceanic climatic zone, rainfall varies from 1 000 mm to 3 000 mm per year. Severe, prolonged droughts are common in the drier islands in the central and southern equatorial region (eg. Gilberts and on Banaba, the Phoenix Islands, and Kiritimati).

The mainstays of the Kiribati economy are industrial fishing, agriculture, copra and remittances. Subsistence activities are also still a major component of the economy of Kiribati.

There are several resource and environmental issues, common to island nations, affecting sustainable development in the Republic of Kiribati. 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 Kiribati's quest for development.

Aerial view of Kiribati

[1]SPC Demography Programme

The Republic of Kiribati has been a full member of the South Pacific Applied Geoscience Commission (SOPAC) since 1979. 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 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 and 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.

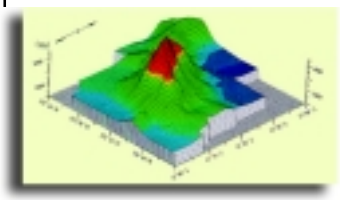
In Kiribati natural resources in terrestrial, lagoonal and near-shore areas are extremely limited. And even though its marine EEZ is blessed with a vast number of resources, these are difficult to utilise.

MINERALS

Kiribati is naturally endowed with several types of mineral resources. These range from terrestrial minerals such as phosphate and gypsum to offshore cobalt-rich crusts and manganese nodules in the country's EEZ.

In the period 1900-1979, phosphate mining was undertaken in Banaba. This ceased in 1979 after the major deposits of fossilised sea-bird guano became exhausted. However, there are still a few unmined areas on the island. Recently mining companies have shown an interest in mining this remaining phosphate on Kiribati.

The other terrestrial and coastal resources include sand, coral, gravel and limestone aggregate that are feeding into the upsurge in construction activities.



Bird's eye view of seamount

Offshore exploration is still at a nascent stage in Kiribati. Surveys, however, reveal the extensive presence of cobalt-rich crusts and polymetallic manganese nodules in the EEZ around Kiribati. The future exploitation of these minerals has the potential to provide great economic benefits to the country. Several exploration companies have expressed interest in these findings and have applied for exploration licences assess the scope and potential for development.

ENERGY

Kiribati relies heavily on imported fossil fuels for its commercial and transportation energy needs. Diesel generators supply electricity to most of the urban centres like Tarawa. For the outer islands, however, where there is no regular supply of fuel for generators, solar photovoltaic technology has been promoted.

Importing fossil fuels for energy generation has been putting an increasing strain on the economy of Kiribati. The use of alternative, renewable energy sources will help to offset future dependence on imports and contribute to the overall aim of achieving the maximum degree of energy independence, while providing opportunities for development primarily in the rural sector.

Solar cooker in Kiribati

Biomass plays an important role for domestic purposes such as cooking in the outer islands and for most families in South Tarawa. Timber products including coconut palms constitute the biomass resources in Kiribati. Increasing population and the overexploitation of fuelwood has resulted in the loss of suitable supplies. On Betio, fuelwood has to be purchased to meet the growing demand.

One alternative source of energy, wind power, is used for pumping water. However, due to problems of maintaining the equipment, it is not utilised for any other purpose. Photovoltaic systems have also been installed in rural homes, but most systems have failed.

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 availability of water has been a long-standing problem throughout Kiribati. Natural sources of permanent potable water are limited to groundwater in freshwater lenses. These freshwater lenses are floating on the higher-density seawater beneath the atolls. Other sources of water include handpump wells, roof catchments and galleries.

Groundwater resources in Kiribati are commonly contaminated from human and other solid wastes. This arises from inadequate use of proper toilet facilities and lack of infrastructure in the sanitation sector. Due to the shallow water tables, seepage of waste into the fragile groundwater system is a common occurrence in Kiribati.

Challenges to Sustainable Development & SOPAC's role in Kiribati

MINERALS

SOPAC has been assisting Kiribati in addressing issues related to the development of mineral resources. Assistance has included field surveys, assessment studies, workshops, training sessions and policy formulation.

Several islands in Kiribati contain a promising amount of gypsum. SOPAC carried out a desk study in 1996[2] to re-evaluate the potential of the gypsum deposit on Malden Island, and assess the economic viability of the deposit.

Several exploration companies have also assessed the development potential of phosphate deposits in Kiribati. SOPAC has provided advice to the Government of Kiribati on the potential of development of these resources. A field survey consisting of drilling is planned in August in 2000 to assess the amount of phosphate remaining on Banaba Island.

