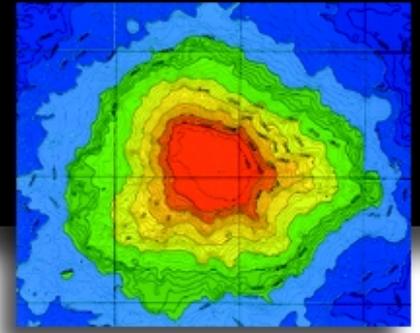


# SOPAC

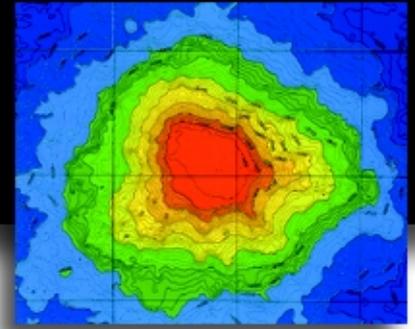


## COUNTRY PROFILE



# MARSHALLS

# 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



## Marshall Islands

"... while we are a government committed to development, we are very conscious of the need to protect and preserve our physical environment. We have a deep desire to keep our ocean space, especially our lagoons free from pollution. We are deeply concerned about the implications for long term planning of the possibility of sea level rise due to increased emission of greenhouse gases."

Honorable Lomes Mackay  
Minister for Resources and Development (1994)

<i>Capital:</i>	Majuro
<i>Population:</i>	63 200 (1999 est.)
<i>Land Area:</i>	181 sq. km
<i>Max. Height above Sea-level:</i>	3 m
<i>Geography:</i>	Double chain of small islands comprising 34 islands; eastern group is the Ratak (Sunrise) Chain and western is the Ralik (Sunset) Chain
<i>EEZ:</i>	2 131 000 sq. km
<i>Climate:</i>	Predominant influence is the northeast trade winds; temperature variations are slight with northern islands being slightly cooler than the southern
<i>Rainfall:</i>	Varies from north to south; Ujelang has an average of 2 030 mm per annum while Jaluit, further south, has twice that amount
<i>Mean Temperature:</i>	27°C
<i>Economy:</i>	Fairly heavy reliance on outside assistance principally in the form of grant assistance and lease payments from the United States, subsistence fishing and agriculture; exports include copra, coconut oil and yellow-fin tuna
<i>GDP per Capita:</i>	US\$ 1 182 (1998 est.)
<i>Currency:</i>	US\$
<i>Energy Sources:</i>	Biomass, solar and wind
<i>Freshwater Sources:</i>	Groundwater, rainwater and desalination
<i>Natural Hazards:</i>	Cyclone, storm surge, coastal flooding, drought, tsunami, erosion and saltwater intrusion
<i>Mineral Potential:</i>	On-land – unknown; Offshore – cobalt-rich manganese crusts
<i>Languages:</i>	Marshallese (Official language), English
<i>Government:</i>	Republic in a compact of free association with the USA
<i>SOPAC Membership:</i>	Full member since 1990
<i>Country Representative:</i>	Ministry of Foreign Affairs and Trade
	Government of the Marshall Islands
	PO Box 2. Majuro MI 96960
	Tel: (692) 625 3012. Fax: (692) 625 4979
	Email: <a href="mailto:mofat@ntmar.com">mofat@ntmar.com</a>



profile

# The Marshall Islands

The Republic of the Marshall Islands (RMI), a young independent nation, comprises approximately 1 225 low-lying islets which make up the twenty-nine atolls and five low-elevation islands. Its total land area is 181 sq km with a maximum height of 3 m above sea level. The archipelagic islands are spread over a vast area of ocean of 2 131 000 sq km in two roughly parallel island chains. The eastern group is the Ratak (Sunrise) Chain and the western is the Ralik (Sunset) Chain.

The RMI has a fast-growing population which is estimated at 63 200 in 1999<sup>1</sup>. Its population is among the youngest in the world – about 50 per cent of the people are less than 15 years old. This implies that the working-age population is growing rapidly in the Republic. More than two-thirds of the total population live in the two urban centres, Majuro and Ebeye.

