

SPREP

**South Pacific Regional
Environment Programme**



PROE

**Programme régional
océanien de l'environnement**

P.O. Box 240, APIA, Samoa. Tel.: (685) 21 929
Fax: (685) 20 231, E-mail: sprep@sprep.org.ws website: <http://www.sprep.org.ws/>

Challenges of Managing Healthy Environmental Resources in the Coastal waters of the Pacific.

Chalapan Kaluwin¹

South Pacific Regional Environment Programme
PO Box 240
Apia
Samoa.

**Pacem in Maribus XXVII Conference
8-12 November, 1999**

University of the South Pacific .

Abstract

The environment and economic health of marine and coastal waters are linked to individual people, community, regional, national and international levels. The interdependence of the island economy and their environment are very well known.

The size of the land mass of Pacific Islands countries are very small compared to the oceans and its resources, as they live on and exploit it to sustain their livelihood. Published scientific research on environmental problems (1, 2,3,4,5,6, 11) in the pacific waters are now available. These reports identify that there widespread environment problems such as land base domestic waste, soil loss, run off of forest products, toxic chemicals, mining, radioactivity and coastal erosion problems which end up in the oceans and contaminate and destroy the marine resources (coral reefs, fishing). Much of the coastal waters/oceans, its processes and its interrelationship between land and sea in unknown. Much of the harvested daily marine resources depend on healthy environment to exist.

The new challenge in dealing with emissions of greenhouse gases and climate variability derived from the atmosphere and coupled with environmental changes pose great impacts on the environment and marine sectors of coastal waters nations. The surface of oceans will expand due to thermal expansion and giving rise of sea level which will impact on water resources, agriculture, housing, coastal erosions, waste pollution, health, coral reefs, fisheries and migration within and between coastal states in the Pacific Region.

This paper will address the environment and oceans relationship and constraints; and identify options, which needs researching into, so that sound coastal management decisions can be made among users of ocean and land resources.

¹ *The Views expressed in this paper do not necessarily reflect those of the management of the South Pacific Regional Environment Programme.*

A. Introduction

Since early 1980's very little has been scientifically researched and documented on environmental problems (1), in the Pacific Region except for some specific and general studies on the environmental assessment on developmental projects. During the process on the formation and establishment of the autonomous South Pacific Regional Environment Programme (SPREP) by its 26 member governments in 1992, a lot of finance and human resources have been devoted to monitoring, studies and research on environmental problems, these have been undertaken and coordinated by SPREP. These reports (2-6,11) have been published to identify key priority national, regional and global environmental problems in the region that needs urgent actions.

The Pacific ocean (including enclosed seas) is an essential component of the Pacific (global) life support system. Every activity, whether natural or anthropogenic, has a far reaching impact on the region and the world. For example, solid waste disposal will contaminate the waters and fisheries or excessive emissions of greenhouse gases may contribute to an increase in the sea level and causing flooding or increase cyclone intensity and frequencies. 98% of the Pacific Island's Exclusive Economic Zones (EEZ) is the ocean surface, which influence climate, weather and the state of the atmosphere and provide food and other resources to the Pacific people.

B. Issues and Constraints.

The discussions of these challenges, issues and constraints faced by the PICs are summarised in regional overview reports (2,3,6,7). On the state of the environment in the Pacific the reports and information accumulated during the 15-20 years of SPREP work and activities clearly identifies the common environmental concerns and challenges that affect the majority of countries and territories in the region. These have been identified as priority issues at national level and development of some legislations were passed to protect the environment and sustain economic development and include:

- Solid Waste Accumulation and Disposal
- Water Contamination
- Toxic chemicals
- Climate Variability, Change and Sea Level Rise
- Hazardous Waste and Radioactive Materials
- Marine Pollution of coastal waters
- Destruction of Coral Reefs
- Coastal Erosion
- Mining
- Forestry
- Soil loss.

In discussing the theme of this workshop on the "Oceans in the New Millennium: Challenges and Opportunities for the Islands" this paper will address three most pressing regional priority environmental issues: Solid Waste Accumulation and Disposal, Marine Pollution (Oil and hazardous waste and radioactive materials), Climate Variability, Change and Sea level Rise and how they influence the health of the ocean islands, and impact on the people of the Pacific Island Countries; these will continue to haunt the Pacific Islands Governments as long term issues into the new millennium if no immediate actions are put into place.