Data compilation and management are crucial for planning and administration of the mineral resources. SOPAC has initiated a project to maintain and update a mineral industry database for all the Pacific Countries including Kiribati. Industry level databases enhance the ability of governments of SIDS to negotiate with powerful transnational mining companies.

ESMG students working in the lab

In 1987[3], SOPAC in partnership with Japan conducted a survey to assess the potential of manganese nodules and cobalt-rich crusts in the Kiribati EEZ. Further surveys were carried out in 1989[4] and 1991[5]. These surveys have given room for optimism as the Kiribati EEZ has shown extensive manganese nodules and cobalt-rich crusts. Therefore, because further extension of research was required to assess the potential of these minerals, SOPAC in collaboration with Japan signed another three-year contract in February 2000.

Furthermore, to evolve the systems and guidelines for preparing Offshore Mineral Policies in the South Pacific, SOPAC coordinated an Offshore Mineral Policy Workshop in February 1999 in Madang, Papua New Guinea. The 1998 Pacific Exploration Technology Seminar that SOPAC coordinated in Nadi, had several modules on offshore mining as well. This has proved useful in setting the stage for offshore mining in Pacific countries.

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.

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 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 Kiribati's goal of sustainable

[2]SOPAC Technical Report 240
[3]SOPAC Cruise Report 123
[4]SOPAC Cruise Report 131
[5]SOPAC Miscellaneous Report 207

development and has attempted to address them while framing policies. Social cost benefit analysis and social and environmental impact assessments are advocated for all mining projects in Kiribati.

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.

ENERGY

Kiribati relies mainly on imported fossil fuels for its energy generation. Many problems are faced by the energy sector in Kiribati. The technical expertise and infrastructure needed to utilise alternative and indigenous energy resources better, are lacking. The cost of technologies is high and the ability to install and maintain them is underdeveloped. In addition to this, the database for electricity consumption is poor, making the forecasting of load demand difficult. Also, the generating system is old and poorly maintained.

Energy database training

SOPAC has assisted Kiribati with the development of a photovoltaic system, which provides a secure, reliable and cost-effective source of electricity for the outer islands[6]. Installation of the project was completed in collaboration with the Kiribati Solar Energy Company (SEC), which was established in 1985.

SOPAC has also undertaken training workshops to strengthen human capacity in Kiribati to evaluate new and renewable energy projects and the collection and use of energy sector data, and to plan and manage the energy sector. A national energy supply/demand database is also currently being created. The investigation into alternative energy sources for Kiribati has been carried out as well.

A series of studies on the wave energy programme has been conducted by SOPAC on a regional level. The outcome of SOPAC's research was published in a brochure called "Ocean Wave Energy in the South Pacific" which provides extensive information on the results, status of wave energy internationally and avante-garde technology in the field. The brochure also proved to be a useful promotional pamphlet for the potential that the South Pacific has in this area[7].

Several regional workshops and training programmes has also been organised by SOPAC. A regional energy programme design workshop was convened in Nadi by SOPAC in 1998. This workshop helped to outline the energy sector priorities of the Pacific nations and drew up a programme for the period 1999-2004. Wind, geothermal energy, biomass and hybrid power systems were identified as energy sources of the future for the islands[8].

SOPAC realises the need to assist Kiribati in:

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

WATER & SANITATION

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

[6]Task Profile KI 99.002

[7]SOPAC Miscellaneous Report 234
[8]SOPAC Miscellaneous Report 315

Assistance was provided by SOPAC to the Government of Kiribati in assessing salt-water intrusion in babai (giant taro) pits on the atoll islands of Makin, Butaritari and Abaiang in 1995[9]. This survey highlighted the need for training to improve water management.

Rubbish dumped on the beach in Kiribati

In 1997[14], SOPAC organised a workshop to review the photovoltaic pumping technology and determine the causes for its failure in the South Pacific. The workshop also looked at ways for making the technology more affordable to villages and households.

In 1996[10], a workshop was conducted by SOPAC on appropriate and affordable sanitation for small islands. This workshop provided information on sanitation options, produced a guidelines booklet, and promoted health and hygiene standards associated with sanitation in Kiribati.

Furthermore, in 1998[11] field investigations were carried out for the demand management and conservation project. Information relating to water issues was collected and observations made on the current water-sector practices in Kiribati. Local water sector staff were trained in the principles of water demand management and use of monitoring equipment.