The mainstay of the RMI economy is grant assistance from the United States. However, subsistence activities also remain key to survival on several of the outer islands and atolls. Although land resources are limited due to nutrient-deficient soils, they contribute to the

daily sustenance of the people of RMI together with the Republic's broad marine resource base. Both land and marine



*Aerial photo of Marshalls*

resources provide opportunities for economic development, as they contribute to the export earnings of the country.



*Children of Marshalls*

There are several resource and environmental issues, common to island nations, affecting sustainable development in the RMI. These include an array of

issues from population growth, 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 RMI's quest for development.

The Republic of the Marshall Islands has been a full member of the South Pacific Applied Geoscience Commission (SOPAC) since 1990. SOPAC is an independent, inter-governmental, 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.

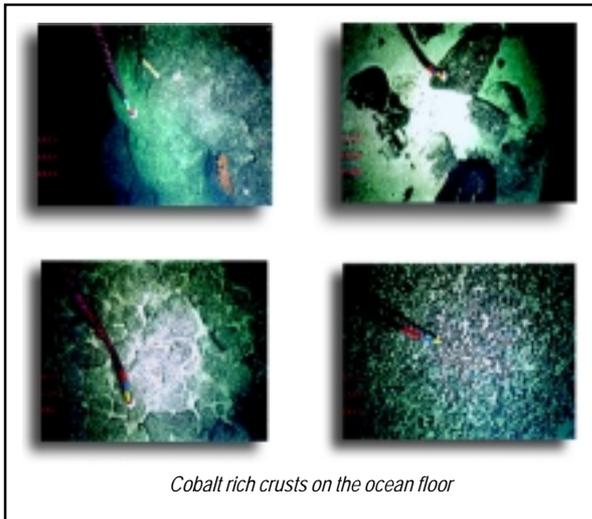
## Resource Development and Management

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 in the long run.

<sup>1</sup>SPC Demography Programme

## MINERALS

Offshore exploration, which is still at a nascent stage in the Marshall Islands, has shown the extensive presence of deep-sea mineral resources such as cobalt-rich crusts within its Exclusive Economic Zone (EEZ). The future exploitation of this mineral has the potential to provide great economic benefits to the country. Interest has been shown in these deposits and therefore a further survey is currently being formulated to assess the scope and potential for development.



## ENERGY

Marshall Islands is almost totally dependent on imported fossil fuel to generate energy. Importation of oil has increased because of a steady growth in population over the past several years, placing an increasing strain on the economy.

In the outer islands small diesel generators produce power along with a few solar panels. Solar energy is a renewable source of power that could be exploited to further the goals of sustainable development in the Marshall Islands.

## WATER & SANITATION

Fresh water is one of the fundamental resources for the survival and development of the Marshall Islands. 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.

In the Marshall Islands water and waste disposal are major problems. A public water-supply system delivers water to the Majuro population but due to inadequate water catchment and storage facilities, supply is limited and often contaminated. The only major catchment area is the airport runway; thus most of the precipitation is lost due to the limited capacity of the country to capture rainfall.

On Ebeye, there is a large desalination plant, which provides fresh water to a small segment of the population. Another supplement to fresh water in the Marshalls is groundwater. However, the system is inefficient and unreliable.

There are reticulated sewage systems in the two main urban centres (Majuro and Ebeye). Both areas have piped sewerage

systems terminating in the sea. However, some households are not connected to the sewerage system and thus have no sanitation facilities. Pit toilets are then dug deep to escape frequent relocation, therefore causing penetration and contamination of the groundwater and adjacent wells. This has serious implications for future use of groundwater as a freshwater source.

Rural households also resort to the natural environment and lagoon for their sanitation needs. Coupled with land development, the effluent from these sewage outfalls is so copious that solid wastes float to the surface, contaminating adjacent shorelines.