C. Environmental Challenges

Currently, the Pacific countries face numerous environmental challenges, each rooted in unique combinations of social, cultural and economic issues. The purpose of this section is to discuss 3 considered important regional environmental challenges that face the region and how these have and continue to impact on the health of the Pacific Ocean and its people:

- Solid Waste Accumulation and Disposal,
- Climate Variability, Change and Sea Level Rise, and.
- Marine Pollution (Hazardous waste and Radioactive materials and oil contamination)

1. Solid Waste Accumulation and Disposal.

The rapidly growing population and production of garbage and sewage in the Pacific Islands pose threats to human, environment and the ocean of the region.

The most visible and widespread environmental problem affecting 90-95% of the Pacific Countries is the safe and proper disposal of domestic/land base sources (4,5,11). Few countries have waste collection, allocated waste disposal sites and treatment facilities but finance of suitable environmentally friend technology and proper maintenance are the main draw back.

For example, Table 1 provides national available data (6) from the region and one can conclude that domestic solid waste generation is of the order of 0.3-0.7kg/capita/day. Organic/biodegradable material generally makes up about 50% of this. Other important components of the solid waste stream include plastics, glass, metals, paper, batteries, white metal goods, and pesticide containers.

Table 1. Characteristics of Municipal Solid Waste in Pacific Island Countries

Item	Honiar a, Solomo n Islands	Pohnpei, FSM	Majuro, Marshal l Islands	Apia, Samoa	Rarotong a, Cook Islands	Nuku'alof a, Tonga
Year	1990	1991	1991	1993	1994	1994
Composition (% by wet weight)						
Vegetable/ Putrescible	18	11	2	45	7	60
Paper	2	13	13	13	11	16
Textile	0	1	3	3	1	2
Leather/ Rubber	0	1	2	0	1	0
Plastic	4	17	16	8	13	9
Metal	8	17	10	14	12	7
Glass/ Ceramic	2	8	6	2	17	2
Garden Waste	0	32	44	14	28	4
Miscellaneous	66	0	6	1	10	0
Bulk Density (kg/m ³)	270	120	110	350	100	Not known
Generation Rate- kg/capita/day	0.38	0.38	0.38	0.52	0.19	0.68

The result of poor management of domestic/land base pollution has impacted greatly on the health of water quality, lagoons and beaches, marine resources, agriculture and recreational sites.

2. *Atmospheric – Climate Change & Sea Level Rise*

Little information (8) on air quality over the last 100 years exist in the Pacific region. Localised air pollution from smelting, cement factories, bush fires, diesel generators and mostly from vehicles is present in larger urban areas/towns, and dispersed by climate variability and local atmospheric pressure conditions. Atmospheric pollution is not perceived by most PICs as a problem since most islands are not highly industrialized.

Latest results from SPREP studies (9,14) show that the greenhouse gas emissions from mainly carbon dioxide prove that the Pacific islands region's contribution to global warming is minuscule. The region contains 0.12 per cent of the world's population and produces approximately 0.03 per cent of global CO₂ emissions. Per capita emissions from the Pacific islands region are approximately 0.96 tonnes per year—well below the global per capita emissions in 1996 of 4.02 tonnes.

Globally, however, trends in the concentrations of carbon dioxide and other greenhouse gases have increased significantly, consequently warming the atmosphere and thus impacting on the climate systems in the Pacific ocean and the world.

The findings from the Intergovernmental Panel on Climate Change (IPCC,15) confirm that “ the balance of evidence suggest a discernible human influence on global climate” and more predictions (8) have suggested that human effect on climate is surfacing. Research and studies (8, 13) in the region to address the energy flux or transfer of energy from the atmosphere and oceans continue so to influence the climate variability, change and sea level rise and daily weather patterns of the pacific ocean. The impacts of combined climate change, variability (cyclones, El Nino) and sea level rise on the peoples, oceans and the economic sectors will be enormous on a long term one.

