
Chapter 14

Co-operation for Environmental Management in the Pacific sub-Region



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Chapter 14 Sub-regional co-operation for environmental management in the South Pacific

I INTRODUCTION



Figure 1. The ocean hemisphere of our planet. Geosphere Project

The ocean hemisphere of Earth is visible from a point directly over Wellington, New Zealand. The only land in sight is Antarctica, Australia, New Zealand, Indonesia, the tip of South America and scattered small islands. The ocean hemisphere plays a vital role in the dynamics of our global ecosystem; shifts in currents and temperatures alter weather patterns around the globe. The plants and animals that inhabit the seas and the islands of Oceania include common and useful species such as tuna, and extremely rare and endangered species such as giant clams, manatees, sea turtles and flightless megapode birds.

Nearly all of the marine biodiversity, and virtually all of the biodiversity of the land, is in the care of some 27 million people. Seven million Melanesian, Polynesian and Micronesian people, living on small, scattered islands, are entrusted with 31 million km² of the surface of the planet. Kiribati's 83,400 people, for example, control an ocean area of 3.55 million km², which is larger than the United States. Each Pacific Islander is responsible for 10.49 km² of our planet.

Square kilometres of land and sea per person in Oceania

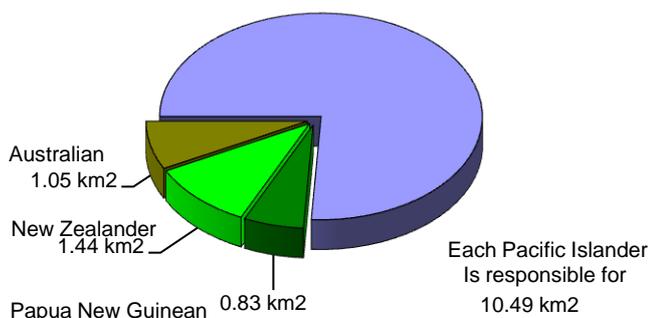


Figure 2. Square kilometres of land and sea per person in Oceania

The most severe sustainable development issues faced by the people of the small island developing states of the Pacific originate from the metropolitan countries of the land hemisphere. The sub-regional programmes for environmental management are, by default, reactionary to these problems and are planned, supported, and managed by a few hundred individuals whose programmes are supported and often directed with international assistance.

Locally produced environmental issues also threaten the life support system of the smaller isolated islands, but these too emerge from economic and political

policies of the larger countries that have, since their colonisation of the Pacific islands a hundred years ago, replaced traditional environmental management systems with unsustainable economic systems. Modern world trade policies continue to be set by the large countries of the land hemisphere and continue to encourage abuse of Pacific island resources. Sixteen of the 24 Pacific political entities are now independent countries, the other eight remain territories of the United States, New Zealand, the United Kingdom or France.

The international community has focussed on the Pacific as a major concern for environmental management because of the global importance of the South Pacific Ocean in large scale atmospheric dynamics and fishery resources,. This concern is evident in the programmes of more than 20 international, regional, and sub-regional organizations. The Asian Development Bank, for example, currently has 14 major programmes dealing with sustainable fisheries, environment planning, capacity development, and waste management, that total US\$ 55.4 million. Major international agreements and action programmes for sustainable development specifically aimed at the small Pacific islands, include the Alliance of Small Island States (AOSIS), Agenda 21, the Barbados Programme of Action on the Sustainable Development of Small Island Developing States, the Cairo Programme of Action on Population and Development, and conventions on climate change, biodiversity, ocean management and pollution.

This chapter summarises the major environmental issues for the Small Island Developing States of the ocean hemisphere and examines progress towards achieving sustainable environmental management. The chapter is divided into five sections, (i) an overview of environmental conditions and trends in the Pacific islands; (ii) causes and costs of environmental problems; (iii) actions taken in response to the environmental problems; (iv) major challenges to sustainable development in the Pacific islands; and (v) conclusions.

I. OVERVIEW OF ENVIRONMENTAL CONDITIONS AND TRENDS IN THE SOUTH PACIFIC ISLANDS

A. The Pacific Island Countries and their primary environmental concerns.

The Pacific Ocean dominates all aspects of development for the Pacific Island Countries. The islands are scattered across the Ocean hemisphere from South East Asia and Australia in the West to Easter Island in the East, and from the Northern Mariana Islands in the North to New Zealand in the South.

Environmental issues of islands have common themes based on isolation, exposure to natural disasters, economic servitude, minimal resources, and lack of capacity for response. Yet the sub-Region is diverse, politically, economically, geographically, and ethnically. Tokelau, for example, has a total population of 1,500 people living on small coral islets with a total land area of a 12 km², while Papua New Guinea (PNG) has 4.3 million people living on a high, volcanic island with 462,000 km² of rugged, forested land. Australia and New Zealand have economically well developed, European dominated economies, while Vanuatu and the Solomon Islands are among the world's least developed nations.

The Pacific sub-region can be subdivided into four distinct zones, based on resource endowments, size, and the state of economic development. Each zone has environmental problems distinctive to their economic and ecological features, but all the countries share in a variety of global threats that endanger the ocean and the atmosphere. Box 14.0 Outlines the evolution of the collective environmental priorities of the Pacific island countries.

1. *Australia and New Zealand are developed countries.*



Figure 3. Sydney, Australia is the largest city in the Pacific sub-region.

Australia and New Zealand are rich in resources, both natural and human, and are relatively large islands (Australia, with 7.61 million km² of land area, is considered a sub-continent). Their populations are heterogeneous and predominantly European cultures although each is superimposed over indigenous populations. They are the only industrialised nations in the Pacific Sub-Region. The primary resource use industries, Agriculture, Forestry, Fisheries, and Mining are extensive and their products form a major portion of export earnings. The primary production sectors are technically advanced with only a small proportion of the population actually employed in them. For example, 3.5% of Australia's 18 million people, and 10% of New Zealand's 3.5 million people, are employed in Agriculture. About 85% of the people of both countries live in coastal urban environments.

The main environmental issues for Australia and New Zealand include land degradation, invasion of exotic species, depletion of fishery resources, elimination of wetlands, loss of native forests and climate change – with associated problems of drought, and fire. Both countries have substantial capability for dealing with these issues and, in fact, are world leaders in the progress towards sustainable development. Australia and New Zealand are also dedicated towards assisting the small island developing states of the Pacific with sustainable development. Australian's international Aid programme AusAID, for example, has 21 projects dealing with sustainability and environment costing USD 30.4 million, plus on-going financial contributions to 11 regional programmes. New Zealand's Overseas Development Aid (NZODA) for the Pacific Islands allocates US\$4.1 million for 42 programmes on environmental and sustainability issues.



2. *Melanesian countries (PNG, Solomon Islands, New Caledonia, Vanuatu, and Fiji) are the largest and most populous of the small developing island states of the Pacific.*

Figure 4. A Vanuatu man in traditional attire.

Melanesian countries are rich in mineral and forestry resources, and have the next largest human population. They can be sub-divided into two socio-economic groups:

In PNG, the Solomon Islands and Vanuatu, about 85% of the people live in rural environments and have a subsistence economy. About 80% of PNG's work force and 90% of Solomon Islanders are farmers. These three countries, have an almost undiluted Melanesian culture

with a total of 4.9 million people. Despite their rich natural resource base, they have a low ranking on the United Nations Human Development Index (PNG 128; Solomon Islands 122; and Vanuatu 124). Logging, mining, and most export agricultural industries are owned and managed by foreign companies.

The French Territory of New Caledonia has rich and diverse cultural base with 201,000 Melanesian, Asian, and European people. The 780,000 Melanesian, Polynesian, Indian, and European people living in the Independent Republic of Fiji, are also share a diverse cultural base. The economies of both these island areas are more stable and diversified than the other three Melanesian countries. About 35% of Fijians are employed in Agriculture and 54% live in rural communities. Only 14% of New Caledonia's work force is employed in Agriculture and 29% of the people (mostly the Melanesian people) live in rural communities. Both Fiji and New Caledonia are considered economically developed countries.

The main environmental problems for the Melanesian countries are: land degradation, unsustainable deforestation, water pollution from mining, local depletion of coastal fisheries, and (with the exception of Fiji and New Caledonia), rapid population growth. The cities of Melanesia are among the fastest growing in the world (7.3% in Vanuatu, 6.2% in the Solomon Islands, 4.1% in PNG). These countries face serious urban issues of unemployment, poverty, sanitation and housing. Droughts and fires are major environmental disasters for these islands.

3. *Mid-sized, open ocean islands of Polynesia (Tonga, Samoa, American Samoa, French Polynesia) and Micronesia (Palau, Pohnpei FSM, Guam, Northern Mariana Islands).*

These countries have limited land resources, minimal or no commercial forests, and no commercial mineral deposits. The people are predominantly agrarian and rural. Their populations are almost entirely Polynesian or Micronesian (except Guam and Saipan, with a mixed cultural heritage). Tonga, and Samoa have good food security, and receive high levels of remittances from expatriate island communities living in Pacific Rim countries.

French Polynesia is a territory of France, while Guam, the Northern Mariana Islands and American Samoa are territories of the United States. These islands enjoy a high standard of living from subsidies, and have few tradable natural resources and no manufacturing capabilities.

The main environmental problems faced by these countries are: a growing scarcity of land, loss of the remaining native forest areas with associated loss in biodiversity, decline of coastal fishery resources, coral reef death, invasion of exotic species, solid waste disposal, pollution of ground water and coastal areas by agricultural chemicals and sewage.

4. *Resource poor, micro states (Cook Islands, Kiribati, Tuvalu, Federated States of Micronesia (FSM), Marshall Islands, Niue, Nauru, Tokelau, Wallis and Futuna) are the most vulnerable of the Pacific islands.*

These are amongst the smallest nations on Earth yet they are spread over vast areas of the ocean. Sixty thousand Marshall Islanders live on 181 km² of coral islets giving each person only 0.3 hectares of land. Their population is expected to double in only 17 years and their urban areas are growing at 8.2%. Considering every sandy islet above mean high water, the people in these countries average 0.8 hectares of land per person. On the other hand, each person in these micro-states has economic control over 41.4 square kilometres of ocean.

The most serious environmental problems for most of these countries are: fresh water availability and pollution of ground water with sewage and salt,

agricultural land availability, solid waste disposal, and rapid population growth in urban areas.

Sea level rise, with its associated coastal erosion and salinization of ground water resources, is especially alarming for the atoll nations. Some of the islands of Tuvalu, Tokelau, Tonga, the Federated States of Micronesia, the Marshall Islands, the Tuamotu Archipelago, and the Cook Islands may submerge entirely. Coastal erosion is already a serious problem in many of these islands.

B. Shared Environmental Concerns

1. *The Pacific Ocean, A Common Resource*

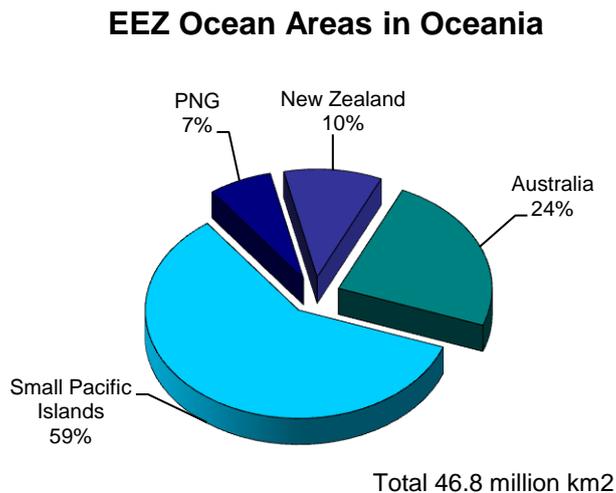


Figure 5. Economic Exclusion Zones of Oceania

The Island nations control Economic Exclusion Zones (EEZ) of 200 nautical miles from their coasts. This represents a significant portion of the high seas fisheries and sea bed mineral wealth of the ocean hemisphere. The marine environment can be divided into five management zones, linked to biological and mineral resources. These are: (i) the coastal zone, (ii) near shore deep and pelagic fisheries grounds, (iii) high seas fisheries, and (iv) sea bed minerals and offshore oil deposits (iv) the sea surface.

Each of these zones has specific environmental management challenges for the nations of the South Pacific. Coastal and near shore zones are the responsibility of individual nations, while all the countries work together on sustainable management of high seas fisheries and sea bed resources.

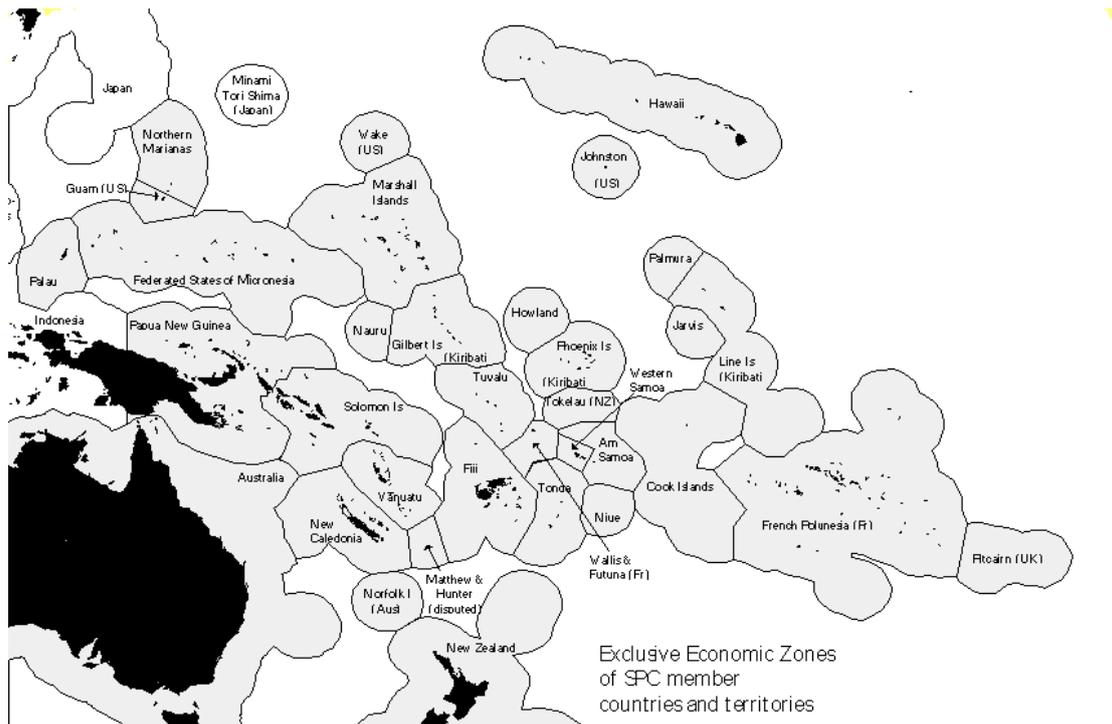


Figure 6. The Exclusive Economic Zones of Pacific countries.

The most serious environmental issues of the Pacific Ocean in each of the four management categories are: (i) Depletion, destruction and pollution of coastal resources, including mangroves, sea grasses, coral reefs, coastal food species, and deep water bottom dwelling fish. (ii) maintaining co-operative management of high seas fishery resources, including tuna and other pelagic fish species, destructive long drift net fishing, by-catch of sea birds and marine mammals, and whaling. (iii) sea-surface conditions, including red (toxic) phytoplankton blooms, oil pollution, floating and suspended solid wastes and destruction of fish and invertebrate eggs at the air/sea interface through chemical pollution and UV-B radiation. (iv) geophysical (global warming) conditions, causing sea level rise, increased storm activity, climate change, and die-backs of shallow water and coastal marine life.

Massive death of coral reefs, sea grass beds, and kelp in coastal waters has dangerous follow-on impacts because these are critical habitats for a number of ocean functions, both biological and physical. Although a number of theories exist to explain these die-backs, the real causes are unknown and are probably not simple. Whatever the cause(s) decline of productivity of coastal areas and lowered ecological resilience are inevitable outcomes. The scale of these disasters is impressive. In 1995 pilchards began dying, in mass, from Bass Straits, up the east coast of Australia, and across to New Zealand. Scientists were never able to decide why they died, but pilchards are an important link in the food chain and many of their predators, including seals and penguins, began washing up, dead, on beaches about a month after the pilchard deaths. Die-backs of sea grass beds along the east coast of Australia, and kelp beds along the east coast of New Zealand also mystify scientists. The same kinds of events are happening in other parts of the world, for example off the southern coast of Florida, and may thus be linked to global conditions.



2. *Physical natural disasters include volcanic eruptions, earthquakes, tsunamis hurricanes and droughts.*

Figure 7. Ambrym Island in Vanuatu is one of many active volcanoes in the sub-region.

(a) Volcanic eruptions, earthquakes and tsunamis

Melanesia, Guam, and the Mariana Islands are part of the “Pacific Rim of Fire”, a region of severe seismic activity. Traditionally, Pacific island communities quickly recovered from volcanic eruptions, earthquakes and tsunamis. Coastal villages and urban areas have expanded into marginal areas land areas and thus increased the potential for severe impacts. For example, on the 17th of July, 1998, a series of tidal waves caused by an offshore earthquake struck the North west of Papua New Guinea in the Sandaun Province. The waves swept over low, sandy islets at Sissano about 30 kilometres west of Aitape. Whole villages vanished and thousands of people were killed or injured.



Figure 8. Ash drifts up to two metres deep from the Rabaul volcanic eruption.

Source: http://volcanoes.usgs.gov/Volcanoes/Rabaul/rabaul_info.html

The 1994 volcanic eruption in Rabaul in East New Britain, PNG caused significant damage to large coconut and coco plantations around the large natural harbour formed by a previous volcano. PNG forests and farms were covered with 1-2 metres of volcanic ash. The ash broke tree limbs, collapsed roofs, and buried roads. Later, rains turned the ash into destructive mudflows that clogged rivers and coastal areas.