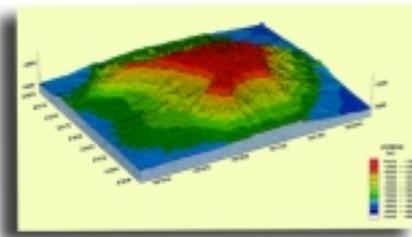
*Close proximity of latrine to water well*

# Challenges to Sustainable Development and SOPAC's role in the Marshall Islands

## MINERALS

SOPAC has been assisting the Marshall Islands in addressing issues related to the development of mineral resources. Assistance has included offshore explorations, assessment studies, training and workshops.

Deep-sea mineral resources including cobalt-rich crusts have great potential and economic significance for future prosperity of the Marshall Islands. In 1996<sup>2</sup>, SOPAC in partnership with Japan conducted a survey to assess the potential of cobalt-rich crusts in the EEZ of the country. Further surveys in 1998<sup>3</sup> discovered additional cobalt deposits in the northern part of the Marshall's EEZ. However, because extension of research is required for further assessment, SOPAC, in collaboration with Japan, signed another three-year contract in February 2000.



3-D topographic map of under-sea seamount

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.

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 led 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 the Marshall Island's goal of sustainable 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 the Marshall Islands.

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

Majuro is totally reliant on the use of fossil fuels for its electricity supply. Other, outer island groups are supplied either by diesel generators or from solar photovoltaic power. The Marshall Islands Energy Company (MEC) provides the diesel-generated electricity service.

SOPAC has assisted the Republic in the identification of renewable energy sources to reduce the dependence on imported fossil fuels. Currently, SOPAC is reviewing the Marshall Islands' solar electrification program to

<sup>2</sup> JICA/MMAJ Vol. 2 1997

<sup>3</sup> JICA/MMAJ Vol. 1 1999

make recommendations on how to improve its sustainability<sup>4</sup>.

Assistance was also provided to the country in the development of rural electrification and appropriate energy supply policies<sup>5</sup>. Potential opportunities such as Ocean Thermal Energy Conversion (OTEC) have been evaluated in detail and recommendations made to the government of the Republic to assist them in determining their most appropriate energy options.

The supply of conventional energy to rural areas by urban-based energy utilities is generally uneconomic. To the rural dwellers, increased energy supply is often

their only hope for improving their standard of living. There is an abundant supply of energy sources in the rural areas. The wind, the solar radiation, the rivers and the forest covers are examples of these abundant energy

sources. The rural dwellers must work together as a community to address their energy needs. Experience in the region has shown that community and rural-based "energy utilities" can be sustainable if the proper business-management practices are observed and the appropriate institutional and policy frameworks are in place. Unfortunately this is currently not the case and it has been identified that assistance in the design and development of a regionally acceptable system will help enhance these rurally focussed energy sector initiatives and activities.

Several training workshops have also been organised by SOPAC for the citizens of RMI to strengthen their capacity in evaluating new and renewable energy sources and managing the energy sector as a whole. In 1998<sup>6</sup>, SOPAC convened a regional energy programme-design workshop in Nadi, which outlined the energy sector priorities of Pacific nations and drew up a programme for the period 1999-2004. Wind,

geothermal energy, biomass and hybrid systems were identified as energy sources of the future for the islands.

SOPAC realises the need to assist the Marshall Islands in:

- encouraging the use of low-emission technologies and native energy sources;
- providing reliable energy services based on the least-cost strategy and technically proven technologies; and
- guaranteeing full cost recovery from customers for the provision of energy.

## WATER & SANITATION

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

SOPAC's role in addressing the water and sanitation issues of RMI began in 1995, when the Water Resources unit was first attached to the organisation. In 1996<sup>7</sup> studies were carried out to identify areas which were the most affected by water and sanitation problems. A consultation workshop<sup>8</sup> was carried out to identify alternative sources of water in the same year. Through this workshop an Action Plan was formulated addressing water and sanitation problems and long-term approaches to solving the problem.