For example with the regards to understanding the global situations and the region, figure 1 and Table 2 provide some useful information on the influence of sea level and climate variability as the largest signals in the Pacific ocean. The Intergovernmental Panel on Climate Change (IPCC) ‘best estimate’ of global sea-level rise is an increase of about 50 cm by 2100. Current observational data indicate a regional (i.e. for the Pacific) average sea-level rise of 2 – 3 mm per year between 1994 – 1999. This is somewhat higher than the IPCC estimate of a 10 – 25 cm global sea-level rise in the last 100 years, and is likely related to changes in ocean currents associated with El Niño events. It is not currently possible to state with certainty whether a clear long-term trend exists for the Pacific islands region, because detailed recording of sea level in the Pacific Ocean has only been carried out since 1994. However, it is worth noting that based on data from the 11 tide gauges installed in 11 Pacific island countries since 1994, relative sea levels in the South Pacific have risen by as much as 25 mm per year between 1994 and 1997. This is more than 10 times the global rate of sea-level rise this century. This finding (13) has been validated by satellite data which show an increase of 2 – 3 cm per year, particularly from Papua New Guinea to Fiji.

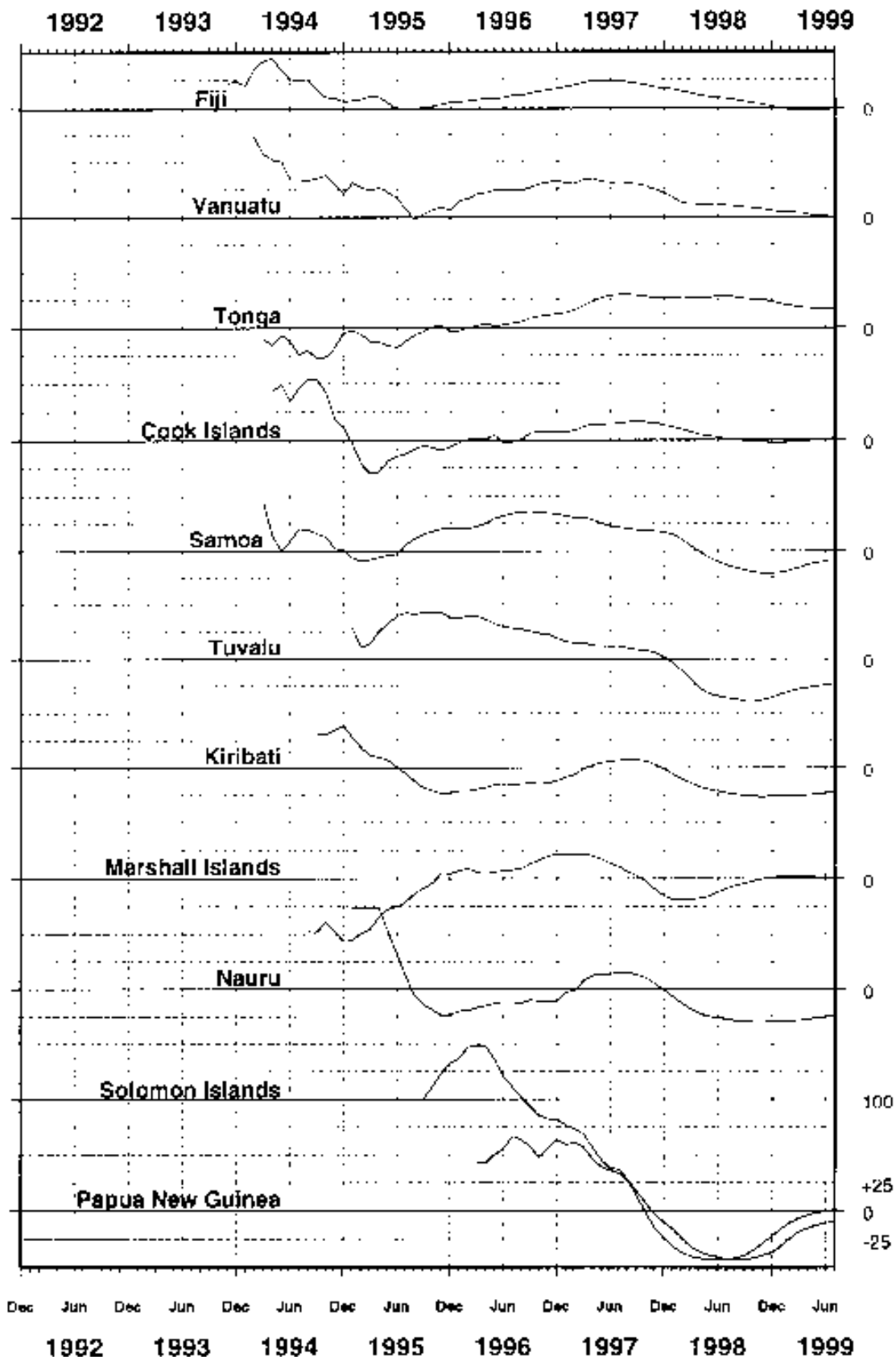
Table 2. Recent Relative Sea Level Trends in the Forum Countries.