Several workshops have been organised by SOPAC to evolve strategies on water resource management and development. A regional consultation workshop on water resource management in the Pacific regions was held in 1996[12]. Some of the constraints specific to Kiribati 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[13]. 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 Kiribati.

During the 1999 World Water Day, organised an Essay and Poster Competition for schools. The theme 'Everybody Lives Downstream' helped raise public awareness on the flow-on effects of water pollution and mismanagement. The day also highlighted the need in island nations to manage freshwater resources wisely and a public forum was organised as well.

In addition to these, SOPAC since 1979 has been running an Earth Science programme for technicians from member countries. Since 1995, when the Water and Sanitation Programme was first attached to SOPAC, a module relating to water issues was added to the certificate course at the University of the South Pacific.

Several projects have also been proposed to address water issues in Kiribati. These include the assessment of the water resources of Banaba and the identification of alternative potable water sources[15] and the monitoring of Kirimati Island's water project[16].

SOPAC realises the need to assist with water and sanitation problems in Kiribati and suggested the following to be implemented:

- development of policy and legislation;
- water sector action plans for Kiribati;
- undertaking of pilot projects, research and feasibility studies to address water and sanitation issues; and
- improvement of infrastructure within the water and sanitation sector, eg. proper maintenance of toilets.

[9]SOPAC Technical Report 229
[10]SOPAC Miscellaneous Report 238
[11]SOPAC Miscellaneous Report 302
[12]SOPAC Miscellaneous Report 229
[13]SOPAC Miscellaneous Report 223

[14]SOPAC Miscellaneous Report 251
[15]Task Profile KI 99.022
[16]Task Profile KI 99.049

CLIMATE & SEA-LEVEL VARIABILITY

Global climate variability may be responsible for increasingly more-frequent and more-severe storms, interspersed with scorching droughts. The impact of this variable climate has been harsh on the ecosystems and coastal, terrestrial and marine biodiversity. 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 that can have detrimental effects on the social and economic systems 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.

Some of the potential effects of climate variability include an increase in the frequency of tropical cyclones. Even though Kiribati lies outside the normal cyclone belts to the north and south of the equator, the effect of distant storms and cyclones can sometimes be felt in the northernmost and southernmost islands. Other effects of variable climate comprise the inundation of low-lying atolls, saltwater contamination of freshwater lenses, increased coastal erosion and the loss of already limited and valuable land. While the actual impact of climate change at the local level has not been assessed, the issue of global warming and sea-level change and its possible impact on the environment is of critical concern to the government and people of Kiribati.

Although SOPAC has not provided Kiribati 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 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

Coastal erosion is one of the major problems facing Kiribati. Being a small low-lying and relatively flat country, Kiribati is entirely coastal. Therefore most activities such as recreation, liquid and solid waste disposal, extraction of sand and gravel rock for construction and building of roadways take place along the shorefront of Kiribati. However, due to the lack of understanding of the wave and current dynamics around the islands and the misconception that the coasts will recover, these atoll environments are under severe stress and are affected by significant erosion, pollution and damage to marine coastal biodiversity.

Activities that contribute to the increasing problem of erosion on Kiribati include fill reclamation for road construction, blasting of reefs for boat channel construction, and aggregate mining for construction purposes[17]. Coastal erosion is most acute near the urban centre of South Tarawa, where population density, unregulated shorefront development and over-exploitation of coastal resources are the highest.

On-the-field training

SOPAC has been assisting Kiribati in addressing the coastal erosion issue through technical field surveys, coastal mapping workshops, in-country training seminars and public awareness campaigns.

The establishment of a beach-monitoring programme on Betio and Bairiki in 1982 was one of the first activities of SOPAC after Kiribati became a member country following independence in 1979. Beach profiles were established to monitor beach changes near a proposed causeway between Betio and Bairiki Islands in South Tarawa. The surveys continued till 1988[18].

[17]Task Profile KI 99.025
[18]SOPAC Technical Report 94

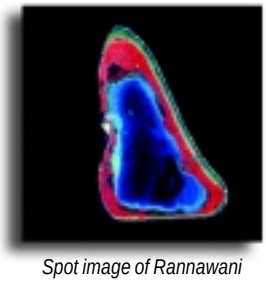
SOPAC carried out coastal-zone field surveys on Tarawa atoll and Kiritimati in 1982[19] and 1983[20] respectively, to examine coastal erosion problems in these areas. Alternative strategies of resolving erosion problems were considered in this assessment. Similar studies were conducted on Abaiang Atoll in 1989[21] and the Gilbert Islands Group in 1992. Subsequently, an action plan to deal with erosion problems was developed[22].