1999<sup>9</sup> saw the completion of a small-scale wastewater treatment plants project, which identified appropriate



*Solar photovoltaic panels being tested*



*Water training*

<sup>4</sup> Task Profile MH 99.008  
<sup>5</sup> SOPAC Misc Report 311  
<sup>6</sup> SOPAC Misc Report 315

<sup>7</sup> SOPAC Trip Report 223  
<sup>8</sup> SOPAC Misc Report 229  
<sup>9</sup> Task Profile MH 99.006



*Erosion is an increasing problem in the Marshalls*

wastewater treatment technologies for villages in the Marshall Islands. Also in 1999<sup>10</sup>, a water-quality database was created to increase the capability of the Marshall Islands

Environmental Protection Authority to manage environmental data more efficiently.

The lack of sustainable fresh water and increasing demands on freshwater resources have been identified as amongst some of the primary constraints to development of the South Pacific. Of the roughly 50% of water that does reach the user, a significant proportion is wasted through poor usage practices. Through efficient demand management and conservation of water supplies, pressure on freshwater resources will reduce thus making more water available for other development or for future use. The actual savings to the operational budgets of small island economies will also be significant. By taking less out of the already stressed water sources, the environment benefits as well.

SOPAC continues to work in the Republic to reduce wastage of fresh water through good demand management and conservation practices by water suppliers and water users<sup>11</sup> respectively. This would in turn make more water available for environment enhancement and for future generations.

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

- development of policy and legislation;
- undertaking of pilot projects, research and feasibility studies to address water and sanitation issues; and
- the need to improve infrastructure within the water and sanitation sector, eg. metering of water supply.

## 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 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, which 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 implication of variable climate is high.

The El Niño Southern Oscillation (ENSO) event caused by regional atmospheric variations has had drastic effects on the precipitation and climate patterns in the Marshall Islands. The ENSO effect led to major water shortages in Majuro.

SOPAC investigated the short- and long-term effects of the ENSO event for the Majuro area and identified feasible options and recommended actions<sup>12</sup>.

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 30-100 cm by the end of the 21st century. This prediction has serious implications for the Republic as the rising sea could submerge most of the low-lying atolls. Salt-water contamination/ intrusion of shallow freshwater lenses will also occur.

In addition, damage to infrastructure by coastal inundation, wave run-up and tidal surges could be immense. Communities can be completely destroyed, with significant loss of lives. The social and economic impact of this on a developing economy is very severe, and can lead to persistent poverty.

Although SOPAC has not provided the Marshall Islands any assistance to date with the issue of climate and sea-level variability, the increasing importance of this

<sup>10</sup> Task Profile 99.011

<sup>11</sup> Task Profile MH 99.001

<sup>12</sup> SOPAC Technical Reports 258 & 260

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

Being a low-lying atoll country, the Marshall Islands is entirely coastal and has limited land resources. Therefore, the loss of any coastal land has a much greater significance here than in other topographically higher island countries, and thus, on sustainable development and the future of the Marshall Islands.

There have been rapid changes in the coastal geography associated with ad hoc land reclamation, road construction and dredging as part of burgeoning urbanisation. To protect reclaimed land from the onslaught of the sea, various protection systems such as concrete sea walls, gabions and rip-rap 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.

Poor construction and development practices, indiscriminate reclamation and aggregate mining in the reef areas cause coastal instability and beach erosion.

Coastal erosion problems are exacerbated by the removal of aggregate from many beaches, at rates that exceed replenishment. Unmanaged aggregate mining leads to coastal instability resulting in reef degradation and impingement on fisheries. Chronic coastal erosion

can also lead to the significant loss of coastal lands and infrastructure.

Dredging activities have minimal

regulations in the

Marshall Islands and

rip-rap is quarried from the reef by drilling and blasting operations. In addition, coastal pollution destroys reef biota.

The problems relating to the continued exploitation of beach aggregate in the Marshall Islands need to be addressed immediately. This requires the assessment of alternative aggregate resources and the development of a management strategy to minimise coastal erosion.