Recent Sea Level Trends in the Project Area Based upon Project Data [Until October 1999]			
No	Location	Length of Data [in months]	Trend [mm y⁻¹]
1	Cook Islands *	80	+6.5
2	Samoa	80	-6.0
3	Tonga	81	+17.6
4	Tuvalu *	78	-17.5
5	Fiji	85	+0.7
6	Kiribati*	78	-20.0
7	Marshall Islands *	74	+1.4
8	Vanuatu	71	+1.9
9	Nauru *	75	-20.4
10	Solomon	61 [with gaps]	-1.3
11	PNG [Manus Is]	48 [with gaps]	+5.9

* Countries seriously concerned about sea level rise [+ rising; - falling].

Figure 1.

SEA LEVEL TRENDS THROUGH JULY 1999 (mm/year)



By far all PIC governments consider global climate change and variability and associated with potential sea level rise as the most threatening long term atmospheric-environmental issue which will impact on their oceans, marine life and other natural resources.

3. Marine Pollution- (Hazardous waste and Radioactive materials and Oil Contamination)

The oceans and their living resources are under tremendous pressure from land –base human activity. Most marine pollution originate from land-base sources, while some is atmospheric (see above); but less than 23 % originates from maritime transportation, off-shore and ocean dumping (12). An estimation of relative contribution of pollutants into the sea/ oceans by human activities are; 1% offshore production, 12% maritime transportation, 10% dumping; 44% run-off and land-based discharges, and 33% atmosphere.

In this region 12 countries in 1994 consumed approximately 21 million litres of oil, assuming that at least 50% of this volume is recovered as waste (6,16).

However, majority of the PICs have identified maritime transportation (hazardous waste and radioactive materials and oil contamination) as a concern to their sensitive mangroves, coral reefs, sea grass beds and other marine life systems. In addition other environmental impacts on the pacific ocean include; translocation and introduction of species, disposal of ships wastes and leaching of toxic chemicals and waste. This can be viewed as potential environmental time bomb issue in the future.

A number of oil spillage accidents from ships and petrol/diesel storage centres in the region like Fiji, Papua New Guinea, Marshall Islands, Tuvalu, American Samoa and Solomon Islands have occurred in the last 10 years. A number of countries have developed oil contingency plans, but lack finance to purchase appropriate technology for clean-up operations and most importantly lack skilled personnel to operate and manage these equipment.

Compared to other regions of the world the Pacific ocean is relatively free of marine pollution. This may be due to the large ocean area and relatively low intensity and small size ships servicing the region. Never-the – less, there are some serious pollution “hot-spots” in the region, including detecting high level of tributyl tin in port sediments. The potential of a large oil slip accident in the region is just around the corner.

D. Impacts on the Health of Ocean Resources and People

These three regional environmental issues; domestic and land base waste (5), climate change and sea level rise (8,9), and oil/marine pollution (16) are common to all the Pacific Islands Countries are considered priority in addressing these as long term challenges. Approximately greater than 95% of the ocean/marine pollution come from these 3 sources.