3. *Atmospheric and Climatic disasters are common.*

(a) Cyclones



The sub-region's tropical and sub-tropical climate is punctuated by climatic extremes; cyclones, floods and drought. These extremes have far reaching impacts on land-use, and serious environmental consequences – especially when combined with unsustainable development practices. Cyclones are the most prominent and wide spread natural disaster in the Pacific. With the exception of islands between 5 degrees North and South of the equator, all Pacific islands have been subjected to cyclones.

Figure 9. Hurricane Susan 1997. New Caledonia is in the lower left of the image.

Data for the last 150 years indicates cyclones are more frequent in the western and central Pacific, both North and South of the equator than in the Eastern Pacific. The Fiji group experienced 136 cyclones between 1880 and 1997. A similar number have been recorded in Vanuatu. Damage to crops and vegetation increases exponentially with wind speed (damage of 180km/hr wind is 4 times that of 90km/hr wind). Severe tropical storms are accompanied by massive rainfall and the low pressure may cause the sea to rise as much as 2 metres. Flooding, coastal inundation, and land erosion, destruction of housing and gardens, loss of vegetation, pollution of water supplies and destruction of coral reefs and sea grass beds are natural impacts of tropical cyclones.

Hurricanes are also getting bigger. Normally they are about 300 nautical miles in diameter, but Ofa and Val in 1990 and 1991 were more than 600 nautical miles in diameter. Ofa was so severe, waves covered the islands of the Tokelau atolls, washed away topsoil, salted the land so crops would not grow, and contaminated the ground water making it unfit to drink. Together, Ofa and Val destroyed or badly damaged 90% of local buildings in Samoa and destroyed extensive areas of the forests in Savaii. Nearly all the bats and birds of the forests of Samoa were destroyed and the shallow water coral reefs were stripped of life.

Between January and April of 1983, five cyclones struck French Polynesia; more in two months than in the previous 150 years. All the islands of the Tuamotus and Societies were damaged. Sea level rose 4 to 5 meters and waves were 8 to 10 meters high. Many villages on the atolls were totally submerged. Some atoll villages completely disappeared. The water lens was salted, all boats were destroyed, all fishing equipment and pearl aquaculture rafts were destroyed. Big blocks of coral were torn from the reefs and thrown onto the reef flats. Vegetation was severely damaged and 50% of the coconut trees were blown down (Gabrie et al 1995).

In November 1997, Hurricane Martin hit the atoll of Manihiki in the Cook Islands, and waves swept completely over the islands, washing away an entire village. Twenty people were never found.

On higher islands, storm damage was amplified by the loss of resilient traditional housing and farming practices. Poor logging and farming practices now result in greater flooding and soil loss and these, in turn, cause loss of valuable soil from the land and siltation of coastal coral reef and sea grass communities. In Pohnpei FSM, for example, large scale clearing of upland forest for commercial kava

plantations resulted in massive landslides after a severe cyclone in 1997. The landslides caused loss of life, the plantations, and damaged coastal coral reef communities.

4. *Global warming, sea level rise, and climate change will amplify existing natural disasters.*

- (a) Global warming will damage shallow water tropical ecosystems and change the distribution patterns of many species of plants and animals.

Global warming from increasing levels of greenhouse gasses is expected to have serious effects on the Pacific Ocean. Temperature changes will not be uniform over the whole area because the ocean currents and atmospheric response to the increasing temperatures will modify the distribution of heat. Exactly how this will happen is not certain, but some patterns are emerging. A New Zealand Meteorological Service analysis of data from 34 monitoring stations throughout the Pacific revealed that, since 1920, temperatures in Noumea (New Caledonia) and Rarotonga (Cook Islands) have risen 0.6–0.7°C. Overall, surface air temperatures in the Pacific region have risen by 0.3°C–0.8°C this century. Overall average increases do not, however, reveal short-term extreme temperatures and these can have immediate disastrous impacts on living systems.

Marine ecosystems operate within specific temperature regimes, some of which are very narrow. A short-term extreme increase in average temperature, lasting only a few days, can result in profound local changes in the distribution of sensitive organisms. This is especially true for shallow water tropical marine ecosystems of the Pacific islands where many key organisms live close to their upper maximum temperature tolerance. Larger fish can, and do, move into cooler waters when temperatures exceed comfortable levels. But many sea creatures, including juvenile or small species of fish, sea grass, algae, corals and their associated fauna and flora are unable to escape temperature extremes. In the past two decades, this has resulted in a significant decline in coastal biodiversity throughout the tropical Pacific.

During the last two decades, coral reefs have declined in health throughout the tropics. Episodes of elevated sea temperatures contribute to this decline. Corals, stressed by high temperatures, are more prone to diseases and may eject their symbiotic algae. Coral bleaching, as this is called, renders the corals less able to cope with additional physiological stress and many of the colonies die. In November 1998, 350 reef managers, biologists and government representatives attended the International Tropical Marine Ecosystems Management Symposium in Townsville, Australia. The scientists revealed that the coral bleaching episodes of 1997-1998 were the most geographically widespread ever recorded and probably the most severe in recorded history (Wilkinson, 1998, Robbins 1999). In 1994, elevated sea temperatures killed over 90% of the living corals of American Samoa from the intertidal zone to a depth of 10 meters.

Temperature also regulates the distribution of plants and animals. Pelagic fish commonly migrate along temperature boundaries and, in some cases, this can result in fish moving away from traditional fishing areas. Samoa, for example, is on the edge of major tuna migrations and fishing success can oscillate from extreme success to failure depending on ocean temperature regimes.

Tropical species of insect pests, including those that spread diseases, are expected to move into higher latitudes and higher elevations. In Australia, for example, Ross River Fever, carried by mosquitoes, has moved further south over the last decade and has reached the northern parts of Sydney. Malaria is now infecting highlanders in mountain regions of Papua New Guinea that were formally free of the

disease. Malaria is also extending further south in Vanuatu and there is concern that the disease might spread to Fiji, New Caledonia and the northern areas of Australia.

- (b) Sea Level Rise is expected to create lowland flooding and associated problems.



Figure 10. Coastal erosion repairs in Tarawa, Kiribati at high tide and low tide.

In the Pacific islands, the people, agricultural land and infrastructure are concentrated in the coastal zones, and are thus especially vulnerable to any rise in sea level. Global warming is reported to be causing a rise in sea level from thermal expansion as the sea warms up and from melting of the planet's ice caps. Determining how severe this problem is, or might be, is complicated by natural shifts in sea level associated with the recurring ice ages. For example, over the past 16,000 years, the sea level rose some 150 metres in the Southwest Pacific reaching its present about 6,000 years ago (Broecker 1983). This would indicate an average rise of more than 15 mm/year for the 10,000 years it took for sea level to reach its present level following the last glacial epoch. According to Australia's National Tidal Facility, the sea level rise in Australia has been 0.30 +/- 0.06 mm/year over the past 21 years, based on hourly sea level readings from 27 stations. In other words, there has been no measurable average increase.

Data compiled from 11 high resolution tide gauges set up in the Pacific islands by Australia's National Tidal Facility at Flinders University reveal considerable variability of sea level rise or fall in the Pacific islands from month to month and year to year. For example, in November, 1998, the trends range from -40 to +25 mm/year from one island area to another. In September of 1997, the tide gauge in Samoa had been operating for 56 months and showed an average sea level rise of +19.2 mm per year. But the following year, when recalculated over 68 months of operation, the average sea level rise turned out to be falling at -19.5 mm per year. In Fiji, the calculated sea level rise over 61 months of operation was +21.5 mm a year in 1997, but after 73 months of operation this dramatic rise was reaveraged as +5.2 mm a year.

Scientists are only now devising precision base-line sea level change sensing systems, but they have been able to make considerable progress in computerised climate change modelling. The latest calculations, backed by global measurements of sea level rise derived from TOPEX/POSWIDON satellite altimeter data, show a rise of 2.1 (plus or minus 1.3) mm/year on a global basis (Nerem et al 1997). But this data is very preliminary and the authors warn that the contribution of annual and decadal mean sea level variations cannot yet be isolated. A longer time series of observations is needed to accurately detect long-term climate change signals.

- (c) Climate Change will shift rainfall patterns causing prolonged droughts in some regions.

Computer models also predict that global warming will shift rainfall patterns, resulting in extended drought conditions in some areas, and excessive rainfall in others. Temperatures are expected to rise everywhere on land by 5.5° C within the coming Century. The Pacific island governments believe they are already experiencing severe economic, environmental and cultural impacts of climate change.

Recent evidence indicates that El Niño weather patterns have become more frequent since 1977, bringing an increase in rainfall in the Northeast Pacific and a rainfall decrease in the Southwest. These more frequent El Niño events are believed to be associated with global warming, although there is no clear evidence that they are not part of a long term natural cycle. Each El Niño event has resulted in water shortages and drought in Papua New Guinea, Marshall Islands, Federated States of Micronesia, American Samoa, Samoa, Tonga, Kiribati and Fiji. (see below).

More frequent El Niño events also bring an increased risk of tropical cyclones, particularly for Tuvalu, Samoa, Tonga, Cook Islands and French Polynesia.

Britain's prestigious Hadley Center for Climate Prediction and Research, announced at the November 1998 conference on climate change in Buenos Aires that parts of the Amazon rain forest will turn into desert by 2050 threatening the world with an unstoppable greenhouse effect. The Eastern United States and parts of southern Europe will also become deserts. Much of the United States prime agricultural land will show at least a 10% crop reduction. These are expected to create a series of economic and environmental impacts for the South Pacific.

5. *Fresh water supplies continue to deteriorate in the sub-Region from drought and neglect.*

(a) Droughts

A supply of fresh, unpolluted water is one of the essential requirements for life. Throughout the Pacific, smaller islands experience difficult, and sometimes life threatening, deficiencies of clean, potable water supplies. Under normal circumstances there is enough water from rainfall to supply the requirements of the resident island people, but development activities, including construction, agriculture and tourism, may elevate water needs to unsustainable levels.

The amount of rainfall varies according to the geographic location of the island and climate conditions. Pacific islands normally experience a wet season that replenishes water supplies for the subsequent dry season. Some islands receive abundant rainfall all year long. Vava'u Tonga, for example, gets as much as 9 metres of rainfall a year. El Niño events result in a shift of rainfall patterns so countries that normally have abundant rain, such as Tonga, Fiji and the Melanesian islands, experience a period of drought.

Agricultural droughts occur throughout the region, and are a particular problem for the atoll nations and the leeward side of larger islands. Vanuatu experienced major droughts in 1978 and 1983, Samoa in 1971 and 1989, and Fiji in 1987, 1992 and 1997. The 1987 Fiji drought was one of the worst in this century, beginning in the 1986 dry season and extending through the 1986/87 wet season.

1997/98 was another major El Niño event and it brought some of the worst droughts on record. Islands were in an emergency drought conditions in the Northern Mariana Islands, Guam, The Marshall Islands, Nauru, PNG, Fiji, Tonga, Samoa and American Samoa. The Marshall Islands received slightly over two inches of rain from January to March 1998, just eight percent of the norm. After more than four months of the drought, the Marshall Islands government declared the country a disaster area. Desalination plants were sent to the two main urban centres, Majuro and Ebeye, and smaller water-makers were installed on ships to provide fresh water to the outer islands. From August 1997 to March 1998, the highlands of PNG experienced one of the worst droughts on record, creating a national crisis and the need for an airlift of emergency food and water supplies.

(b) Neglected water systems amplify water shortages.

The Pacific Island Countries also face critical water supply and contamination problems because of the inability of governments to maintain adequate water reticulation and treatment systems. A 1983 meeting on water resources development in the South Pacific identified the following major problems throughout the region (ESCAP 1983):

1. Limited financial resources made it necessary that water supply and sanitation systems be low cost.
2. Water losses ranged from 30 to 50 percent and wasteful use of water by consumers were among the causes of water shortage and high cost of water and required serious and immediate attention.
3. Maintenance and repair of existing water supply systems, plant, equipment and instruments was poor and getting worse due to lack of funds, trained manpower, improper or inadequate operations, maintenance and repairs.
4. Over pumping of aquifers and groundwater lenses floating on sea water were endangering freshwater supplies with salt-water pollution,
5. There were concerns - but little data - on the impact of industrial and agriculture on groundwater resources.
6. Most countries had insufficient data to carry out a proper assessment of their water resources.
7. Most countries lacked a national water policy within the framework of and consistent with the overall economic and development plans of the country.
8. Most countries lacked adequate institutional arrangements to ensure that the development and management of water resources took place in the context of national planning. There was poor co-ordination among all bodies responsible for the investigation, development and management of water resources.
9. Comprehensive water legislation providing guidance on a co-ordinated approach to water resources development was lacking.

Unfortunately, this list maintains its validity at the end of the Century and in fact, conditions have generally continued to deteriorate. Peri-urban settlements have grown substantially in the past decade and are rarely supplied by water in any Pacific island country because they are not part of the formal system.

Water catchment systems and supply systems are in poor condition in many countries. In Tarawa, the Capital of Kiribati, for example, leaks in the water system result in the loss of 60% of the pumped ground water. Despite the fact that the Public Utility Board pumps enough water each day for the entire population the water supply was turned on for only two hours per day over a period of several years. The water system in Honiara leaks 60 to 80% of the water. Nukualofa's water supply has losses

of up to 60%. Most countries world wide accept a 20% leakage as an inevitability, but in parts of Honiara in the Solomon Islands the loss is up to 90%.

(c) Polluted water stunts economic growth

Water pollution, discussed below, requires that drinking water be filtered and chlorinated, but treatment systems are difficult to install and to maintain in remote island areas and the water is not safe to drink – even in the capitals of all but two of the Independent Pacific Island Countries. Fiji and Vanuatu make the biggest effort to supply clean water to urban centres. Both countries filter and chlorinate their supplies. Tonga, Kiribati, and the Solomon Islands try to treat their water but do not always have access to adequate amounts of chlorine and chlorine injection systems fail from poor maintenance. Even where the fresh water source is protected from pollution, tap water from urban systems is seldom safe to drink because of leaky pipes and negative water pressure during times of high use. Imported bottled water is common in shops throughout the Pacific islands.

Water services are also measured by percentage of the general population with access to piped waters. The Cook Islands and Niue government run services supply piped water to the entire population. The Cook Islands and Kosrae supply the water free of charge. Port Vila has the most expensive water supply at an average USD22 per month, compared to USD11 for Fiji. In Honiara, water costs are USD12 and in Nuku'alofa, Tonga USD14.

Fiji has the largest water system in the Pacific Islands based on an economy of scale, but this is a legacy from when Fiji was a British colony. The system has deteriorated steadily since Fiji became independent and is now a major impediment to future tourism development. For example, plans to open a luxurious \$US20 million resort fell through when American conglomerates realised there was no easy method of transferring water to the site at Natadola Beach. The countries largest integrated tourist resort was supposed to open the first of its 4 hotels in time for the millennial celebrations. A condominium, marina, golf club, entertainment centre, club hotel, housing and handicraft centre were to be completed by 2006.

A survey by SOPAC Water Resources and Sanitation Programme revealed that it would be difficult and expensive for the Government to supply water to the site, especially when the water department was already overloaded with broken mains and long overdue maintenance. Between 1991 and 1995 the amount of water lost through broken pipes, leaks, and clandestine connections increased from 36% to 43% (Johnston 1999).

6. *Biodiversity has steadily declined since the 19th Century and will continue to do so as the process of biotransformation continues.*

The isolated small islands of the Pacific have fostered the evolution of myriad species of plants and animals found nowhere else on Earth. These creatures can be adapted to specialized micro-habitats, on only a limited portion of a few islands. They are especially vulnerable to extinction from habitat destruction (for example by fire or deforestation), competition from introduced organisms, agricultural poisons, or harvesting.

New Caledonia, for example, has been isolated from other lands for 80 million years. Seventy six percent of the flora and fauna evolved on the island. Several plant species, unique in the world, are limited to only a small area of one mountain and are represented by only a few specimens. One plant species has recently become extinct. The rich and diverse genetic heritage is of such scientific importance that Myers, 1988, lists New Caledonia as one of the 10 hot spots in the world where the primary forest is at once exceptional and endangered. New Caledonia has the most diverse bird life in the Southwest Pacific, with 68 species. Twenty-two species of

birds (32%) and thirty sub-species, are found only in the Territory. The remote isles and reefs of Matthew, Hunter, Walpole, Chesterfield, Surprise and d'Entrecasteaux are important breeding sites for sea birds in the South Pacific sub-region.

The decline of the biodiversity of the Pacific islands began with the arrival of the first humans. Archaeological investigations discovered an even more phenomenal bird fauna existed in New Caledonia before the 18th Century, including a giant flightless bird, like the famous (and also extinct) New Zealand Moa. The extinction of these birds coincides with the arrival of the Melanesians about 900 years ago, and was likely caused by fire, slash and burn agriculture, and hunting. The arrival of European settlers towards the end of the last Century greatly accelerated the loss of biodiversity. A combination of logging, mining and natural drought conditions resulted in massive fires that destroyed a majority of the natural habitats on the southern part of the island.

This pattern was repeated throughout the Pacific. In the Marquesas, for example, the Polynesian settlers exterminated eight of twenty sea birds, including shearwaters, petrels, and boobies. Fourteen of the 16 land birds, primarily flightless rails, pigeons, doves, parrots and songbirds became extinct. On Easter Island, the early settlers denuded the entire island of trees and exterminated 22 species of sea birds and all six species of land birds. The Maori people arrived in New Zealand about 900 years ago and by the time the Europeans arrived in mass in the 1840's, a wide range of the country's unique avifauna was extinct and nearly 30% of the native forests were cleared.