SOPAC has been assisting the Marshall Islands in addressing the coastal erosion issue through coastal-zone field surveys, coastal mapping workshops and public awareness campaigns. One of the key projects undertaken in the Marshall Islands was a coastal mapping workshop in 1994<sup>13</sup> held in Majuro to train local officials in field mapping techniques that are useful for evaluating coastal development. Another coastal zone management workshop was held in 1996<sup>14</sup>, the objective being to train personnel in aggregate assessment, field work for bathymetric surveying, collation of maps, basic MapInfo and use of Geographical Information System (GIS).

A survey of Majuro Lagoon was conducted in 1997<sup>15</sup> to establish beach profiles on Laura Island. This activity served as a forum for educating the locals about the impact of coastal engineering works and their relationship to erosion.

SOPAC developed a specific public-education campaign for the Marshall Islands on this important issue. This involved the production of a pamphlet and three leaflets translated into the vernacular language highlighting the significant problems of coastal erosion and the importance of coastal management and



*Aggregate mining causes coastal instability and beach erosion*



*Coastal mapping*

<sup>13</sup> SOPAC Training Report 66

<sup>14</sup> Task Profile MH 97.016

<sup>15</sup> SOPAC Technical Report 254



*Erosion causing loss of traditional sites*

appropriate protection strategies<sup>16</sup>.

In addition to this, SOPAC carried out a project in Majuro Lagoon to identify alternative

sand aggregate sources<sup>17</sup>. Deposits were identified in the northeast part of Majuro Lagoon.

Several recommendations have been made by SOPAC to address coastal erosion and manage reef and beach aggregate mining. These include:

- implementation of appropriate environmental policies and legislation;
- 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.

Given the critical importance of sustainable development in Fiji, SOPAC will continue playing an important role in coastal preservation and the development of sound policies to ensure better management of coastal 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

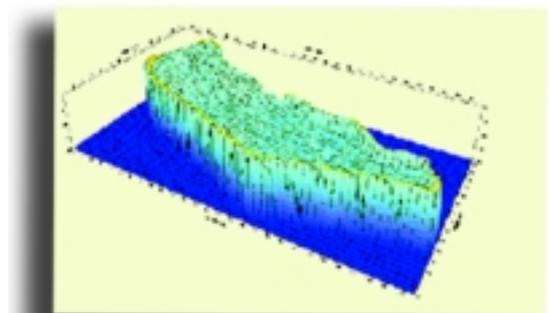
cost of communication between the various islands. Given the small size of these nations, technology providers are reluctant to supply cutting-edge technology because of poor economies of scale and difficulties in monitoring. Low human capital endowment further complicates the situation. These problems are a constraint in the Marshall Islands' pursuit of rapid growth.

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

- The development of improved software and GIS utilities<sup>18</sup>.
- Digital organisation of coastal data and information<sup>19</sup>.
- Support for GIS and remote-sensing (RS) capacity<sup>20</sup>.
- Assistance in the development of Intranet and Internet<sup>21</sup>.

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

As a regional data centre, SOPAC has been compiling geographical data on the Marshall Islands.



*3 Dimensional view of Majuro Atoll*

<sup>16</sup> Director's Report 1998

<sup>17</sup> SOPAC Technical Report 215

<sup>18</sup> Task Profile MH 98.012

<sup>19</sup> Task Profile MH 98.013

<sup>20</sup> Task Profile MH 98.008

<sup>21</sup> Task Profile MH 98.010

## *Future Directions in the Marshall Islands*

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

SOPAC will further its partnership with the Marshall Islands in developing offshore resources of cobalt-rich crusts. 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 the Marshall Islands in creating a national capacity in geoscience.

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 the Marshall Islands 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.



*Severe erosion causing loss of road*

## *Reference Materials*

SOPAC provides access to a variety of information relating to the Marshall Islands. This can be accessed through our library database, PIMRIS or the Internet.