As an individual issue and or combinations of these problems has impacted on the health of the oceans, living organisms and its people in the pacific and can be summarised as the following:

- Tropical disease transmitted water borne vectors (malaria, dengue and yellow fever) from land base waste and climate change sources.
- Water resources and marine environment quality reduced greatly affected by waste and oil pollution.
- Wetlands affected by domestic waste, climate change and oil pollution
- Coral reefs destroyed and killed in the presence of waste, climatic and oil/marine pollution
- Marine birds population would decline when exposed to waste, chemicals and oil spillages.
- Fisheries and aquaculture would be extinct in the presence of large concentrations of waste, oil and industrial pollution.
- Sporting and recreational sites contaminated with oil, waste and sea level rise
- Disruption to sea food security by waste and radioactive materials contamination, oil and climate change issues
- Beaches and coastal erosions exacerbated by climate change, variability and sea level
- Migration and resettlement of people in the oceanic islands due to sea level rise and climate change and oil contamination.

- Marine biodiversity population will be reduced exposed to waste, oil and climate change and variability.

E. Way Forward

PICs have developed a number of strategic plans for various sectors, for waste, marine pollution (Oil and hazardous waste and radioactive materials) and climate change. In general the coordination and implementation of these strategies are poor mainly due to lack of finance and political support. However, in protecting the health of the environment, Pacific ocean and its people from these environmental challenges/issues, a planning and trailing of a integrated coastal management (ICM) “no-regrets” approach may be the most useful tool in sustaining economic development on the condition that there is financial and political support.

F. Conclusion

Much about the ocean, its processes, and the relationship between land, oceans/seas and atmosphere is unknown. Much of the region’s harvested marine resources depend upon a healthy marine environment to exist. Continued research is needed so that sound management decisions can be made when conflict amongst users of oceans resources arise. The Pacific Governments are now moving beyond viewing health, safety, and pollution control as additional finance of doing business to an understanding of broader partnership, recognising that economic and traditional and cultural prosperity would be useless if coastal waters/marine areas are comprised or destroyed in the process of development

Although much progress has been made over the past 20 years in the region to enhance marine environmental quality and ocean resources, much work remains. The challenge is maintain and continue to improve the ocean/water quality as population of the islands increase and migration of people to the coasts and pressure of urbanisation increase. Continual use of education, community partnership, improve technology, and personal commitment and responsibility, the Pacific ocean quality should continue to improve and sustain economic development.

Reference:

1. Dahl, A.L. Oceania’s most pressing environmental concerns. *Ambio*, 13 (1984) 296-301
2. ADB, Environment and Development –a Pacific Islands Perspective. Asia Development Bank, Manila, 1992.
3. SPREP-The Pacific Way: Pacific Island Developing Countries’ report to the United Nations Conference on Environment & Development. 1992
4. National Environmental Management Strategies (NEMS) for 12 Countries –Cook Islands, Tokelau, Tonga, Western Samoa, Vanuatu, Fiji, Federated States of Micronesia, Kiribati, Marshall Islands, Niue, Solomon Islands, Palau. (1992-95).
5. Waste Management in Small Island Developing States in the South Pacific. Report of a Regional workshop organised by UNEP and SPREP in collaboration with Environment Australia, Canberra, ACT, Australia, 12-16 May 1997. Volume 2: Papers and Lectures presented.
6. Pacific Islands Environment Outlook is a joint UNEP, EU, SPREP publication 1999
7. SPREP Action Plan 1997-2000
8. Kaluwin C. and Hay J (editors) Third Climate Change and Sea Level Rise Proceedings, Noumea, New Calendonias, August 1997, SPREP Report, 1999.
9. Kaluwin C. and Sem G. Impacts of Climate Change on Pacific Islands Countries, SPREP Report 1999.
10. United Nations Framework on Convention on Climate Change
11. A World Bank Report: Voices from the Village- A comparative Study of Coastal Resources Management in the Pacific Islands, July 1999.

12. The International Tanker Owners Pollution Federation Limited: Technical Information Paper- Effects of Marine Oil Spills, 10 (19985)
13. South Pacific Sea Level and Climate Monitoring Monthly Report (October 1999), National Tidal Facility, Flinders University, South Australia.
14. Regional Greenhouse Gas Inventory- SPREP Report 1999.
15. Intergovernmental Panel on Climate Change (IPCC) WGI, 1996. Scientific Report.
16. PACPOL Strategy, SPREP Report (1999).