The European invasion of New Zealand resulted in the most extensive and complete biotransformation of any large island in the Pacific. This was a deliberate effort of "Acclimatisation Committees" to make New Zealand more like "home" and included removal of all but 20% of the native forests, filling all but 10% of the wetlands, and importation of over 3198 species of plants and animals. Australians were less successful than the New Zealanders in the biological transformation of their country, largely because of the sheer size of the landmass and the unsuitability of many areas to British plants and animals.



Figure 11. A Polynesian family in American Samoa tend their traditional Taro Garden.

The process of biotransformation of the smaller Pacific islands, and the parallel loss of biodiversity, is most advanced in the Polynesian and Micronesian islands. After some 3500 years of occupation, almost all Polynesian and Micronesian islands are now cultural landscapes. Surviving indigenous species have either been adopted within the traditional social structure, or tolerated in inaccessible areas. Unfortunately, with the advent of modern agricultural practices, the habitats for many of the formerly adopted plants – useful for medicinal or aesthetic or other values – are being destroyed in favour of cash cropping, construction or other activities. Some of the valuable native habitats were destroyed in parallel with other development activities. On the island of Tongatapu, Tonga, for instance, most of the remaining indigenous forests were cut down in the 1960's to provide wood for shipping crates during a banana development scheme.

Melanesian islands have the greatest reserve of unaltered biodiversity in the sub-region. Commercial logging, rising populations, and the rapid spread of unsustainable agricultural techniques are major threats to the terrestrial biodiversity in these islands. However, the extremely rugged topography of the Melanesian islands and the conservative nature of its people has, so far, preserved the biodiversity of much of PNG, the Solomon Islands, Vanuatu, and parts of Fiji.

The process of human-induced biological transformation of the land is irreversible. Efforts are in progress in some countries to establish protected conservation areas that might allow the survival of representative indigenous ecosystems. It will require continual effort on the part of managers of these areas to minimise attack from exotic species of plants and animals that now inhabit the unprotected areas.

7. *Deforestation is a common concern throughout the area.*

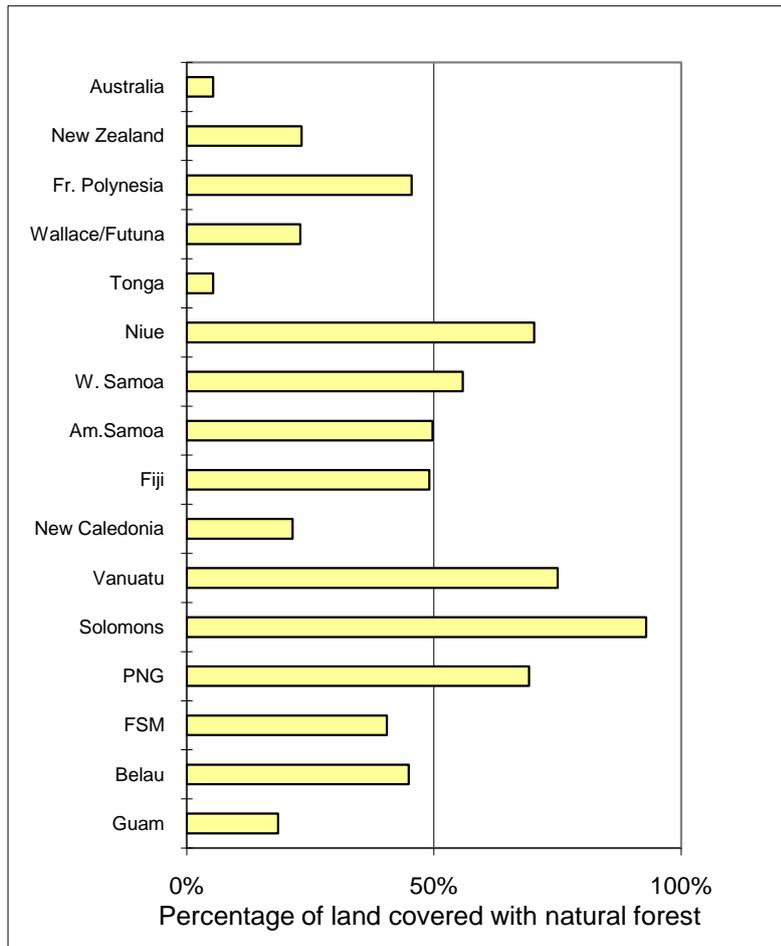


Figure 12. Remaining forest cover in the countries of Oceania.

The average remaining forest cover is deceptive. Australia is a large country and forest cover is naturally absent over most of its interior. Some states, such as the Northern Territories, remain relatively untouched, while South Australia was heavily logged. In total, an estimated 40% of Australia's original forests have been removed and another 35% logged, leaving only about 25% of unharmed natural forests. In 1997, there were 156 million hectares of native forest and woodland. Around 3 per cent of these are mangroves and rainforest, 25 per cent open forest (mostly eucalyptus species) and 72 per cent woodlands. (Montreal Process 1997). About 650

000 hectares of forests were cleared in 1990, mostly for agriculture development. More than 65% of Australia's land surface is currently used for agriculture and pasture.

New Zealand has been even more energetically stripped, with about 79% of the original forests gone. Overall forest cover does not reveal uneven rates of deforestation in different types of forests. For example, in the Solomon Islands and other Melanesian islands, there are six major forest types: Saline Swamp Forest, Freshwater Swamp and Riverine Forest, Lowland Rain Forest, Hill Forest, Upland Rainforest on Hills. The Lowland Rain Forests and Riverine Forests are the most vulnerable as these are easiest to log and provide good agricultural land after clearing. Similarly, in Australia remaining forests tend to be those with the least economic value.

New Zealand and Australia still log indigenous forests. Only 14% of Australia's remaining natural forests are protected. Most commercial logging is clear felling and is causing considerable debate between government and conservationists. More recently, logging in Tasmania for the wood chip industry has clear felled huge areas of natural forests, extracted only about 10% of the trees for wood chipping, and burned the remaining felled wood in place.

New Zealand will log natural forests until 2006. In theory, unsustainable logging was halted in New Zealand in 1996. However, many conservationists now believe indigenous forests cannot be sustainably logged in New Zealand. The process of road construction and movement of heavy machinery through the forest is too damaging to non-target trees. The invasion of trucks and bulldozers also opens

pathways for exotic plants. These displace the native forests when the large trees are removed. Sustainable “minimum impact” logging in Vanuatu, however, where the incidence of imported plants is less overwhelming, has had better results provided gaps in the canopy are kept to a minimum.

Papua New Guinea's forests are well known for their outstanding biodiversity. There are 10 major forest types with 1200 tree species in the lowland rain forests alone. This diversity means a low commercial harvest per hectare, so the logged trees are often used for pulp or chipping. Declining supplies of trees from Southeast Asia has increased logging activity in PNG. Logging tripled between 1979 and 1988. There is considerable doubt as to how much of the forest is suitable for commercial exploitation, the value of various timber species, and the extent the forests can be logged commercially. Uncontrolled logging is thought to deforest well over 80,000 ha per year. Expansion of agriculture into forested areas is estimated at 200,000 ha per year (Kula 1993). Uncontrolled logging has caused significant environmental damage in some areas.



Figure 13. Merremia vine completely enshrouds the trees along a river in Santo, Vanuatu.

In the Solomon Islands, commercial logging began in 1963 but did not reach unsustainable levels until 1993. Current rates of deforestation are uncertain due to poor reporting and lack of recent remote sensing imagery. In 1995, 54% of the Lowland Rain Forests were logged or degraded, while only 12.8% of the Hills Rainforest had been logged or degraded (MFEC 1995).

Forest and biodiversity recovery is poor because of subsequent invasion of exotic plants and animals. In the highland forests of the Solomon Islands, for example, feral cats have disturbed the native wildlife populations and exotic grasses compete with tree seedlings. In Vanuatu the Merremia vine, introduced from the United States during World War II, quickly covers trees when large areas of forests are cleared. Roads and clearings provided by the commercial clear-cutting invites local settlement and agricultural activities. There is negligible reforestation in the small Pacific islands, even after clear-felling.

New Caledonia's fragile forest ecosystem has been repeatedly damaged by fires and mining activities. Only a small remnant forest ecology remains, but most of this is now protected in national parks and reserves.

There are few commercially valuable forests on most of the non-Melanesian Pacific islands. In most countries, undisturbed native forests only remain on steep-slopes of high islands or remote, uninhabited, small islands where removing the trees presents technical problems. Remaining forest areas are severely impacted by human activity.

8. *Pollution of terrestrial and marine areas is a serious concern in all countries of the sub-Region.*

Pacific island countries, like the rest of the world, face serious problems with disposal of wastes and pollution. Organic and most metal wastes can be recycled, and this is practised in a limited way in some areas. Increased urbanisation and

growing populations have accelerated problems with the collection and disposal of both solid and liquid wastes. Every year the importation of packaged consumer goods adds to the growing amount of non-biodegradable waste. Pollution from industrial waste and sewage and disposal of toxic chemicals are significant contributors to marine pollution and coastal degradation.

Manmade chemicals, many of them very toxic, can be difficult to recycle and expensive to destroy. Hazardous wastes should be buried in such a way that they can't pollute the water or the soil of the island, or burned at high temperatures. The first requires land and expensive burial techniques and land is the rarest of resources on small islands. Burning at high temperatures requires very high energy costs and energy is an expensive commodity on small islands in the middle of the Pacific. As a result, most wastes, hazardous or not, are simply dumped together at the nearest available government owned land. In Fiji, Tonga, and Vanuatu, for example the public dumps are in mangrove forests and the Department of Health dusts them regularly with pesticides and rat poison.



Figure 14. Niafu's public dump sites are in mangrove forests.

Environmental degradation from pollution indirectly impacts human health through reduction of food security, loss of drinking water supplies, and loss of economic opportunity. The major industries in the small island states are agriculture, tourism, forestry, mining and fisheries. All of these generate wastes – some a by-product of the activity, some a necessary part of the product stream. By-product wastes are generally the result of poorly managed operations and include siltation (from mining and land clearing during agricultural or forestry activities), oil pollution (used oil from machinery and from accidental spills), poisons (from pest control), and miscellaneous plastic trash (old fishing gear, plastic sheeting, drums and bags). Production wastes include organic wastes from food processing, chemical wastes (from oil palm refineries, mining processes, wood treatment).

(a) The economic impact of pollution in the Pacific islands

Pollution from wastes has serious implications for the small island developing states. These problems fall into three categories. (i) aesthetics, (ii) human health (iii) environmental degradation.

Figure 15. Litter contaminates beaches throughout the Pacific.

Since tourism is most promising economic opportunity for the Pacific islands, ambient beauty has a cash value. Yet in most of the Pacific islands, tourists are confronted with litter; wrappers and aluminium cans line the roads, fast food plastic packaging is heaped on the edges of scenic overviews, disposable diapers tangle in the branches of corals. Open municipal dumps are often



close to major urban centres and almost always on fire, with the fumes distracting from the romance of the sub-region. atmosphere. Even on larger, relatively developed islands like Fiji, refuse disposal and management of garbage dumps is a national dilemma. The more prosperous the island, the more disgraceful the scenic display of rubbish. In French Polynesia old cars and refrigerators are dumped along the road or in the bush. (Gabrie 1995).

Tourists also contribute to the waste stream. In the Windward Islands, for example, there were 208,000 residents and 140,000 tourists in 1993 (Gabrie 1995). In Saipan, the resident population of tourists can be a quarter of the total population at any one time.

(b) Solid wastes contribute to human health epidemics.

Figure 16. Mosquitos breed in water collected in trash. Photo from the waterfront in Pago Pago, American Samoa.



Human health is, indirectly, endangered by litter. The mosquito that carries the dengue fever abrovirus is a “domesticated” insect. It breeds in water trapped in cans, old tyres, jars, and plastic containers. Dengue epidemics are common in the Pacific islands. A study in New Caledonia, for example, found the epicentre for a recent outbreak of dengue in a squatter city where litter was abundant. There are 23 different strains of dengue, most of them debilitate the victim for several weeks to several months. One variety causes internal haemorrhaging and can be deadly. In

1998 an epidemic of Dengue spread across the South Pacific. Fiji spent millions of dollars combating the disease. More than 6,500 people required hospitalisation.

(c) Contamination of water supplies

Improper disposal of waste also contaminates water supplies. Sewage contamination of water is common in all island countries of the region and few streams and even many ground water supplies, are safe for human consumption without treatment. Diarrhoea - often related to water related diseases - was the third most common cause for hospitalisation in the Pacific islands. In Kiribati, diarrhoea and other water related diseases were the number one cause of death (WHO 1984). In Ebeye Lagoon, in the Marshall islands, where pollution levels have reached 25,000 times higher than WHO safe levels, epidemics of gastro-enteritis were almost impossible to control. Cholera, which caused diarrhoea and dehydration, killed 18 people in Kiribati in 1977 and initiated renewed efforts at improving sanitation and water supplies (Kiribati UNCED 1992).

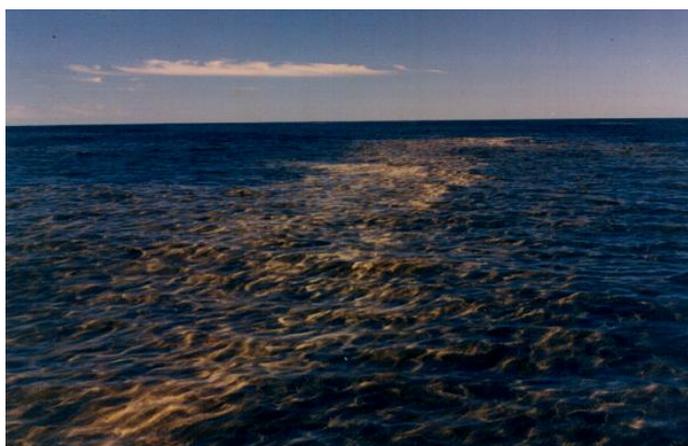
Droughts and subsequent floods amplify water related health problems. Leptospirosis and amoebic dysentery both increased following the prolonged droughts in 1987. Leptospirosis is transmitted by contamination of water supplies by rat or dog urine. Amoebic dysentery is transmitted by sewage contaminated water. In New Caledonia and French Polynesia leptospirosis increased from 9 cases in 1987 to 87 in 1988 and 158 in 1989. It fell again in 1991 in parallel with the incidence of amoebic dysentery. In French Polynesia, leptospirosis hospitalised 100 out of every 100,000 people in 1992. This compares to 0.4/100,000 cases in France.

(d) Ecological impacts; pollution of the world's largest nursery, the sea surface

Effluents and dumps, storm runoff, sewage and siltation from erosion cause localised environmental insults to inshore marine environments. This is especially damaging to coastal marine nursery areas like sea grass beds, coral reefs, and mangrove forests. Perhaps even more catastrophic, wind blown agricultural dust rich in pesticides, oil pollution, siltation and plastic trash contribute to extensive damage to the sea surface.

Figure 17. A natural slick on the surface of the sea, rich with eggs and larvae, off the coast of Australia.

The sea surface is a highly specialised habitat. It is a zone of high productivity, a habitat for a great diversity of organisms, a vital nursery area for eggs and larvae, a collection point for natural organic compounds produced in the water column, and an area of concentration for man-made



toxic chemicals from the atmosphere and the water column (Hardy 1997). Almost all species of marine grasses, fish, and invertebrates shed their seeds and eggs into the sea water. These float to the surface where winds and currents concentrate them in natural organic slicks. Thus, almost all sea creatures spend the most delicate first few hours of life close to this micro-layer boundary at the sea surface. The sea surface habitat is divided into several layers. A very thin membrane of natural organic

compounds, called the nanolayer, coats the upper few microns of the surface of the sea and is slowly digested by special marine bacteria that inhabit the microlayer just below. The bacteria-enriched microlayer and the millilayer just below it (only one millimetre from the sea surface), is the largest single nursery environment of the planet. Here the microscopic eggs and larvae of fish and shellfish undergo the most delicate stages of development. They are nourished by organic products released by the marine bacteria and plants in the microlayer and later by microscopic algae, protozoans, and small crustaceans.

Special equipment has been designed to sample this surface layer and over the past decade tests from throughout the coastal areas of the world have revealed the microlayer habitat is heavily polluted by heavy metals, agricultural poisons, and break-down petroleum products. Much of this pollution has been traced to atmospheric fallout of dust particles from cities and agricultural areas, oil spills, and antifouling chemicals used on ships. The pollutants concentrate into wind slicks in the same way – and the same locations – as the eggs and natural organic compounds. The concentration of these toxins is sufficient to kill or inhibit the development of the eggs and larval stages of fish and invertebrates (Liss and Duce 1997).

Unfortunately, no samples have been taken from mid ocean areas or from small island states so there is no documented evidence of the total extent of the problem. But along coastal areas in the North Pacific, the Atlantic and Mediterranean, the problem is known to be of major concern. The same oceanographic conditions that concentrate the pollutants – and the same sources of pollutants – exist in the Pacific Islands, so there is every reason to suspect that the sea surface habitat is polluted in the islands as well. And the impact will be as severe for the marine fauna of oceanic islands as it is for coastal areas of continents.

Scientists know, for example, that ocean currents form eddies around Pacific islands and that planktonic stages of island and open ocean sea creatures concentrate in these oceanic vortices. Lagoons of atolls, and bays of high islands, are also key areas for planktonic development. These important nursery areas are often downwind, as well as downcurrent, from islands. Air blown dust, smoke, and fresh water storm run-off from the islands carry oil soluble man-made toxins from gardens, food processing areas, kitchen sinks, and municipal dumps onto the surface layer of the sea.