Some of these reference materials relevant to the Marshall Islands are:

- Maps of the Marshall Islands (coastal, aerial)
- Project Reports (Technical, Cruise, Preliminary Reports, etc.)
- Education/Awareness Pamphlets
- Videos (eg. deep-sea mineral resources)
- Geological samples
- Deep-sea Mineral Database
- General reference material on the Marshall Islands

Please refer to Marshall Islands' Bibliography for SOPAC's full reference and material listing.



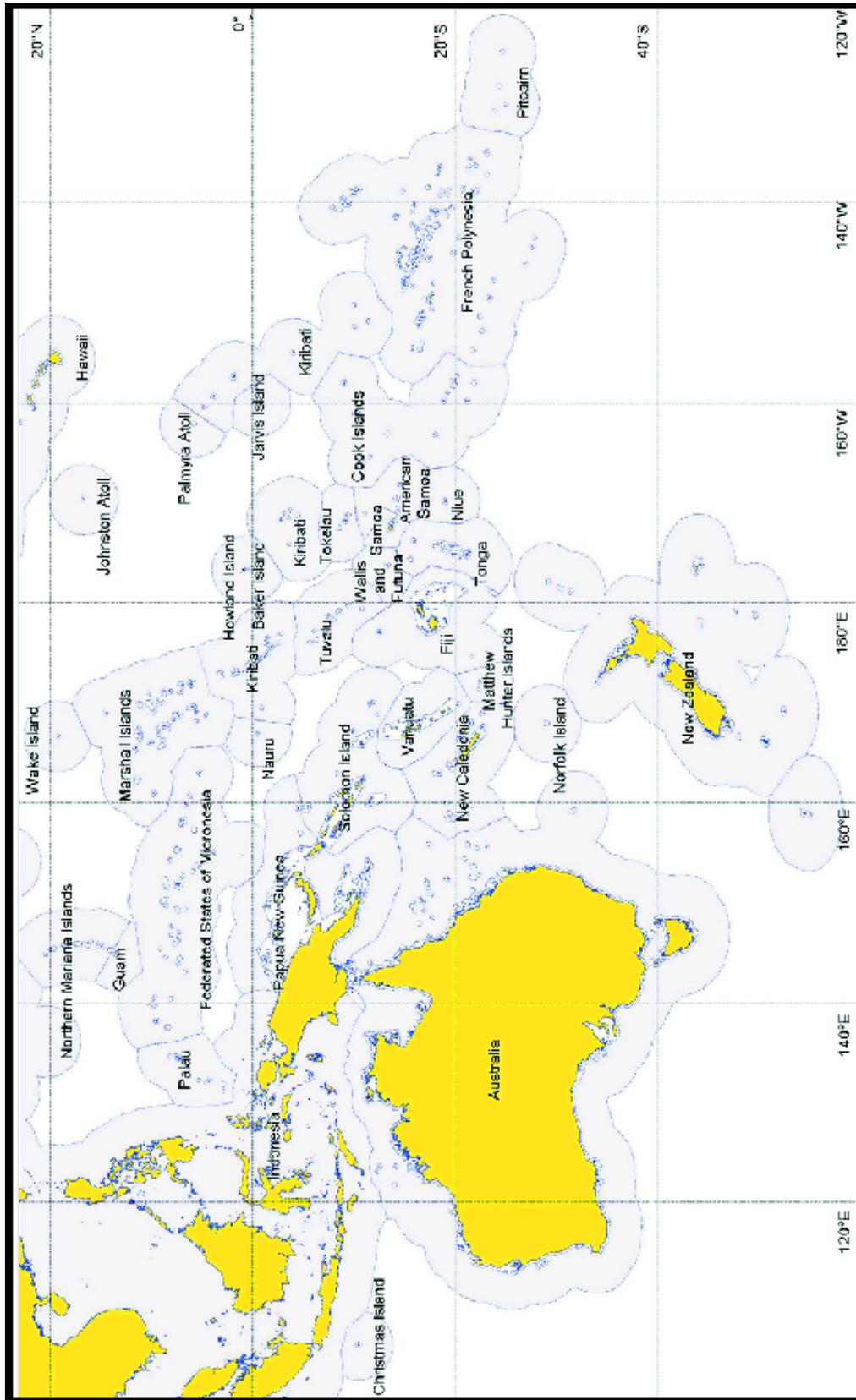
*Aerial view of Marshall Islands*

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Website : [www.sopac.org.fj](http://www.sopac.org.fj)