To assist Kiribati in meeting the immediate needs for sand aggregate SOPAC has undertaken several projects[23]. These include the identification of alternative aggregate sources and their assessment[24]. An assessment study was also done for the demands for sand and gravel in Tarawa[25]. Recently, SOPAC conducted a training workshop on beach dynamics and coastal processes in Tarawa[26]. This formed part of an in-country training session to provide information for Government personnel on coastal processes. A draft beach manual and several technical guidelines were prepared for this activity.

Use of coconut trunks as protection against erosion

Several recommendations have been put forward by SOPAC to tackle coastal erosion and manage sand aggregates:

- implementation of appropriate environmental policies and legislation;
- use of advanced technology for shoreline protection;
- management and maintenance of coastal structures; and
- identification of alternative coastal aggregate resources using remote sensing and ground surveys.



Spot image of Rannawani

Given the critical importance of the coastal area as a source of subsistence activity and the small, low-lying and vulnerable nature of Kiribati islands, SOPAC will continue playing an important role in the future.

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 the Kiribati's pursuit of rapid growth.

SOPAC has been assisting Kiribati to improve its management systems and train personnel in Information Technology. This assistance includes:

- GIS workshop to provide training in MapInfo and remote sensing to staff of Lands and Survey Department and other agencies, in 1996.
- Fellowship attachments at SOPAC[27].
- Upgrading of the Ministry of Natural Resources information systems[28].
- ITPACNET, a regional annual meeting, created by SOPAC and FFA. The aim of this meeting is to standardise information technology and communications between CROP and the region.

[19]SOPAC Technical Reports 25 & 31
[20]SOPAC Technical Report 24
[21]SOPAC Technical Report 92
[22]SOPAC Technical Report 167 & Preliminary Report 52
[23]SOPAC Technical Reports 217 & 235
[24]SOPAC Preliminary Report 72
[25]SOPAC Preliminary Report 75
[26]Task Profiles KI 99.025 & 99.040
[27]Task Profile KI 98.021
[28]SOPAC Miscellaneous Report 195

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

As a regional data centre, SOPAC has been compiling geographical data on Kiribati.

In future, the focus will be on:

- Development of 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 (RS) techniques.

Future directions in Kiribati

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

SOPAC will further its partnership with Kiribati in developing onshore and offshore resources for minerals and hydrocarbons. Policy formulation will be a key area that SOPAC will develop as one of its core professional activity. 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 Kiribati in creating a national capacity in geo-science. SOPAC will continue its work to reduce Kiribati'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 Kiribati 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 Kiribati. This can be accessed through the library database, PIMRIS or the Internet.

Some of these reference materials relevant to Kiribati are:

- Maps of Kiribati (coastal, aerial, bathymetric)
- Project reports
- Educational/Awareness Pamphlets
- Videos
- Deep-sea minerals database
- Geological samples
- General reference material on Kiribati