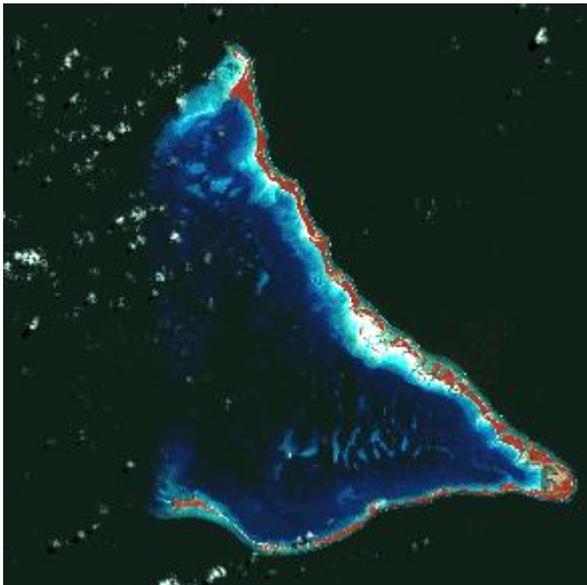
Scientists fear that the pollution of the sea surface may be a major contributing cause for the steady decline in marine productivity observed around the world. Elevated temperatures from global warming and increased ultraviolet radiation from ozone loss in the upper atmosphere increase the impact of the toxic compounds.

II. CAUSES AND CONSEQUENCES OF UNSUSTAINABLE DEVELOPMENT.

A. Locally caused issues

1. *Poor environmental planning increases vulnerability to disasters*

A multitude of factors controls the vulnerability of Pacific islanders to disasters. To measure vulnerability, researchers examine physical features of the islands and the resilience of the people, their culture and their economies when confronted with a disaster. Vulnerability indices can be applied to economies, to



societies, to culture, and to ecosystems. For example, SOPAC recently co-ordinated the development of an Environmental Vulnerability Index for the Pacific Island sub-region (Kaly et al 1998). The index summarises national environmental vulnerability from 57 different indicators. These include 39 indicators of risk, 5 indicators of resilience and 13 indicators of environmental integrity or degradation.

Figure 18. Tarawa Atoll, Kiribati islands, is one of the most vulnerable islands in the Sub-Region due to poor management of its water supply and population growth. SPOT image SOPAC.

The regional Environmental Vulnerability Index was devised as a means of helping aid donors decide funding priorities. It also helps focus attention on the interplay between how ecosystems and people depend on each other for survival. More importantly, vulnerability indices reveal a cascade effect, with both ecosystem vulnerability and human vulnerability increasing as a result of poor economic and social decisions.

The peoples inhabiting the Pacific islands for the past three to four thousand years have shown remarkable resilience to natural and environmental disasters, but the steady degrading of traditional coping measures makes islanders and the island ecosystems less resilient to disasters. Hurricanes, for example, have always been a normal part of the environment of South Pacific people and traditional societies coped with them very well. Coral reefs and coastal ecosystems were also resilient to hurricanes and recovered quickly. But poor farming and logging practices result in massive erosion in storm conditions and this, in turn, pollutes water supplies and dumps massive loads of silt on the coral reefs. In addition, gardens that once were protected by trees are not totally destroyed by hurricanes and soil lost with each storm makes the gardens themselves less resilient and less productive.

Over-harvesting of near shore fish and invertebrates removes important sources of suitable nutrients from coral reefs while sewage from urban areas destabilises near-shore coral communities making these vital ecosystems less able to withstand or recover from the waves and rain of hurricanes.

In the past, islanders whose gardens were harmed by hurricanes had traditional food reserves, forest gardens that still provided food, and abundant protein from the coral reefs. The same people today find their gardens are destroyed, the reefs are destroyed, their homes are destroyed, and their drinking water polluted.

Hurricanes, thus, have moved from annual events to disaster status because of unsustainable human behaviour.

2. *Population growth, extravagant consumption and poverty decrease resilience to environmental disasters.*

Natural, economic and man-made environmental disasters are often interrelated, making some communities more vulnerable than others to disasters. The most vulnerable communities are impoverished peoples occupying marginal environments (such as low-lying filled mangrove swamps, urban areas of atoll islets, or steep-sloped mountain areas), with high population density and dependence on a single source of sustenance. For example, the 1998 drought in the Marshall Islands required the installation of large desalination plants to meet the drinking water needs of the densely packed urban populace on Majoro and Ebeye. The same drought required massive importation of food and supplies to the highlands of PNG where overpopulation and reliance on coffee and other commercial crops lowered the resilience of the communities. Fortunately, such communities are still uncommon in the Pacific islands compared to other parts of the Asia Pacific Region.

Population pressures vary dramatically between different island groups. In the Polynesian and (to a lesser extent) Micronesian countries, emigration is an important population safety valve. Although these countries have high fertility rates, the steady stream of people moving to the Pacific Rim countries keeps the resident population growth reasonably low. For example, the Tongan population increased by only 0.3% per annum over the last twenty years but the fertility rate is 4.2 births per woman. In the Cook Islands, each woman had an average of 3.3 children but emigration kept the population growth at below 0.4% per annum. More than 20,000 Cook Islanders live in New Zealand, compared to 19,000 in the islands themselves (Cook Island NEMS 1993). The population of Kiribati grew at only 1.4% despite a fertility rate of 4.5 children per woman. The population of Tokelau actually decreased -0.9% despite a fertility rate of 5.7 children per woman. The population of Niue decreased -1.3% with a fertility rate of 3.5. There are actually 14,556 people from Niue living in New Zealand compared to 2,100 living on their home island (Niue NEMS 1993).

On other islands, populations have soared (4.2% in the Marshall Islands, 5.6% in the Northern Mariana Islands, 2.9% in Nauru, 2.6% in Palau). Melanesian people seldom choose to emigrate and populations are rapidly increasing on their islands (3.4% in the Solomon Islands, 2.8% in Vanuatu, 2.6% in New Caledonia, and 2.3% in PNG. Fiji's population growth remained low primarily because of emigration of large numbers of Fiji's Indian population following the racially inspired military coup of 1987. (Population figures from SPC 1997).

Where islanders have the ability to emigrate easily, large families are an economic advantage. The brightest students inevitably leave the islands to obtain an education in Australia, New Zealand or the United States. French youth from French Polynesia, New Caledonia, and Wallis and Futuna, go to France for continuing education. Many of these youth never return on a permanent basis. In developed countries, the young people find employment and send funds back to their families. These remittances comprise a major portion of foreign exchange income and are especially valuable on islands where there are few local employment opportunities. There is, in fact, little employment opportunity for youth in the Pacific islands, except for subsistence agriculture and fisheries beyond the major urban centres. For example, of the 43 inhabited islands of Tonga, only two islands have any meaningful level of local employment, Tongatapu and Vava'u.

People who cannot migrate overseas, migrate from rural areas to urban areas. Moving overseas offers environmental and economic advantages to an island society, but moving to the city brings environmental and economic difficulties.

3. *Rapid urbanisation results in complex environmental problems.*

Lack of access to land, employment and educational opportunities has forced rapid urbanisation. The fastest growing cities in the region are in the countries with the highest population growth. For example, in the Marshall Islands, the annual urban growth is 8.2% and Ebeye's population density already reaches 23,200 per square kilometre. American Samoa's Pago Pago is growing 8.2% per year. Port Vila, Vanuatu is growing 7.3% per year. Honiara in the Solomon Islands is growing by 6.2% each year. Saipan in the Northern Mariana Islands is growing by 5.6% per year and the urban areas of Port Moresby, Lae and Madang in PNG are growing at 4.2% per year.

Suva, Nandi, and Lautoka (Fiji), Port Moresby and Lae (PNG), Port Vila (Vanuatu), Honiara (Solomon Islands), Noumea (New Caledonia) and Nuku'alofa (Tonga) now have populations of unemployed people living in poverty in squatter housing. Squatter housing is often on marginal land. In Nuku'alofa, for example, there has been substantial new housing development and squatter sites in prior mangrove swamps. The people in these areas are vulnerable to storm flooding, insect and water borne diseases, and sanitation problems.

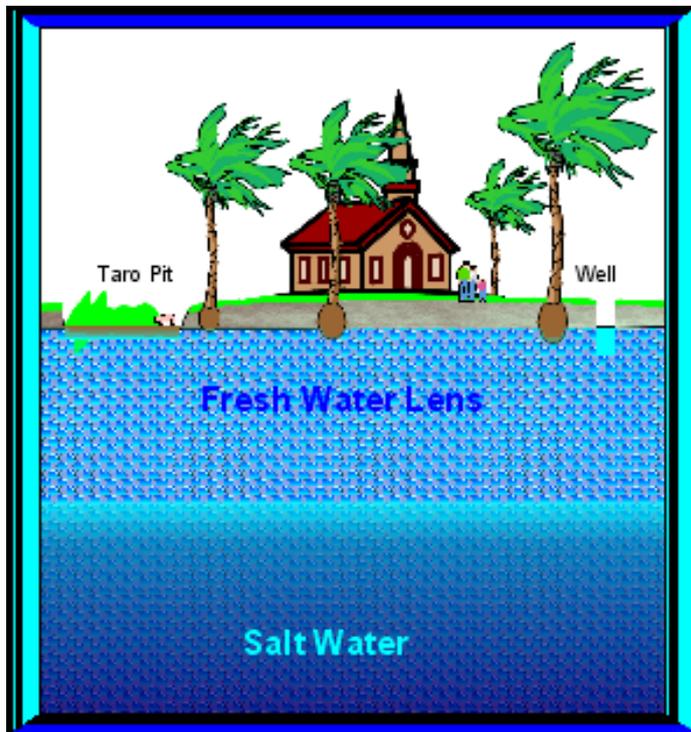


Figure 19. On the small sandy islands of atolls, the water lens floats on top of salt water and is easily polluted.

People living on atolls, and other low-lying coral islands, are perhaps the most vulnerable in the Pacific. They have very small, poorly producing agricultural land. This is compensated for, in part, by marine resources, but the communities are especially vulnerable to storm surge, drought, and pollution of water supplies. The 28,000 people that live on Tarawa, the Capital of Kiribati, depend on a thin layer of fresh water that floats on top of sea water in the sandy soil just two meters below the highest

land on the island. The water on most of the inhabited islands has been severely polluted from sewage or from increased salinisation of the water supply (Chesher 1997c). Coastal erosion, caused by removal of sand from lagoon and reef areas for construction, has become a serious problem. Elevated sea levels from global warming are expected to accelerate both of these environmental problems, perhaps making the island uninhabitable.

4. *Agricultural practices decrease biodiversity and cause deforestation, soil loss and pollution.*

(a) Traditional agricultural systems were sustainable

Traditional Pacific island agricultural systems were highly sustainable, even when planting on steep slopes. In Vanuatu, for example, steep lands of Pentecoast and Ambae are cultivated for a variety of crops, including commercial kava plantations. These gardens have not contributed significantly to soil erosion and degradation because of their discontinuous nature amid natural vegetation, minimum tillage practices, and small size. Crops are grown without chemicals and farmers observe long fallow periods. Forest areas were traditionally an integral part of the food security system of the village and provided protection against cyclones and drought. In Tonga, shifting cultivation techniques with mixed cropping under the canopy of up to 100 associated tree species, allowed regeneration of soils, reduced pest problems, and prevented erosion (Thaman 1992).

(b) Modern agricultural systems are the most environmentally destructive activity in the Pacific islands.

Modern commercial agriculture is the most pervasive and environmentally destructive human activity in the sub-Region. Its primary impacts are; (i) the direct removal of existing ecosystems; (ii) the reduction of biodiversity; (iii) destruction of soils; (iv) pollution of the surface and ground waters with agricultural chemicals; (v) pollution of wetlands and the marine environment with silt and agricultural chemicals; (vi) a major contributor to global warming through the loss of trees and generation of methane; and (vii) a contributor to landlessness.

Traditional farming systems break down as farmers enter the cash cropping system. Small productive mixed crop gardens with abundant trees are either burned or bulldozed to create large, treeless clearings. Tractors till the soil, chemical fertilisers and poisons are applied with subsidised abandon, fallow times are shortened, sometimes replaced with crop rotation, and mixed crop gardens are replaced with monoculture. Monoculture, growing a dense, single species crop, inevitably leads to outbreaks of pests and application of poisons to control the pests. The Banana industry in Tonga, for example, went through two development cycles since World War II that followed an identical pattern of; (i) conversion of mixed local food gardens to extensive banana plantations followed by; (ii) a succession of banana insect pests and diseases and; (iii) the eventual collapse of the industry. In the process, during the first cycle, most of the remaining native forests were cut down to make wooden shipping crates.

In Fiji, widespread burning to clear land or remove sugar cane debris, continues to be a disaster for wildlife, and contributes to soil loss by altering soil characteristics making it more prone to erosion. A number of villages in western Viti Levu no longer have viable food gardens within reasonable proximity to the villages. On smaller islands, burning in combination with goat grazing, has proved to be devastating to terrestrial ecosystems. Steep slope farming on the high islands has resulted in extremely serious soil erosion, making these areas more vulnerable to the impact of cyclones and drought. In Fiji, clear felling of forests for kava plantations reduced the forest habitat needed for yam and other wild foods that formerly were important staples during emergencies. In Samoa, prior to the taro blight, 2,400 ha of forest were being cleared a year for planting commercial fields of taro, often on steep slopes.

Erosion during climatic extremes leads to heavy siltation of streams and rivers and sediment loading of coastal marine environments. This has been especially damaging to coral reef habitats that require clear, clean water for survival. Coral reefs

were destroyed along the north coast of Samoa following two super hurricanes in 1990 and 1991.

Agricultural poisons, used to control pests or clear vegetation, are carried by rain runoff throughout the island ecosystems. Watts (1993) lists numerous discoveries of pesticides in soils, water supplies, marine sediments and organisms in the sub-region. In American Samoa, coastal fish species were contaminated with lead, mercury, PCBs and pesticides (Craig 1994). In Tonga, DDT, Lindane, Heptachlor, Aldrin and Endosulfan were found in a wide variety of foods, ground water, and in human tissues (IDEC 1990). In Guam, Paraquat, Lindane and 2,4,-D were detected in ground water (Morrison and Brodie 1985). Long term effects of pesticides on microbes, plankton, corals and other key elements of the island ecosystems are completely unknown and unstudied. Research in the Caribbean, however, shows that corals exposed to pesticides become physiologically stressed, making them less able to regenerate after storms, cope with diseases or temperature elevations, or to survive siltation from erosion.

Agricultural chemicals adhere to soil particles or are absorbed in organic compounds in the soil. During drought conditions these are blown off the island as dust and settle on the surface of the sea. The poisons are dissolved in the organic microlayer of the sea and become concentrated in slicks on the sea surface. The slicks are a critical habitat for most species of fish and invertebrates (including sea grasses and corals), and the concentrated poisons endanger the reproductive capacity of coastal marine life (Liss and Duce 1997).

(c) Introduction of exotic species is biological warfare against the indigenous species

The introduction of a plant, animal, disease or a pest can cause far greater long-term damage than a physical disaster. Cyclones can last for hours or days, droughts for months, but biological disasters can be open-ended, causing permanent damage. Most introductions of exotic organisms into the Pacific were deliberate and commonplace, although many associated species – including diseases and pests – were unexpectedly imported with desired species. New Zealand immigrants arrived from England with more than 1,305 species of animals and in Australia, imported animals now make up more than 10% of the population of land mammals. Imported cattle, possums, rabbits, goats, pigs, deer, horses, donkeys, and sheep graze on native plants, prevent other animals from using waterholes, compete with native fauna for shelter, and carry diseases that harm wildlife and other domestic stock. Cats, dogs, fox, rats, stoat, and other carnivores, prey on a wide range of native species. Widespread use of poisons to try and control some of the introduced species (such as rabbits and possums) has killed native wildlife as well. Many of these same animals, especially the domestic ones, were introduced throughout the Pacific islands.

Other animals, including a wide variety of rats, snakes, snails, and insects were introduced accidentally. Rats accompanied the first humans into the islands and had a devastating impact on smaller species of birds. The most dramatic recent biological disaster was the accidental introduction of the brown snake into Guam following World War II. The brown snake feeds on birds. Guam birds had no experience with snakes and today there are no more birds on Guam. This has had a series of impacts, including a massive infestation of spiders and other insects in bush areas of Guam.

Coastal marine areas have also had a series of accidental introductions. For example, the introduction of Japanese starfish, a predator on oysters, into the coastal areas of Tasmania, resulted in major problems for a valuable the shellfish industry. Red tides in New Zealand are thought to have been stimulated by the introduction of toxic dinoflagellates from Japan, carried in the ballast water of ore carrier ships. The

red tides have, in turn, killed a multitude of inshore marine life and contaminated shellfish. Following a series of human poisoning from oysters contaminated with toxic dinoflagellates, many of New Zealand's oyster farms were closed.

Imported plants, especially agricultural grasses for grazing, displace native habitats through human cultivation and by subsequent seed dispersion. Some species aggressively invade wildlife areas, killing native plants and thus destroying important ecological links between indigenous animals and associated plants. New Zealanders, during their acclimatisation programme, imported more than 1,893 species of plants (New Zealand UNCED report 1992) while Australia imported about 2000 species of plants (Year Book Australia 1994). Undesirable plants and plant diseases were often imported along with the desirable plants. Some of these diseases were highly dangerous and have infected wildlife areas, displacing or killing native species.

(d) Agriculture is the primary cause of permanent deforestation

While deforestation is due, in part, to harvesting trees, long term forest loss comes from the introduction of food plants and the development of commercial agriculture or plantation forestry. In many countries of the region, economically valuable trees - including coconuts, rubber trees, oil palms, pine trees and mahogany - have permanently replaced highly diverse local forests. Tree plantations were often subsidised or mandated by government. In Tonga, for example, the Land Act (1882) guaranteed each Tongan male over the age of 16 a plot of garden land of 3.3 hectares. In 1927, the Land Act required each land holder to plant 200 coconut palms and keep them in a state of cultivation. Consequently, coconut palms are the dominant land cover over most inhabited islands in the Kingdom.