## Issues and SOPAC's Responses for Further Development

ISSUES	CONSTRAINTS	RESPONSES FOR FURTHER DEVELOPMENT
Water & Sanitation	<ul style="list-style-type: none"> <li>· Limited freshwater supply</li> <li>· Inadequate water catchment and storage facilities</li> <li>· Contamination of groundwater and wells by adjacent pit-toilets</li> <li>· Diminished water supply as a result of population growth</li> <li>· Water wastage through poor demand and conservation and management practices and leakage</li> <li>· Insufficient sewerage systems for the entire population</li> <li>· Lack of public knowledge of safe sanitation practices</li> <li>· Limited area for solid-waste disposal</li> </ul>	<ul style="list-style-type: none"> <li>· Development of resource policy and legislation</li> <li>· Undertaking of pilot projects, research and feasibility studies</li> <li>· Increasing public awareness on sustainable water management through training and workshops</li> <li>· Advising on the improvement of infrastructure within the water and sanitation sector</li> <li>· Educating the public on safe sanitation and waste-disposal practices at all levels</li> <li>· Training of local people</li> </ul>
Coastal Management	<ul style="list-style-type: none"> <li>· Coastal-zone management plan yet to be implemented</li> <li>· Unmanaged sand mining and dredging</li> <li>· Inappropriate coastal development and protection works</li> <li>· High population growth rate putting increasing strain on coastal areas</li> <li>· Poor awareness of environmental impacts of coastal degradation</li> </ul>	<ul style="list-style-type: none"> <li>· Implementation of appropriate policies and legislation</li> <li>· Identification of alternative potential aggregate resources using remote-sensing techniques</li> <li>· Educating the people about coastal degradation and management through workshops and field training</li> <li>· Dialogue with the government and private sector on coastal development and management</li> </ul>
Minerals	<ul style="list-style-type: none"> <li>· Inadequate scientific research to define full potential of resources</li> <li>· Absence of legislature framework for the management of offshore resources</li> </ul>	<ul style="list-style-type: none"> <li>· Assessing the potential of cobalt-rich manganese crusts in the Republic's EEZ</li> <li>· Development of resource policy and advice on the development and management of offshore minerals</li> <li>· Encourage further research</li> </ul>
Energy	<ul style="list-style-type: none"> <li>· Use of fossil fuels to generate electricity placing an increasing strain on the economy through imports</li> <li>· Inadequate public awareness on renewable energy sources and management</li> </ul>	<ul style="list-style-type: none"> <li>· Identification of viable renewable energy sources</li> <li>· Development of rural electrification</li> <li>· Development of appropriate energy policies</li> <li>· Enhancing the skills required by local staff for management and operation of the energy sector through workshops and appropriate training</li> </ul>
Information Technology & Communication	<ul style="list-style-type: none"> <li>· Limited availability and poor access to information</li> <li>· Lack of skilled people to manage the IT sector</li> <li>· Lack of relevant regional and local data</li> <li>· High costs</li> </ul>	<ul style="list-style-type: none"> <li>· Development of improved software and GIS utilities</li> <li>· Digital organisation of coastal data</li> <li>· Assisting in the development of Intranet and Internet in the Republic</li> <li>· Training of local staff in information technology</li> <li>· Coordination, compilation and creation of standardised geographic data sets</li> </ul>
Human Resource Development	<ul style="list-style-type: none"> <li>· Weak human resource base</li> <li>· Limited financial and institutional resources</li> <li>· Limited expertise</li> </ul>	<ul style="list-style-type: none"> <li>· Conducting workshops and technical training programmes to improve national capacity in the geosciences</li> <li>· Running the Earth Science and Marine Geology course to improve the human resource base</li> <li>· Fellowship attachments</li> </ul>



## 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.