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

For more information please contact:
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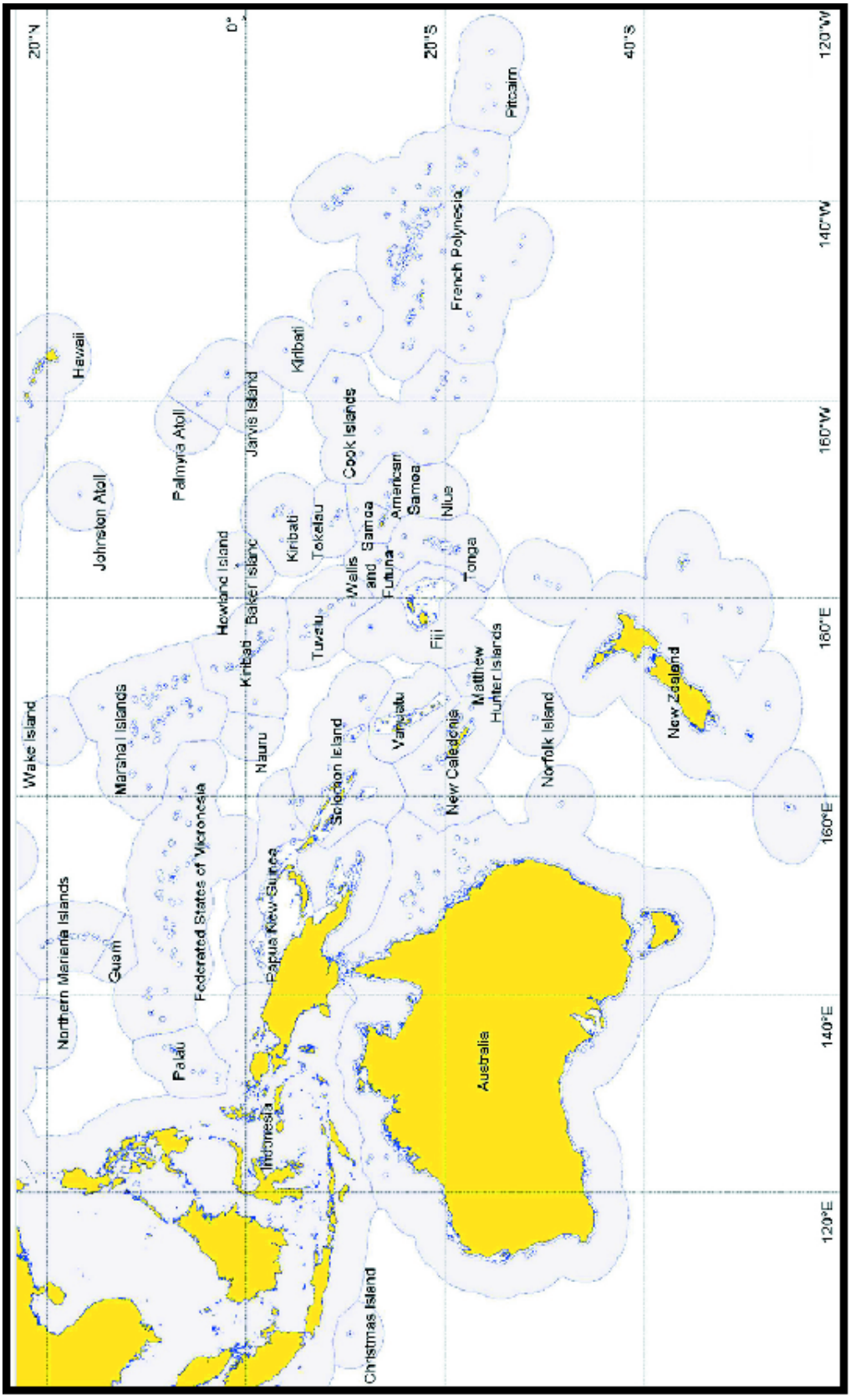
Website : www.sopac.org.fj

Issues and SOPAC's Responses for Further Development

ISSUES	CONSTRAINTS	RESPONSES FOR FURTHER DEVELOPMENT
Water & Sanitation	· Lack of management and maintenance of water supply infrastructure · Limited groundwater supplies · Demand exceeds potential of groundwater sources · Low rainfall · Groundwater susceptible to contamination by salt water and faeces · Inadequate water catchment and storage facilities · Lack of public knowledge on water conservation · High population density and insufficient sanitation facilities · Lack of public awareness of safe sanitation practices · Limited land available for landfill sites · Lack of awareness of the environmental impacts of poor waste management · Inadequate legislation to control waste disposal	· Development of resource policy and legislation · Assisting in development of rainwater catchment systems · Educating public on the importance of water conservation · Improvement of infrastructure within the water and sanitation sector · Holding workshops and training programmes to educate local people on safe sanitation and waste disposal practices · Undertaking pilot projects, research and feasibility studies
Coastal Management	· Poor land management practices · Uncontrolled coastal activities such as sand mining, leading to serious erosion · Inappropriate coastal development and protection works · Inadequate public knowledge on coastal zone management	· Development and implementation of appropriate policies and legislation · Identifying economically viable, alternative aggregate resources · Dialogue with the government and private sector on coastal development and managment · Public education and awareness raising about coastal degradation and management
Minerals	· Inadequate scientific research to define full potential of resources · High risks and costs associated with acquisition of data	· Development of resource policy and advice on the development of minerals · Encourage further research
Energy	· Importing fossil fuels to generate electricity placing increasing strain on the economy. · Lack of technical expertise in the energy sector · Inadequate public awareness on renewable energy sources and management	· Identifying viable renewable energy sources · Enhancing skills required by energy staff for management and operation of the energy sector through workshops and training programmes · Development of energy policies and legislation
Information Technology & Communication	· Limited availability and poor access to accurate, timely and sound scientific information · Poor human resource capacity in the IT sector · Lack of relevant regional and local data · High cost	· Upgrading of information systems · Providing training to locals in information technology · Compiling and organising databases · Assisting in the development of Internet access in Kiribati · 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.