Replacement of balanced indigenous ecosystems with single species forest or food crops can lead to further biological disasters because of movement of produce between islands. Some recent examples in the South Pacific are:

- The introduction of taro leaf blight into Samoa, resulting in the loss of the country's most important staple and export crop.
- The introduction of coffee rust into PNG in the 1980's requiring a major investment of industry, government and aid funds to help the coffee industry recover.
- The entry of the melon fly into the Solomon Islands making it difficult to grow any of the cucurbit family;
- The incursion of yellow zucchini mosaic virus and watermelon 1 virus into Samoa and western Viti Levu in Fiji, making it difficult to commercially grow cucurbits such as watermelons.
- The establishment of the papuana beetle on Viti Levu in Fiji has excluded many growers from lucrative export markets.
- The introduction of toxic dinoflagellates into coastal waters of Australia and New Zealand leading to massive blooms of toxic phytoplankters (red tides), and subsequent closures of huge areas of oyster farms.

Biological disasters are often linked to physical disasters and to pollution. Cyclones, droughts or pollution can destabilise delicate ecological balances leading to a rapid proliferation of a pest or disease. Agricultural experts believe disruption of the environment by severe cyclones in 1992 and 1993 facilitated the pervasive taro leaf blight in Samoa in 1995. Nearshore pollution from fertilisers and sewage is thought to provide nutrients fuelling red tides and die-backs of sea grass beds and kelp in Australia and New Zealand.

5. *Forestry*

(a) Logging practices in Australia and New Zealand

Commercial forestry has had a profound impact on the native forests of Australia and New Zealand. Both countries logged for construction materials and export wood products since colonisation began in the last Century. Australia stripped an estimated 50% of its native forests while New Zealand removed 79%. Both governments paid subsidies for farmers to cut down or burn forests to create pasture and farm land while, at the same time, both governments paid farmers to plant forests to reduce the severe erosion problems caused by cutting down the native forests.

The National Forestry Service (NFS) was established in New Zealand around the turn of the Century to control logging of native forests. The NFS, however, saw its function as extraction rather than conservation. It continued the policy of clear felling forests and paid subsidies to farmers and sold licences to commercial logging companies to accelerate the process. The NFS also began extensive planting of exotic tree plantations in the late 1950's. Conservation efforts began to attempt to curtail clear felling of native forests in the 1920's. The NFS could not be persuaded or forced to moderate logging activities. In 1986 the New Zealand government had to disband the National Forest Service to stop it from completely stripping the native forests from New Zealand (Smith 1991). Today, clear felling of native forests is banned in New Zealand but "sustainable" logging continues will continue in two lease areas until 2006.

In Australia, clear fell logging continues in about 16% of Australia's natural forests (6.5 million hectares). The issue is highly controversial in Australia. Despite excellent sustainable logging policy and legislation at the State and Federal level, unsustainable clear felling and burning continues. Conservation groups, in March, 1999, accused federal and state forestry officials of using regional logging agreements and codes of practices to get unsustainable logging practices out of the news media.

(b) Commercial logging in Melanesian islands

Papua New Guinea, the Solomon Islands, and Vanuatu have extensive tropical rainforests. Commercial hardwood volumes of 30 to 80 m³/ha, exist in some parts of PNG and the Solomon Islands. These rainforests are also home to a rich diversity of plants and animals found nowhere else on earth. Both governments have authorised commercial logging at unsustainable rates, causing global concern amongst conservationists and considerable strife between the local people, Asian logging companies, and the National Governments. Hughes (1997) describes the basic cause of unsustainable logging as follows:

"Despite strong efforts by domestic NGOs and the trenchant criticism from the Australian government, no effective counter has been found for the alliance between foreign logging companies (some operating under licences issued to local "front" companies) and influential nationals seeking immediate cash income."

In the Solomon Islands, where licences have been granted to harvest 97% of the existing rainforests, unsustainable rates of logging help finance an oversized public service that lacks other effective means of economic survival. Logs also pay for expensive imports of fuel, machinery, vehicles, and electronics.

Deforestation is also caused to provide wood for local construction, fuel requirements, and conversion of land into agricultural land for commercial or subsistence farming, or for homes, and roads. In PNG, Vanuatu and the Solomon Islands, however, large scale commercial logging is the primary concern.

(c) Forest Plantations

Australia, New Zealand, Fiji and New Caledonia have important forest plantations. These are monoculture forests of rapid growing, easily cultivated hardwoods or pine trees. While monoculture plantations have considerable economic value for the woodchip, construction and paper industries, pine plantations are not suitable habitats for most of the indigenous plants and animals of these areas and thus represent a major loss of biodiversity and genetic heritage. Pine plantations also pose a significant fire hazard during droughts, and forest fires are perhaps the second greatest danger to biodiversity of island ecosystems.

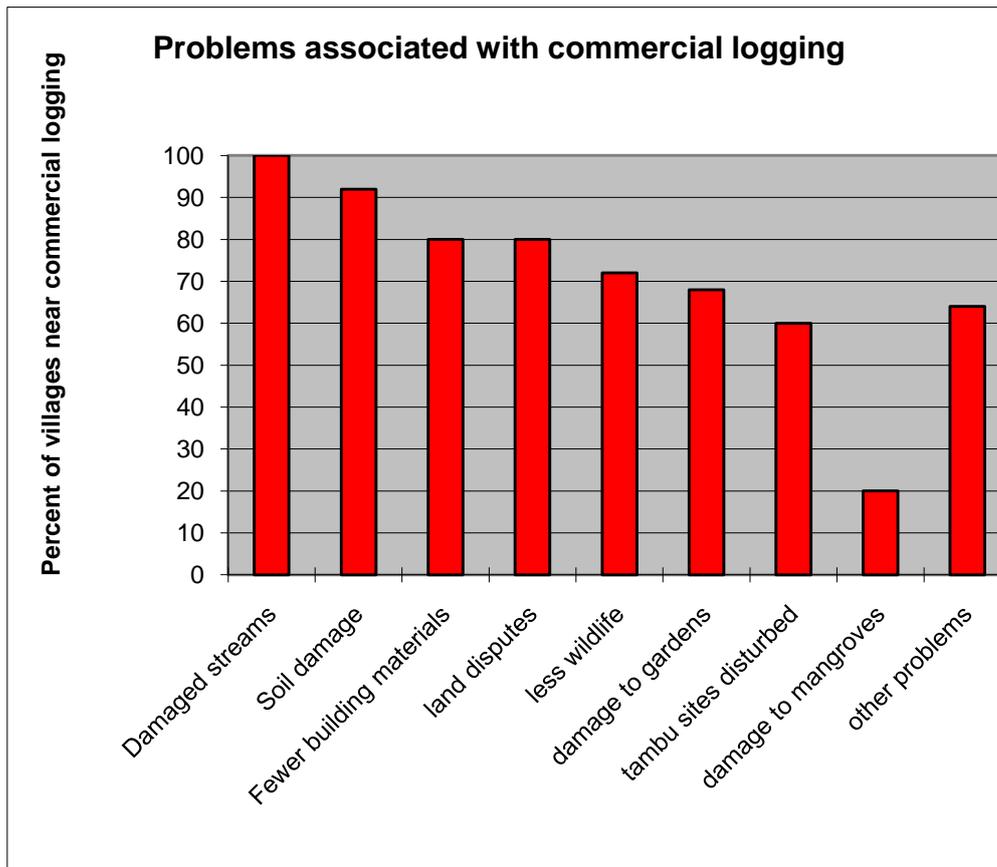


Figure 20. Problems associated with logging in the Solomon Islands

Plantation trees also propagate by seeds and invade native forests. In Fiji, for example, mahogany trees have out-competed native trees and are spreading into natural forest reserves.

Commercial large scale logging activity results in severe erosion, soil degradation, and loss of biodiversity. This has carry-over effects of siltation of streams and coastal coral reefs. Aside from pollution of drinking and bathing water and loss of sea foods from siltation, the people living in logging areas become deprived of fuel wood for cooking, readily available timber and other materials for construction, medicinal plants, and important wild foods found in the forests. Chesher 1997b.

6. *Commercial fisheries, combined with environmental stresses, results in the unsustainable exploitation of marine resources*

(a) Exploitation of coastal fisheries has been unsustainable

Prior to the 1980's Pacific island national fisheries agencies believed the "real issue" was how to develop commercial fishing. Subsistence fisheries were not a national concern, and the general belief was that the inshore areas were under-fished and thus offered an important path to economic development. These views turned out to be wrong. Subsistence fisheries are of great importance to national food security and the coastal areas were not adaptable to sustained commercial fishing pressures, especially not destructive commercial fishing using dynamite, gill nets, diving equipment and poisons that rapidly destroyed coral reef habitats and depleted species with slow growth rates.

Other government sectors that interact with fisheries are largely excluded from the fisheries development process. There was little, if any, communication between fisheries agencies and, for example, tourism (sport fishing, diving, resorts, parks), environment (parks and habitat protection), planning (macroeconomics and finance), agriculture and forestry (responsible for water siltation and subsequent damage to inshore fishery habitats), lands and survey (responsible for filling of mangrove and coastal areas) or public works (responsible for building waste dumps, coastal roads and causeways that diminish fish nursery areas, cut off fish migration routes, and disturb water flows in bays and estuaries). There was also little or no communication between subsistence fishers (especially women) and the national fisheries agencies (mostly men).

While excessive fishing and use of destructive fishing techniques may be the direct cause of the decline of inshore stocks, pollution and habitat loss also depresses the ability of inshore stocks to recover. Sea grass beds, coral reefs, mangroves, and the sea-air microlayer are all critical nursery habitats for marine plants and animals. All of these have been damaged by siltation, pesticides, hazardous chemicals, petroleum products and heavy metals. Mangroves are used as municipal dump sites and are filled for housing.

Fisheries experts remain convinced that shallow water coral reef fish stocks are in good condition away from population centres but agree that stocks of important key species, and all commercially valuable species, are over-fished near villages and especially near urban centres. There is, however, little data to substantiate the health of reef stocks in remote areas. Valuable commercial species, such as giant clams, lobsters, and most large reef fish have been heavily fished even on remote reefs, especially where there is an available anchorage.

Deep reefs and sea mounts, ranging from 100 to 500 metres below the surface, were also believed to hold great promise for commercial fishing. Many countries in the region received assistance to increase their fishing fleet for deep bottom fishing. Then it was discovered that the large fish in these depths were also very old, many not reaching maturity for decades. Some of the fish harvested were over 40 years old. When the marketable fish were harvested from a particular sea mount, replenishment of the stocks was so slow the area could not be successfully fished again for many years. Fishers in Tonga, for example, began to deplete sea mounts – one after the other – within a few years after their discovery. As the fishers moved to progressively more distant sea mounts fuel costs and refrigeration problems began to deplete their profits. Many of the boats, bought on zero-interest loans, were never able to pay off their debts.

- (b) Offshore fisheries in Australia and New Zealand have been exploited beyond their sustainable level.

Offshore fisheries are believed to be in good condition in the Pacific islands, but have been fished beyond their sustainable level in Australia and New Zealand. In Australia, the level of fishing effort exerted by the fishing fleet increased rapidly over the last decade to the point where almost all the major known fish, crustacean and mollusc resources are fully exploited. Some major fisheries such as southern bluefin tuna, gemfish and shark suffered serious biological depletion (Year Book Australia 1994).

The condition of bottom dwelling species such as the orange roughy in deep waters off New Zealand, is a well documented case-history of poor fisheries management (Box 14.1 Roughy).

7. *Mining*

Mining is a non-renewable activity and environmental management is essentially a process of removing the minerals with minimal harm to the environment and maximum profit to society. There are four kinds of mining in the Pacific islands, mineral extraction (nickel, gold, silver, copper, iron, titanium), coal mining, construction mining (for fill, building stone and cement), and oil and gas extraction. Each activity has its own environmental impact during both extraction, processing, and transport.

Australia, New Zealand, PNG, and New Caledonia are the major mineral mining centres in the sub-Region, and the first three also produce petroleum and natural gas, mostly from off-shore wells. Mining in all these countries results in unavoidable localised environmental damage. Regulations attempt, with varying degrees of success, to mitigate damage from mine tailings, processing fumes, and siltation of streams and rivers. In New Caledonia and PNG, for example, nickel and iron is taken by strip mining in mountainous areas. The more rugged the terrain, the more practical difficulties in preventing massive siltation of waterways. Prior to the 1980's there were few, if any, environmental precautions taken with mining activities. Siltation of waterways and coastal areas was common. Even after regulations were enacted the practicalities of mine operation in rugged terrain often precluded effective environmental protection. For example, siltation settlement ponds at the OK Tedi gold mine in PNG were destroyed by an earthquake and the mine was allowed to operate anyway. Sediments polluted the Fly River causing considerable damage to coastal gardens and fisheries. Local land owners successfully sued the mine owners and forced renewed construction of settlement ponds but the success of these will be tested by future earthquakes and torrential rains.



8. *Tourism*

Figure 21. A cruise ship docks in Pago Pago, American Samoa, bringing 2,500 tourists for a day visit.

Tourism is one of the fastest growing industries in the Pacific sub-region. Of all the industries, tourism holds the most promise for accomplishing the sustainable goals of Agenda 21. The Pacific islands are wealthy when it comes to natural beauty. Sustainable Tourism was included in the top eight priority areas for the Pacific Island Countries and although tourists are not in the same category as other living natural resources, they must be hunted, captured, transported, processed, and they and their wastes must be disposed of properly. Recycling is preferred, so the same tourists, and their progeny, can be reused again and again.

Tourists themselves are flourishing on a global basis, and Australia and New Zealand cultivate them in large numbers. Baiters include a wide range of movies, videos, books, advertisements, and cultural demonstrations at tourism conferences extolling the wonders “down under.” Both countries have considerable infrastructure to process tourists with minimal harm to tourist habitats. Specialized tourist habitats include theme parks, wilderness areas, sporting events, art, and glittering casinos where tourists can be effectively relieved of large amounts of excess cash.

The smaller Pacific island nations have much less success in all sectors of tourism. Fiji, New Caledonia and French Polynesia are the major tourist destinations in the Pacific islands but there are doubts as to the sustainability of the effort due to increased local pollution and availability of water supplies, un-scenic litter and peri-urban shanty towns, and high costs of feeding, housing, and transporting the tourists.

Money leakage is common in Pacific island tourism. Resorts and hotels are often self-contained microcosms. Governments provide attractive investment inducements, such as a waiver of duty on construction and other hotel development materials and a waiver of corporate taxes on profits for several years. Developers can therefore construct and run a resort from a Pacific island and export the profits. Some resorts include rooms, food, local transportation, and duty-free shopping as part of a holiday package that is paid for before the tourist ever arrives on the island. Very few of those dollars ever arrive on the island, making it difficult for the governments to provide quality infrastructure (roads, water, electricity, education and training of tourism personnel, attractive parks and recreational areas). In Saipan, for example, Japan Airlines, in partnership with a major Japanese company, built a large hotel. The government charges a room tax for each tourist. But the hotel’s clientele are the employees of the company and they are “given” the tourist package of room, food, transport, sight-seeing, etc. as part of their annual leave pay. The room rates are, therefore, very cheap and the employees arrive with all expenses already paid – in Japan.

Cruise ships are the ultimate self-contained tourism activity. They arrive in a Pacific island destination and spend a single day there so the tourists (often more than 2,000) can experience the country. Unless the destination is well organised and adequately prepared, very few tourist dollars remain behind.

B. Globally caused issues

Externally derived environmental disasters are generated outside of the sub-region and include: (i) trade-induced over-exploitation of local resources; (ii) global warming with associated sea level rise and climate change, (iii) ozone depletion, (iv) hazardous wastes, (v) sea surface pollution (vi) exploitation of ocean resources.

1. *Trade*

From the appearance of the first Europeans, Pacific island people have enthusiastically traded local resources for European manufactured goods. Cloth, metal items of all kinds, tobacco, alcohol, fat-enriched foods, and manufactured items remain the basic motivation for exploitation of primary resources through agriculture, fisheries, timber, mining and energy production. The need to develop manufacturing and tourism industries is linked to the need to remain economically viable in global trade. Virtually all Pacific Island primary sector ministries were formed and operated specifically to promote primary production for export purposes. Environmental degradation is inevitable when the natural resources are used at maximum or above maximum levels of exploitation. Since the exploitable resource base in the Pacific islands is very small, and since trade demands are very large, governments have encouraged or at least condoned unsustainable exploitation in all primary sectors. Most of the “locally produced” environmental issues have been caused by trade-induced primary commodity production.

Industrialised countries like Japan, the United States and the European Union sometimes cause environmental degradation to the Pacific through unfair agricultural subsidies or protectionism. The European Union, for example, pays preferential prices for Fiji sugar but also pays preferential prices for African and Caribbean sugar as well. The European Union also limits importation of sugar into Europe itself and dumps excess production in other parts of the world, driving prices down. The World Bank’s answer to decreasing world prices for agricultural products from developing countries is to encourage the Pacific Island Countries to increase the production of other primary goods for export. When many countries in the Pacific and the developing world produce more of the same goods, such as spices, sugar or bananas, the price comes down and the market collapses. For example, a large increase in vanilla production in Madagascar and other parts of the world forced the price of vanilla in Tonga from T\$80 a kilo in 1997 to T\$60 a kilo in 1988 resulting in a loss of \$T20,000 per tonne.

The Asian economic slump of 1997 and 1998 proved disastrous to Papua New Guinea's forest industry. Asian markets are the sole buyer of logs from PNG and the Asian recession forced many logging companies (also run by Asian companies) to suspend operations. Nearly 4000 PNG employees were laid off between July and January 1997. Logging operations shipped stockpiles worth about \$US 14 million, and there was very little fresh felling. The average export price fell from \$100 a cubic metre in November to \$90 a cubic metre in January, and the old stocks were selling for as little as \$65 a cubic metre. The industry was especially concerned about the decline in the Japanese and Korean markets, which account for 80 per cent of PNG's log exports. PNG exported \$US59 million worth of logs to Korea in 1996, but dropped to \$10 million in 1998. The Rimbunan Hijau logging company, which controlled 45 per cent of the total timber industry in PNG with a production of about 1.2 million cubic metres a year, was down to about five per cent of that figure. Turama Forest Industries in Gulf Province closed, and Vanimo Forest Products in West Sepik and Madang Timbers in Madang were operating at reduced levels. The Forest Industry Association called for an immediate cut of 20 per cent in export tax rates, to allow producers some alternative to closure. The PNG government granted the cut in export taxes, despite objections from conservation organizations, and the Asian logging companies made a rapid recovery.

2. *Climate change and global warming*

The potential socio-economic impacts of climate change on the smaller Pacific island countries were estimated in a series of vulnerability studies. Depending on the worst case scenario (one metre sea level rise), the studies suggest that sea

level rise will have negative impacts on tourism, freshwater availability and quality, aquaculture, agriculture, human settlements, financial services and human health. Storm surges are likely to have a harmful impact on low-lying islands without costly protective measures.

Low lying coastal areas of all islands are especially vulnerable to a rising sea level, as well as to rainfall, storm frequency and intensity. Inundation, flooding, erosion and intrusion of sea water are among the likely impacts. These catastrophes would result in economic and social costs beyond the capacity of most Pacific island countries. Shifts in rainfall regimes and any increase in tropical cyclone intensity and frequency greatly amplify the impact of sea level rise. A rise of average sea level by one metre, when superimposed on storm surges, could easily submerge low-lying islands.

The costs of responding to climate change depend on the options considered. They include (i) prevention: striving to prevent climate change; (ii) adaptation: emphasising strategies and measures for reducing expected damages; and (iii) policies: indirectly inducing reduced emissions of greenhouse gases. Although accurate estimates of costs of protection against climate change have not been finalised in Pacific islands, IPCC estimates that adaptations to climate change could cost billions of dollars. Pacific islanders are not impressed with these estimates, pointing out that for many islands, their entire culture and perhaps their lives are at risk.

Evidence suggests a correlation between severe drought in the region and the El Niño Southern Oscillation (ENSO) event. In 1997, for example, the Solomon Islands and PNG were in the grip of an extreme ENSO induced “50 year” drought. Repeated frosts during the dry nights in the highlands of PNG killed the sweet potato crops (the staple of the highland people) and extensive fires killed much of the available bush food. Combined with high population densities and commercial dependence on a single crop – coffee – the drought became a major disaster for PNG.

The majority of Pacific peoples living in low lying coastal areas are vulnerable to sea-level rise and the adverse effects of climate change. The increased frequency and intensity of storms and cyclones, combined with even minor increases in sea level may threaten the very existence of small atoll countries and, at best, be a significant impediment to sustainable development.

Integrated coastal management (ICM) has been promoted as a means of managing human activities and natural processes affecting coastal systems, including climate change and sea level rise. The development of national capacity to avoid or mitigate coastal degradation and to develop and implement adaptation strategies will therefore rely greatly upon the development and implementation of ICM approaches relevant to Pacific islands.

C. Marginalisation of environmental agencies prevents adequate responses to environmental concerns.

1. Institutional incapability

One of the greatest causes of unsustainable behaviour in the smaller Pacific island countries is the lack of capacity for adequate environmental (or business, or institutional) planning. In the Pacific islands, understaffed and under funded are terms applied equally to environmental units and planning units. Neither have much influence over politics or policies. This is a critical issue and will be examined more closely in the section on responses to environmental issues. Lists of regional priorities and case studies from the countries of the Pacific always include statements like, “Governments failed to provide sufficient support to their

Environmental Departments for them to adequately undertake the tasks expected. Core funding and staffing has been inadequate – with an over reliance on donor assistance” (McGregor 1998).

Environmental units have no direct input into the main decision making processes except in Australia, New Zealand, Tuvalu and Papua New Guinea where environmental ministries sit on the Cabinet level. In most other countries, environment is marginalised as a department within a multi-function ministry, headed by a junior civil servant. There is a historical background that is largely responsible for the existing institutional weakness of environmental efforts in Pacific island countries.

2. Regional and national environmental institutions were marginalised by poor planning.

Nobody thought to do a strategic Environmental Impact Assessment on setting up The South Pacific Regional Environment Programme (SPREP) within the domain of the (then) South Pacific Commission (the SPC has been recently renamed the Secretariat for the Pacific Community). The SPC seemed to be a logical choice. The Governments of Australia, the French Republic, New Zealand the United Kingdom of Great Britain, Northern Ireland, and the United States of America, set up the South Pacific Commission in 1947. The goal was to strengthen international co-operation for economic and social welfare and advancement of the peoples of the non-self-governing territories in the South Pacific region that they administered. Amongst other powers and functions, the SPC was to study, formulate and recommend measures for the development of the economic and social rights and welfare of the inhabitants of the territories. Areas of interest included; agriculture (including animal husbandry), communications, transport, fisheries, forestry, industry, labour, marketing, production, trade and finance, public works, education, health, housing and social welfare.

The SPC was thus an inter-governmental technical advisory and networking organisation helping guide the small island countries of the Pacific region towards self-reliance and reduced dependence on foreign aid. This, in the paradigm of the day, meant increasing the output of local primary industries to create employment and national income. These twin goals have been the common national goals of the Pacific island nations ever since. Following the 1972 Conference on the Human Environment in Stockholm, the European leaders thought an ecological advisor might be a good addition to the SPC staff.

The Ecological Advisor arrived just as colonialism was ebbing from the Pacific Ocean. The very first country to gain independence was Samoa and it had been independent for only 12 years. Ten island countries became independent between 1971 and 1981. Despite each new country having its own constitution, the government systems were patterned on the colonial government administration. European consultants drafted the constitutions and wrote the legislation for the new countries. More importantly, the local people who worked in the colonial governments became the leaders and officers within the new government agencies. Their training under the colonial domain instilled a bias towards the functions and expected rights and privileges of their offices, especially regarding the decision-making powers of the man at the top.

3. Government structures became centralist democracies.

Colonial governments were centralist, top down structures. They paid little attention to traditional governance systems or local resource management. Villagers were not consulted on policy matters or decisions. High level policy was developed in Washington D.C., London, Canberra, Paris, or Wellington. For example, the British

Solomon Island Protectorate was instructed by the Home Office to set up a Forestry Department in 1952 to “build the production forest estate.” Under the Land and Titles Ordinance (1959), the Forestry Department was supposed to establish “Forest Reserves” and “Forest Areas.” These were for long term forest use, not preservation. The members of the colonial government were so isolated from the people of the Solomon Islands that they thought land outside of the immediate vicinity of villages was “vacant” land the government could proclaim as loggable forest areas. The people of the Solomon Islands eventually were able to make it clear that there was no such thing as “vacant land” and all the land was custom-owned (Zoleveke, G. 1979).

As the colonies achieved independence, they were placed on the list of official members of the SPC. The new leaders gained a position at the yearly conference table to review and consult on the SPC’s regional development programmes. The SPC Secretariat set up programmes that mirrored each of the various colonial government sectors or, in some cases, helped the colonies new government offices. For example the first fisheries development program began in 1952, and helped establish fisheries offices in the countries. At first, European fisheries officers headed these, but eventually, the islanders themselves (usually with a European advisor in the next office) staffed the fisheries offices. By 1974, when the Regional Ecological Advisor was assigned, the SPC had on-going programmes in Fisheries, Agriculture, Animal Health, Community Health, Demography, Forestry, Women, Media, Maritime Law, Youth, Rural Technology, Statistics, Education, and even an environmental program responsible for sanitation.

The Pacific leaders were not sure what the Ecological Advisor’s job encompassed. Most leaders were unfamiliar with the words used to describe his role. The advisor, Arthur Dahl recalls, “I was asked by some leaders to explain what these highly technical words, like ecology, environment, actually meant. Nobody had thought through what all this meant, the terms of reference for my position were unbelievably vague.”

4. *SPREP’s scope was determined by default*

Following the 1975 Wellington conference on National Parks and Reserves in the South Pacific, there was greater political support for a regional approach to nature conservation, symbolised by the signing of the Apia Convention in 1976 calling for the protection of the region’s natural environment. In 1982, the South Pacific Conference on the Human Environment in Rarotonga, modelled on the 1972 Stockholm conference that had launched the international environmental agenda, ended with the signing of the *Convention for the Protection of the Natural Resources and Environment of the South Pacific Region (SPREP Convention)* (Noumea 1986) by a majority of the member nations of the SPC. This Convention established the South Pacific Regional Environment Programme to promote and co-ordinate environmental management in the South Pacific, and to represent the member countries, internationally, on environmental issues.

SPREP’s Membership eventually comprised American Samoa, Australia, Cook Islands, Federated States of Micronesia, Fiji, French Polynesia, France, Guam, Kiribati, Marshall Islands, Nauru, New Caledonia, New Zealand, Niue, Northern Mariana Islands, Palau, Papua New Guinea, Pitcairn, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, United States of America, Vanuatu, Wallis and Futuna.

SPREP was officially founded as a semi-independent organization within the SPC headquarters in Noumea, New Caledonia. It was funded by the SPC, the United Nations Environment Programme (UNEP) and the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) and its work programme was reviewed by the member governments of the SPC.

5. *The SPREP Secretariat made a fundamental logistic error*

There was a problem, however. So long as SPREP was dealing with nature conservation (parks and reserves), prevention of pollution, and environmental awareness raising, Pacific leaders and the SPC understood and agreed with the programme. But environmental issues are much broader than that, and solving them involves important decisions about how government operates. Preventing coastal pollution requires new policy decisions for forestry, agriculture, public works, tourism, fisheries, mining, family planning, and eventually the whole of government. The SPREP Secretariat saw its domain as all aspects of the human environment, including resource use, project planning, rural and urban planning, detection and control of all forms of pollution, coastal zone management, conservation of rare and endangered species, development of parks and reserves, improving national capacity for environmental management and education.

However, the SPC already had programmes dealing with resource use, health, education, statistics, planning and economics. The South Pacific Applied Geoscience Commission dealt with the engineering aspect of resource use, did resource surveys and helped the countries with technical advice on mining. The University of the South Pacific was the regional organization dealing with research, training and education – including resource, environment, ecology, public health, and geographic subjects. The SPC administration would not endorse a SPREP programme on sustainable development of fisheries because there were two excellent regional fisheries programmes already operating at the SPC.

6. *The domain problem was compounded when setting up National environmental units.*

With the encouragement of SPREP, the backing of UNEP and assurance of international funding, Pacific island countries began setting up “Environmental Units.” Environment units were (and remain) small organizations with one or two professional staff, set up to act as national SPREP “focal points” or as agents for other environmental funds. Nobody was exactly sure how these units should function or, for that matter, exactly where they belonged in the government structure. The Environment Unit of Vanuatu, for example, has shifted from one ministry to another eight times in two years and is now in the Ministry of Lands.

While SPREP was in a very liberal – almost academic - environment at the SPC, the Environment Units were in a very different situation, precariously situated in highly conservative, practically oriented, colonial-style government hierarchies. The existing government departments already claimed control over all of the idealised functions of the budding environmental units.

The concept, if not the practice, of sustainability has long been an integral part of all sectors of resource use. Fisheries management has been based on the statistical concept of a Maximum Sustainable Yield since the early 1940's. Sustainability has been a recognised part of forest management for hundreds of years. Problems with soil loss and salinisation of soils has been a serious concern of Agricultural organizations in Australia, New Zealand and Fiji since the turn of the Century. Rural farmers in all the Pacific Islands have traditionally recognised the problems and solutions of sustainable farming for thousands of years. Health departments have been dealing with family planning, public health (including testing water supplies and sanitation issues), and solid waste disposal since World War II. Anti-littering laws were on the books since before the 1930's. In Tonga, for example, littering was prohibited under the Public Health Act of 1913, the Mosquito Control Regulations of 1938, the Garbage Act of 1949, and the Town Regulations Act of 1974. The idea of conservation reserves was a traditional behaviour pattern throughout rural Pacific areas and there have been parks in urban areas since urban

areas began in the Pacific sub-Region. Most of the newly independent governments already had parks and reserve legislation and a government office responsible for nature conservation. For example, the Birds and Fish Preservation Act of 1915 in Tonga included protection of specific endangered species and set aside protected areas where people were forbidden to

“(a) discharge or cause to be discharged, and effluent or noxious or toxic liquid or substance; (b) erect any harbour, wharf, pier, jetty or other building works, temporary or permanent; (c) cut, damage, remove or destroy any mangrove; (d) erect any fish fence, set any fish trap, trawl for fish (including shellfish) or engage in fishing for commercial purposes; (e) carry out any boring, drilling or dredging operation.”

The police, fisheries and agricultural officers enforced the 1915 Act and punishments ranged up to six months in jail.

In addition to Health, Education, Agriculture, Forestry, Fishery, and Conservation departments, Governments already had fully staffed statistics departments, water departments, economic, rural and urban planning departments, commerce and tourism departments all aimed (however poorly) at sustainability.

7. *Resistance to parallel decision making further alienated environmental efforts.*

Ministers and Directors of Government Ministries understandably feel they are better qualified and informed in managing their ministries than a young person in an Environmental Unit from some other Ministry. And the same young bureaucrat will have even worse problems if he or she attempts to make decisions for the minister or permanent secretary hosting the environment ministry. For instance, the Environment Unit in Vanuatu was part of the Ministry of Agriculture, Forestry and Fisheries when its Minister authorised export shipments of logs that had accumulated during a ban on log shipments. The Environment Unit took an active, and successful, role in preventing the logs from being exported and the ban on log exports remained effective. The Environment Unit was transferred to the Ministry of Lands.

Even when mandated by law, the Ministers and Permanent Secretaries are intolerant of another agency making their decisions for them. Governments do have various ways of curtailing Ministry activities, if necessary. For example, Cabinet generally reviews all development proposals and can vote against a particular Minister's proposal. Administration departments may not allow new job positions, and finance can pull the purse strings on unpopular activities. The Ministry of Health might shut down a polluted water well, but is unlikely to be able to force the Public Water Board to fix leaky pipes even when tests show substantial pollution enters the public water supply from those leaks. However, in general, only the Minister – unless over-ruled by the Cabinet – has the authority or the right to make decisions on how the Ministry will operate. Only the Permanent Secretary (or Director) makes day to day decisions on the operation of the Ministry. Much depends on the willingness of the Minister and the Director to co-operate with the whole of government on common environmental issues.

8. *Resistance to environmental legislation is due to intolerance of parallel decision making.*

SPREP assisted many Pacific island countries in the distillation of old and outdated legislation into comprehensive framework environmental laws. Only one of these laws has ever been enacted (The Solomon Islands passed its new environmental law in 1998). A “Sustainable Development Act” was produced for Fiji, a “Comprehensive Environmental and Resource Management” law for Vanuatu, and a “Environmental Assessment Planning Bill” for Tonga. All have all been sidelined – probably permanently. The main reason all three laws were stopped was because

they set up a parallel decision making body in Government. Just as Ministers and their Directors resist outside parties from making their decisions for them, Cabinets will not tolerate a second National decision making body. They will accept an advisory council, perhaps, but not one that could legally conflict with their own decisions.

For example, in the Federated States of Micronesia, a proposed “Nationwide Board on Environment and Sustainable Development” was rejected by Congress because,

“it was considered to be very powerful and therefore was politically unacceptable.” Instead, the President ordered that a “Environment Management and Sustainable Development Council” be set up with representatives from a broad cross section of Government Sectors. The Council is advisory only and the Secretariat is based in the Office of Planning and Statistics. The Council has been active in reviewing new projects and making recommendations for integrating activities without environmental damage. Meanwhile, the Environment Unit, set up in 1986, has played a minor advisory role despite its mandate to co-ordinate all activities across sectors, government agencies, NGOs and the private sector that deal with environmental matters as well as provision of technical advice and specialist attention on matters relating to the environment.” (Paeniu, 1996).

9. *Environmental Impact Assessment is often seen as parallel decision making*

SPREP, and The Environment Units of the countries, have all produced Environmental Impact Assessment procedures and have recommended that all projects be subject to EIA. Yet even where this suggestion has been accepted, few EIAs are carried out unless they are done by the corporation wanting to do the project – or by banks that intend to fund the project. All ADB and World Bank projects must now have an EIA completed before the project can begin. The Bank normally hires consultants to do the EIA, and other consultants to evaluate it.

Governments resist the EIA process because it has been instituted outside the normal stream of decision-making. EIAs can be a confusing and expensive exercise, and experts often produce enormous technical documents whose content must be interpreted to the national leaders. Small scale EIAs can be superficial and unconvincing. The staff of the environmental units, even when trained in EIA practices, are seldom viewed as more competent than Cabinet Ministers, with their technical advisors and planners, to judge the overall value and problems of a proposed project.

10. *SPREP and the difference between co-ordination and co-operation.*

SPREP failed to adopt a policy of co-operative participation practices and strategic conflict management. It took the “expert” approach, created its own agenda and sold it to an uncertain management. Colonial-trained government officials, habituated to a strictly top-down centralised decision making process, rapidly isolated the Environment Units and have kept them understaffed, underfunded, and without direct input into decision making processes. Were it not for the international mandate to have them, and international funds to support them, there would be very few environment units in the Pacific islands.

III. ACTIONS TAKEN IN RESPONSE TO ENVIRONMENTAL PROBLEMS

A. General progress in awareness raising has been excellent.

The power of modern communications and information technology has revolutionised the capability of people to become aware of, and respond to, threats of all kinds. Prior to 1972, most Pacific islanders thought environmental health referred to personal hygiene and using latrines and pour-flush toilets as opposed to beaches and streams. People were aware of and practised a range of conservation measures for sustainable use of land and marine resources.

There was a general belief that resources were under-utilised and that economic self-reliance would come from increasing the primary sector output. Fisheries, Forestry, Agriculture and Mining were all thought to be available for rapid development. Tourism development was oriented toward the construction of large hotels and resorts. Nobody had heard of eco-tourism, global warming, ozone depletion, sea level rise, climate change, biodiversity, or genetic heritage. There were no educational programmes that dealt with environmental topics and few Pacific islanders with training in environmental management.

Twenty five years later, Forestry, Fisheries, and Agriculture departments are all aware of the need for, and methods to attain, sustainable development (although the sectors continue to utilise unsustainable methods). Governments are working out methods of decentralisation and are forming partnerships with NGOs and communities for land planning and sustainable development initiatives. Traditional resource management has been recognised as an important development asset. Nearly everyone has heard of eco-tourism, global warming, ozone depletion, sea level rise, climate change, biodiversity and genetic heritage. Environmental education units have been included in school curricula, starting in primary schools and continuing through to the university level. There are a growing number of Pacific islanders with formal education, including Ph.D.s, in environmental management subjects.

Politicians, Ministers, government employees on all levels, planners, bankers, developers, and business people all understand the need for sustainability. A major environmental catastrophe, be it an oil spill or forest fire or tsunami is reported everywhere in the sub-region within hours. Pacific islanders are quick to accumulate resources and respond to real or imagined threats.

Awareness, however, does not necessarily result in an immediate change in behaviour. People do not always do what they know is best, especially if there is a commercial reason to do otherwise.

1. *Regional Awareness Raising Efforts*

SPREP has made major contributions to environmental education and awareness raising throughout the South Pacific. Their Environmental Education, Information and Capacity Building program has been underway since 1982. Following the UNCED in 1992, SPREP introduced the *Capacity 21* project to strengthen environmental policy and strategy co-ordination in Pacific island nations. The project worked in six countries (Solomon Islands, Vanuatu, FSM, Cook Islands and Samoa) to increase awareness of sustainable development issues in government sectors, NGOs, the private sector and community groups. The project (i) reviewed policies and procedures of development banks and other lending institutions; (ii) examined development planning procedures and held sustainable development conferences for planners and financial institutions; (iii) reviewed the extension service

programmes of agriculture, forestry and fisheries; (iv) assisted with the development of national policies on waste management, land use, population and water management; and (v) assisted with the development of environmental legislation.

The policies and legislative efforts are starting to show dividends. The Solomon Islands has, in 1998, passed a major framework environment law and others are in various stages of development. Government workers from nearly all ministries were exposed to strong arguments for sustainable development and government policies have indeed been changing. Capacity 21 was followed by *Capacity Building for Environmental Management in the Pacific*.

The SPREP *Environmental Education* program has hosted a multitude of teacher workshops and environmental education conferences on curriculum development, teacher training, multi-media, public awareness and materials production. The program targets both formal and non-formal audiences and provides training for teachers, non-government organisations, church leaders and the media. For example, SPREP has co-ordinated two major Pacific Regional Conferences for Environment Education and Training. The first produced the Environmental Education Teachers' Manual and the second assembled educators from throughout the region to exchange ideas and develop further initiatives for Environmental Education in the Pacific.

All of SPREP's programmes include conferences and workshops. These cover every conceivable aspect of environmental management and have ranged from high level international conferences to form environmental policies for the Pacific sub-region to practical workshops on doing environmental impact assessments or even desk-top publishing. Thousands of Pacific islands – including heads of state, government employees in all sectors, NGOs, media and the private sector have attended and been exposed to the theory and practice of environmental management. SPREP's activities have touched the lives of everyone in the Pacific islands and that, alone, has helped to make everyone more aware of their environment.

2. *National Government Activities*

National governments have responded to the SPREP initiatives by hosting a range of public awareness activities. Samoa, American Samoa, and Tonga, for example have set aside an environmental awareness week. The Government of Tonga began an Environmental Awareness Week in 1984, as the result of a SPREP training course in environmental radio broadcasting. It has continued every year since and is one of the few examples in the Pacific islands where an environmental project changed the behaviour of the people, resulting in a measurable change in the environment.

The main radio station in Tonga is owned and run by the Government. When a young radio announcer wanted to initiate an annual radio series on environment, the Environmental Division of the Ministry of Lands, Survey and Natural Resources worked with her to create a week long programme that linked with the United Nation's World Environment Day and, as it happens, the King's Birthday.

The project involves a week long celebration of the environment, with schools, businesses and government offices participating in a variety of activities. The radio station presents and co-ordinates the program in association with the Environment Unit and all the Government ministries involved with environmental issues, including Agriculture, Forestry, Fisheries, Health, Tourism, and Public Works.

Although individual projects and themes vary from year to year, the week usually includes: (i) Sunday the churches discuss the environment and people's obligation to protect it; (ii) Monday everyone cleans up the island; a massive campaign of sweeping, litter collecting, and trimming of hedges and lawns. Prizes are awarded for the tidiest village; (iii) Tuesday, the Agriculture Department provides

seedling trees for free and thousands of people plant thousands of trees on public and private property; (iv) Wednesday there is a contest for the best songs, dances and artwork posters for the environment; (v) Thursday there is a radio talk-back show where people call in to ask a panel of key government officials for information on environmental topics. (vi) Radio shows each day of the week on different environmental issues.

Sapling trees planted in the 1984 environmental awareness week are now reasonably sized trees. Not all the trees survived, but each year thousands more are planted; fruit trees, nut trees, decorative trees, medicinal trees. It is one of the few examples where one can return more than a decade after an environmental project started in the Pacific islands and find a measurable improvement in the flora.

The fact that the week happens to be in June, at the same time as the King's birthday, helps the festive spirit and the government commitment to environmental issues. Its success also centres on the realisation by the Church, NGOs, schools, government departments, and businesses that the Environmental Awareness Week is a time for co-operation for the benefit of the whole community. Radio has been a big help and, in more recent years, television.

3. *NGO Activities*

Grass roots environmental NGOs are a recent development in the Pacific islands, although they have been active in New Zealand and Australia since the 1920's. NGO Campaigns are often aimed at forcing governments to respond to environmental issues. They often play an opposition role, accusing governments or industries of damaging the environment because of short-sighted attempts to liquidate resources for cash - or greed. NGO protests in Australia, for example, forced the remaining whaling industry to quit and later challenged Australian leaders to implement laws protecting marine mammals. NGOs in New Zealand fought the National Forestry Service for 50 years before government was obliged to disband it.

When NGOs and governments agree on issues, however, partnerships between them can be extremely effective. For example, The rapid and powerful response of the governments of the South Pacific to drift netting in the South Pacific (see Box 14.2 DriftNet) was due to the hard-hitting NGO media campaign to stop it. If it were not for their talents in photography and communications, the drift netting prohibition would probably not have come about. The government leaders of Oceania were outraged at the images of the death of dolphins, sea turtles and seals on TV. Their immediate and effective action was welcomed by the world.

The Pacific sub-region has seen a progressive change in government/NGO relationships. Both realise more progress can be made if they work together on issues. Australian government agencies work together with Australian NGO's in the One Billion Trees Program and the Greening of Australia. The campaign aims to plant 1 billion trees in Australia by the year 2000. They are making excellent progress and have gained the co-operation of communities in almost all of Australia's cities and towns. Trees are being planted everywhere, in towns and villages and on degraded pastures.

In Vanuatu, the Government agencies use the Wan Smol Bag Theatre to deliver environmental messages. For example, the Vanuatu Sustainable Forestry Programme supported the writing and production of a play on the new Vanuatu Code of Logging Practices and then supported the theatre to teach people from remote islands to perform the play in villages during visits by forestry extension agents. The Vanuatu Department of Health enlisted the support of the Wan Smol Bag Theatre in a victorious campaign to clean up litter and thus stop a dengue epidemic that was being spread by mosquitoes.

The Solomon Island Development Trust is the largest and most active locally operated NGO for sustainable development in the Pacific islands. The Honiara based

SIDT co-ordinates a series of small centres in different island groups. 11 field teams with a total of more than 200 young people (men and women) travel to villages in groups of 3 to 5 and educate the village people in sustainable development. In 1991, there were 332 village workshops on Population and Resource Awareness and 109 special workshops on environmental and development topics. 35,806 participants attended these workshops. The special workshops included logging and resource reviews, kitchen gardens, women's interests, raising village quality, communal education, leadership courses, reforestation and special political awareness. Their Women's Outreach programme in 1991 held meetings in 92 villages with 11,080 women participants.

SIDT village theatre group teaches other staff members to teach drama skills to the villagers. The dramas are about development issues. They encourage village people to examine development issues and take some measure of control over events. The theatre group has proven an excellent community resource, fulfilling an increasing demand for imaginative and new approaches to non-formal education. Action, with its emphasis on visual imagery, story telling and audience participation is able to communicate complex ideas in a simple and direct way. SIDT publishes some of the best locally oriented environmental reports in Oceania. Their magazine, Link, is entirely produced by the staff. It is filled with interesting information about social, economic, and environmental topics in the Solomon Island. Each issue has a typical theme - such as marine resources, education, pollution, logging or the role of music in tradition. The issues, distributed by subscription and by the mobile teams, are bound every so often and placed in all the schools. SIDT also publishes a Komik in Pidgin which, like Link, is filled with comic strips and cartoon stories about environmental issues.

The Foundation of the Peoples of the South Pacific International (FSPI) is an international network of NGOs with national affiliates in PNG, Fiji, Tonga, Kiribati, the Solomon Islands and Vanuatu. Their core focus is participatory resource planning and management and building of institutional linkages between resource user groups, communities, governments and other NGOs. They have a multitude of programmes including coastal/marine resource management, community forestry, environmental awareness and education. FSPI is currently developing capacity for management of conflict in community resource development and plans to make conflict management tools available to all Pacific island NGOs and organisations, thus enhancing overall effectiveness in the implementation of environmental management programmes.

4. *Industrial and Public Awareness*

The Manufacturer's Federation of New Zealand surveyed some 379 manufacturers on their environmental initiatives. The companies were most concerned about: (i) use of energy; (ii) New Zealand's environmental reputation; (iii) emissions to air and water; (iv) packaging.

Half the companies surveyed indicated environmental issues would change the way they do business. More than half were developing, or had developed, policies and procedures to address environmental issues. Nearly two thirds had made an informal check of their own company's environmental impact and half carried out formal audits. Half the companies found ways to reduce their energy use, 60% reduced their waste output and more than half recycled materials from their plant's operations. 75% wanted New Zealand's clean and green reputation to be developed internationally, they saw it as a trade advantage.

In 1992, to prepare for UNCED, Australia conducted one of the most comprehensive public opinion polls on the environment ever done, asking more than 12 million people what they thought on a variety of environmental issues. Of these, only 6.6% thought economic growth was more important than the environment while

more than 11 million voted the environment was of equal or greater importance. The poll revealed the primary environmental problems that the Australian people worried about were air pollution, destruction of trees/ecosystems, and ocean pollution.

Global media reaches everywhere in the Pacific, helping to form a consensus on environmental issues. The views of business leaders in the Solomon Islands were strikingly similar to a survey of 150 business leaders in Asia (Alexander 1994). For example, when asked their views on economic development and environmental protection exactly 54% of both Asian and Solomon Island business leaders answered it was a costly but necessary drag on economic development. 24% and 27% respectively said environmental protection offers companies opportunities to make profits and can enhance economic development.

B. Response to disasters and global warming.

1. Dealing with Disasters

Hurricanes, floods, droughts, tsunamis, earthquakes and volcanic eruptions do considerable damage to sustainable development plans. The economic costs can bankrupt a local community. While nobody can avert natural disasters, the impacts can be greatly minimised by (i) accurate and timely predicting when and where disasters will strike; (ii) rapid emergency response to victims; and (iii) land use planning to reduce vulnerability.

Advances in the first two areas have been spectacular in the Pacific sub-Region. Prior to the 1940's disasters struck with no warning. Weather forecasters could only predict the occurrence and path of hurricanes, for example, if there happened to be ships at sea to report them, or the regional network of weather forecasters that communicated by radio were able to report on hurricanes passing close to them. Following World War II improvements in communications, increased shipping and air traffic, increased the ability to provide early storm warnings. Radar, developed during the war, gave weather centres the ability to accurately track storms within a hundred miles of some weather stations.

Since the 1970's, satellites have completely changed weather forecasting. Meteorologists now have real-time views of weather systems anywhere on the planet. Faxes were installed in all island weather stations to provide up to the minute weather charts and weather warnings. Telephones and radio enabled national meteorologists to communicate storm warnings to everyone. All Pacific island nations now follow a common code of hurricane alerts, and provide radio instructions to the public on preparedness procedures. Within the last five years, as computer models of the atmosphere improved, meteorologists have become increasingly accurate in predicting hurricane formation and tracks, often delivering explicit information on storm track, wind velocities, expected sea level rise and wave heights for three days in advance.

SPREP now hosts the World Meteorological Organization (WMO) sub-Regional Office. SPREP and WMO have collaborated in providing eight Pacific island countries with equipment to receive low-orbit weather satellite images. SPREP has also provided real-time computer displays to national meteorological services that show readings from weather monitoring stations. SPREP also organises the Regional Meteorological Service Director's Meetings to review the status of SPREP's regional meteorological and climate programmes and discuss new projects.

Better prediction of storms not only reduces loss of life and damage to property, it enables governments to mobilise emergency response teams to assist communities with food, medicine, and shelter.

Weather scientists have been able to predict drought thanks to a greater understanding of the El Nino event in the Central Pacific. In the past decade

improvements in satellite imagery and computer modelling have enabled scientists to directly observe ocean warming and currents and the response of the atmosphere over the entire Pacific; in fact over the entire planet. This incredible sensory capability gives meteorologists predictive tools to forecast climate conditions for months in advance. Governments are now using this information to adjust agricultural projections.

Although tsunamis are very difficult to predict, volcanologists are becoming increasingly adept at predicting when volcanoes will erupt and sometimes when violent earthquakes will happen. When the volcano exploded in Rabaul, PNG, in 1994, for example, the community was warned and evacuated long in advance. Most possessions, including vehicles and valuable belongings, were saved.

2. *Ganging up on Global Warming, Sea Level Rise and Climate Change – AOSIS in the Pacific*

“The (South Pacific) Forum is a diverse organisation with both developed and developing states, ranging from the largest continental island to the smallest of atoll states. We have, despite our considerable differences and wide diversity of interests, managed to arrive at a comprehensive common position (on climate change) which seeks a way forward. This surely is a lesson for the international community. It can be done. It is possible to work together with respect and integrity, towards common goals and objectives regardless of national agendas and opposing perspectives.

And again I wish to stress that while we in our region have come up with a comprehensive position on this important issue, this will amount the naught if the international community does not follow suit in pursuit of common grounds and partnership that will address the threat from climate change and sea level rise which threatens the very existence of many of our members as well as other communities around the world.” *Address by W Noel Levi, secretary general south pacific forum secretariat to the second committee of the 53rd session of the United Nations general assembly.*

The small island developing states of the world banded together into an Alliance of Small Island States (AOSIS). AOSIS was established in 1990 during the Second World Climate Conference in Geneva and has since played a central role in shaping international policy on climate change. The association is a classic example of co-operation for environmental reform (Box 14.3 AOSIS). It is a success story that is still in progress at the turn of the Century, as AOSIS members lobby to force the continental nations into major reductions of greenhouse emissions. With considerable justification, AOSIS is claiming damages to their countries. Some countries, such as Tuvalu, point out that the damages might be very expensive, as their islands may well become uninhabitable because of sea level rise.

3. *Responding to climate change*

Since 1980, considerable effort has been made to: (i) raise awareness of climate change; (ii) monitor research developments; (iii) develop methodologies for vulnerability assessment; (iv) monitor sea level rise; and (iv) strengthen national capacity to understand the science, impacts and responses to climate change and sea level rise. These efforts have involved environment officials, planners, meteorologists and the general public. Most SPREP members have ratified the United Nations Framework Convention on Climate Change (UNFCCC).

The Pacific Islands Climate Change Assistance Programme (PICCAP) is a three-year activity funded by the Global Environment Facility (GEF), implemented by the United Nations Development Programme (UNDP) and executed by the South Pacific Regional Environment Programme (SPREP). Another GEF-funded global programme, CC: TRAIN, implemented by the United Nations Institute for Training

and Research (UNITAR) is integrated into PICCAP by SPREP and executed as PICCAP. PICCAP began in 1997 with two main objectives (i) to assist 10 Pacific Island countries that signed and ratified the UNFCCC to meet their reporting and other commitments, and (ii) to develop, train and enhance the capacities of Pacific Island countries to implement the UNFCCC over the long term.

All countries which are Parties to the United Nations Framework Convention on Climate Change (UNFCCC) are required to form Climate Change Country Teams and a Climate Change Country Co-ordinator to:

“Undertake an inventory of the sources and sinks of greenhouse gases identify and evaluate mitigation options to reduce greenhouse gas emissions assess their vulnerability to climate change and develop adaptation options submit an initial national communication to the Conference of the Parties, and develop a national implementation strategy for mitigating and adapting to climate change over the long term.”

Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Republic of Marshall Islands, Nauru, Samoa, Solomon Islands, Tuvalu, and Vanuatu appointed country co-ordinators and established country teams to undertake the climate change activities in their own countries. Niue and PNG also have climate change programmes, but these are funded directly by GEF through the United Nations Environment Programme (UNEP) and UNDP and are not included in PICCAP.

A Regional Training Workshop on National Greenhouse Gas Inventory Methodology was conducted at the University of the South Pacific, Suva, from April 13-17 1998, to train Pacific islands national experts in undertaking their national inventories of greenhouse gas sources and sinks. A total of 23 participants from Cook Islands, FSM, Fiji, Kiribati, RMI, Nauru, Samoa, Solomon Islands, Tuvalu, Vanuatu and Niue attended.

A six-month training course on climate change vulnerability and adaptation assessment was held at the International Global Change Institute (IGCI), University of Waikato, Hamilton, New Zealand in June of 1998. Participants from 12 countries including Niue and PNG participated in training on assessing climate change vulnerability and adaptation requirements.

The South Pacific Sea Level and Climate Monitoring Project, funded by AusAID and managed by the *National Tidal Facility* (NTF), based at the Flinders University of South Australia, was established in 1991 to:

- Set up high resolution monitoring stations in eleven island countries to measure the relative motions of land and sea at each station;
- Carry out a supplementary survey and geodetic programme to measure movements of the crust at other strategic sites in each country with respect to the reference station;
- Help identify changes to sea levels with reference to a similar network of stations in Australia and elsewhere in the world; and
- Collaborate with on-going international geodetic programmes, which may be incorporating satellite altimetry and radio astronomy, to provide a measure of regional vertical control, and exchange information and data with national, regional and international Climate Change centres. This will help the understanding of the complex problem of measuring changes in sea levels.

In the area of Information and Training, the Project:

- Assists the Pacific governments and regional organisations by transferring recorded data and other information on matters concerning sea level rise, climate change, impact assessment and policy responses.
- Designs and conducts two week training programmes for national and regional personnel to improve their understanding and use of oceanographic, atmospheric and climate data in social and economic decision making.

The Project appointed a Climate Change Officer based at the South Pacific Regional Environment Programme (SPREP) in Western Samoa to help co-ordinate member countries' and regional efforts.

The Japanese Government has provided funding for Fiji, Marshall Islands, Samoa and Tuvalu to develop an integrated coastal zone management programme that will assess the impacts of sea-level rise and develop vulnerability assessment methodologies.

Japan, Australia, and the United States of America have conducted tests of the IPCC Common Methodology for Sea-level rise impacts in Fiji, Kiribati, Marshall Islands, Palau, Samoa, Tonga and Tuvalu. Further studies are in progress in the Cook Islands, Federated States of Micronesia, Nauru, Solomon Islands and Vanuatu with assistance from the GEF. In addition, the UNDP, Australia and Japan contributed to a SPREP program to assist Fiji, Marshall Islands, Samoa and Tuvalu with planning for policy responses to climate change in the economic and environmental sectors, such as impacts on water supply, coastal protection, energy and coastal management planning.

The IPCC Second Assessment Reports and many subsequent findings have vindicated the serious concern about potential impacts on fragile small island environments. It was, therefore, not surprising that SPREP's member countries, as part of the Association of Small Island States (AOSIS) made strong recommendations to the Kyoto discussions, calling for major cuts in emissions of greenhouse gases. The members of AOSIS played a highly visible role at the Third Conference of the Parties to UNFCCC meeting in Kyoto, Japan in 1997 and again at the Fourth Conference in Buenos Aires, Argentina, November 1998. The joint statement by the South Pacific Forum and SPREP commented:

“Pacific island countries are already experiencing some of the worst climatic effects known in recent times. These include droughts, freshwater shortages, coastal degradation, frequent and severe cyclones and storm surges. There has already been serious and irreversible damage to life and property. For ten years, Pacific island countries have spoken of their fears of the effects of global warming and climate change, and called for mitigation and adaptation measures. Those fears are becoming reality. It is time, now, for meaningful and tangible actions.”

C. Successful responses to marine resource management

1. A new look at whaling

(a) Destruction of the Whales

Whaling represents one of the world's worst environmental failures, yet it has also become a remarkable success story in the Pacific sub-region. From the middle of the last Century until the 1980's whales were hunted to the brink of extinction. In 1846, the American whaling industry had a fleet of 736 ships sailing from 70 ports to all the oceans of the world. The American Civil War and the introduction of petroleum as a lubricant and kerosene as a cheap lighting fuel caused the United States to abandon the whale hunt. Norway and Britain controlled 80% of the whale industry from the turn of the Century until 1950. Australia, New Zealand, and Tonga played a minor role as whaling nations.

Norway developed highly efficient hunting and processing techniques, including the exploding harpoon fired from canon and factory ships with an attending fleet of hunting ships. World War I increased the demand for fat products in Europe and, by 1925, an entire whale could be processed on deck. The whale catch increased from about 2,000 per year in 1900 to 20,000 per year by 1911. As the whale herds in the North Atlantic and North Pacific vanished, the hunt turned, in earnest, to Antarctic waters. By the 1940's the Blue, Right and Grey whales were on the verge of extinction. Although their demise was forecast in the 1930's there was

no attempt at management of the whale hunt until, in 1946, the 46 whaling countries of the world formed the voluntary International Whaling Commission.

The commission meets annually to regulate whaling by (i) setting geographical limitations, (ii) prohibiting the taking of certain species such as the Arctic right and blue whales, (iii) establishing rules for safeguarding immature whales and females with suckling calves, and (iv) limiting the operations of factory ships and shore stations. The commission does not have the power to punish violators. They prohibited hunting the right and grey whales and limited the Antarctic kill to 15,000 Blue Whale Units (One BWU = 2 fin whales, 2.5 humpback whales or 6 Sei whales). Even this proved overoptimistic and the whales continued to decline. In 1963, the humpback was protected. In 1965 the blue whale was protected. In 1979 factory ships were banned. In the early 1980s the quota set for all species world wide was 14,500 and sperm whales were totally protected. By then, almost all member nations had given up whaling, except for the USSR, which terminated all whaling operations after the 1987 season following the 1986 IWC ban on all commercial fishing. Iceland, suspended whaling operations in 1989 and Japan formally ended commercial whaling but continued to hunt whales for scientific purposes (the whale meat was sold to pay the scientific costs).

In 1994, the IWC banned whaling permanently south of Africa, Australia and South America, making the whole of Antarctic waters a Southern Ocean Whale Sanctuary. New Zealand and Australia played a crucial role in achieving this designation. Japan had planned to defeat the motion, insisting that they had the required expertise and data to manage the Antarctic whaling industry without danger to the stocks. A New Zealand scientist who had developed methods for identification of different species and populations of whales by DNA typing flew to Tokyo and took DNA samples from whale meat purchased in the public fish markets. At the Mexico City IWC meeting, just before the vote on the Antarctic Sanctuary, he presented his findings to the Commission, proving that Japan was harvesting and selling meat from endangered species prohibited under the Commission bans. This destroyed Japan's scientific credibility and the meeting quickly voted for the Antarctic Whale Sanctuary.

In all, an estimated 1,400,000 whales were killed in Antarctic waters and all species except, perhaps the small Minke whales, were hunted to the edge of extinction. New Zealand and Australia are both working towards the creation of a South Pacific Whale Sanctuary to adjoin the Southern Ocean Whale Sanctuary. In August 1998 the South Pacific Forum members voted in support of the proposal. In 1999, Japan, which continues to hunt whales in Antarctica despite the sanctuary, announced it would oppose the proposition.

The whaling industry thus represents one of the worst examples of environmental degradation. Co-operation for management of whale stocks produced no significant results. Most of the countries quit whaling simply because whale products were replaced with less expensive alternatives and whales were simply too costly to find as their numbers declined. Russia was able to continue only because of government subsidies. Japan continues to hunt whales because the meat is a high-value luxury item in Japan.

(b) The new, well regulated, whale industry



Figure 22. Whale and dolphin watching is a major industry in the Pacific sub-region.

The 1990's have seen the development of a whole new whale industry, and there is widespread co-operation for environmental management. Whales are again an extremely valuable commercial species in the South Pacific – but this time, they are valued for the tourism industry. In New South Wales, Australia, for example there are more than 50 ship operators conducting cetacean-based tourism activities. They range from watching humpback whales and dolphins in Merimbula to sea kayaking with dolphins in Byron Bay. A bevy of laws protect the rights of the cetaceans from overzealous tourism operators. It is against Australian Federal whale-watching guidelines to swim with dolphins or whales except under carefully regulated and licensed tourism operators. The industry is worth about USD 6,000,000 a year in New South Wales. The Commonwealth imposes fines up to \$100,000 and jail terms for killing, injuring, or deliberately interfering with whales or dolphins.

Whale watching is also important for the Pacific island countries, especially Hawaii, Tonga, the Cook Islands, American Samoa and New Caledonia. SPREP's Marine Mammals Conservation Programme, in collaboration with Whales Alive (an NGO), hosted a sub-regional workshop for whale watching operators and guides in Tonga. Participants from American Samoa, Cook Islands, Fiji, Niue and Tonga attended the course to trial and revise whale watching guidelines for the region. SPREP also produced a field guide to marine mammals of the South Pacific and a baseline review of the knowledge and issues for marine mammal conservation in the region.

2. *Success on the high seas – facing regional threats from outside sources.*



Figure 23. A purse seiner sets off from American Samoa in pursuit of tuna.

(a) The Sustainable Development of the Tuna Industry in the South-Pacific Sub-Region

“The task facing the region in the implementation of comprehensive fisheries management arrangements cannot be underestimated. A total of around 30 states and territories with diverse social, economic and political objectives will need to co-operate if the sustainability of the tuna resources of the region are to be assured.”
Uherbelau & Cartwright 1998

The combined effects of increased investment, rising populations and changes in income distribution have increased the world catch of sea foods from 20 million tonnes to over 100 million tonnes in the last 40 years. The increase, however, was not sustainable and despite management attempts, a number of formerly abundant fish stocks have been depleted. Fishing has had to be severely curtailed in nearly half of the global fisheries, and some of the world’s most renowned fishing grounds have been closed (Weber 1993).

Throughout the world fishing nations have fought politically and militarily over fishing rights on the high seas. The south-Pacific sub-Region, in a bid to create a truly sustainable high seas fishing industry, has developed one of the most successful political and scientific alliances in the world. The twenty year effort was conducted under the overall guidance of the Forum Fisheries Agency, with the scientific collaboration of the Secretariat for the Pacific Community, the political will of 16 Pacific island nations, the participation of the largest fishing nations in the world, and the private fishing industries of those countries (Cartwright 1996).

The Western and Central Pacific (WCP) tuna fishery is now the largest in the world, and has contributed to the rapid growth of fish products over the last 40 years. This important ocean fishery is on track to become the first sustainable tuna fishery in the world.

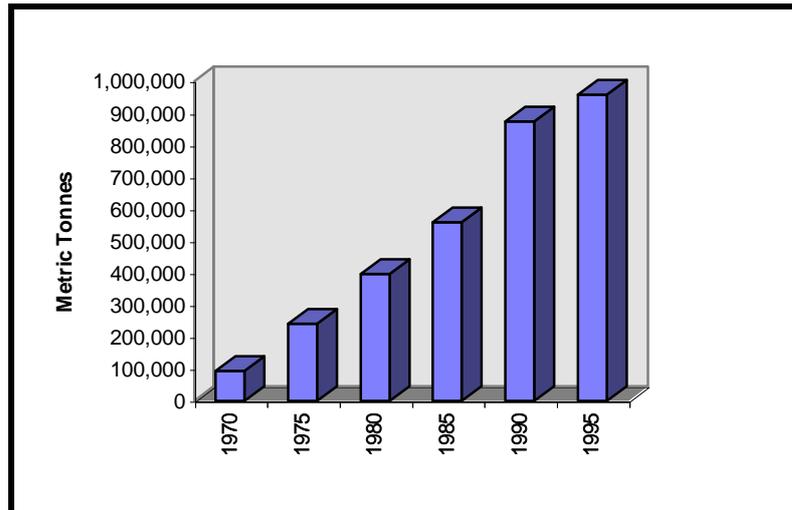


Figure 24. Tuna catch in the Central Western Pacific Ocean source SPC 1996

Current statistics show that tuna stocks in the region are generally in good health, but this situation is predicted to change if fisheries are harvested without adequate regulation. Because the tuna migrate over large oceanic distances, and span the borders of many countries, effective regulation means co-operation between all of the coastal states as well as the distant water fishing nations (DWFNs) in the Western Central Pacific. Otherwise, the benefits of regulations in one country could be undone by unregulated fishing in another country or in international waters.

The United Nations Law of the Sea

The Third United Nations Conference on the Law of the Sea gave each country the right to develop... 'measures for the exploration, exploitation, management and conservation of the living resources of the sea' within Economic Exclusive Zones (EEZ's) extending 200 nautical miles from their coastlines. The small island developing states of the Pacific were enthusiastic signatories to the Law of the Sea but had neither the financial nor human capacity to meet the terms of the agreement. The law also specified that if a country does not harvest the resources to the fullest maximum sustainable yield, it must allow other fishing nations to enter their zones to harvest the unused portion.

In 1979, The South Pacific Forum founded the South Pacific Forum Fisheries Agency (FFA) to represent the interests of all its members in 'the conservation and optimum utilisation of the living marine resources of the South Pacific, and in particular of the highly migratory species' (FFA Convention, 1979). The FFA represents The Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Palau, Papua New Guinea, Solomon Islands, Tonga, Tuvalu, Vanuatu, Samoa, Australia and New Zealand.

Regional partnerships for assessment, planning and negotiation

The FFA works in partnership with the Oceanic Fisheries Programme of the Secretariat for the Pacific Community (SPC). Together the two agencies collect and process statistical information about the oceanic fish stocks. Scientists, using the data processing facilities at the SPC provide the necessary information to determine the optimum sustainable yield from an economic and a biological perspective. The high quality of this data has played an essential role in smoothing the negotiation process because all parties accept the results as an accurate, factual base for regulating fishing efforts.

Establishing resource rights for the member countries

The FFA has been remarkably successful in promoting regional co-operation and co-ordination for the sustainable development of high seas fisheries. Its first step was to establish inviolable rights to manage the fisheries resources in their zones. The Distant Waters Fishing Nations, including major fishing fleets from the United States and Japan, insisted that Article 64 of UNCLOS allowed them to enter the Exclusive Economic Zones (EEZs) of member countries to fish highly migratory species, such as tuna. PNG and the Solomon Islands responded by arresting two U.S. Super-Seiners. In the tense period following the arrests, the FFA represented its member countries in negotiations with the United States. In 1987, the United States agreed to the U.S. Treaty, giving FFA's members global assurance of their inviolable rights to the tuna resources as well as US\$18 million a year in access fees.

FFA, having established these rights, negotiated access agreements with other fishing nations and developed a system for the regional monitoring, control and surveillance of the high seas fisheries of the South Pacific. Initially, negotiations with distant water fishing nations centred on payment schedules for access rights and how to monitor fishing activities on the high seas to be sure the member countries received their full commissions. There were few discussions of limiting fishing activities, as the data analysis provided by the SPC Ocean Fisheries Programme showed stocks to be under-fished.

Initiating management control for sustainable fishing on the high seas.

In the late 1980's and early 1990's, catch data suggested that regulations were needed. FFA countries, fully aware of the declining fisheries in the rest of the world, began steps to assure the sustainability of their tuna resource.

Their first response ranks as one of the most important achievements for sustainable development in the South Pacific. Korea, Japan and Taiwan fishing fleets were fishing for albacore tuna in international waters using drift-nets that were often many kilometres long. Studies revealed these nets were taking an unsustainable toll on the albacore tuna stocks, as well as catching a vast array of other sea creatures, including marine mammals. Under the leadership of the FFA, the countries of the South Pacific joined together in an emergency session to declare The Wellington Drift-net Convention (Box 14.2 DriftNet). While efforts to halt drift net fishing in the North Pacific had proved unsuccessful, the Wellington Drift-net Convention succeeded. Korea, Taiwan and Japanese drift net fishers withdrew from the area. The Wellington convention demonstrated that when their resources were clearly threatened, the small island nations were prepared to react swiftly and in concert against major opponents.

Current strategies for future management of tuna fisheries

Confrontations would not bring about a commercially viable partnership for sustainable development of the world's largest tuna fishery. Using principals set forth in Agenda 21, and mandates set forth in the Law of the Sea, FFA began a series of Multilateral High Level Conferences to develop effective management strategies to assure the sustainable development of the tuna resources of the Pacific Ocean. These conferences have been milestones in diplomatic strategies for shared resources. The process is scheduled to finish in 2002 with a final agreement on management practices for the offshore tuna fishery (Box 14.4 MHLC).

Regionalism and Sustainable Development of Fisheries.

Regional leverage depends on the species or fishery. For example, more than 80 percent of the surface fishery for skipjack and yellowfin takes place within the EEZ of coastal states and 60 percent of these states are members of FFA. It is economically not viable to operate a large scale purse seiner on the high seas alone, therefore the coastal States have excellent leverage to determine access fees.

On the other hand, 80 percent bigeye tuna are captured by Japan in international waters. Taiwan takes over 75% of the Albacore in international waters. In these cases, FFA member countries, acting collectively, have little leverage over the fishery. For example, a recent attempt to encourage Taiwan vessel owners into a sub-regional longline arrangement for albacore with Cook Islands, Fiji, Niue, Tonga, Samoa, Solomon Islands and Vanuatu, was not successful.

Regionalism can produce a unified negotiating front, leading to an enhanced likelihood of achieving political and economic goals. The problems that face many Pacific Island countries are similar, and there is much attraction to considering the region as a homogenous bloc, united in views on a wide range of developmental and other key issues. But, before regionalism can be truly effective, it must be considered in terms of its tangible benefits to individual member countries.

(b) National experiences with offshore marine resources

Pelagic fish are not distributed randomly on the high seas. They travel from one island area to another in small groups and may school together in very large numbers where islands cause turbulent currents downstream of islands. The Polynesian and Micronesian people have fished these massive shoals of fish near their islands for millennia. They fished from small boats using simple lures and hand-lines, using from simple dug-out canoes. The great distances between islands reduced traditional conflict between Pacific island countries over fishing grounds. Today, with 200 mile Economic Exclusion Zones, many fishing areas could overlap. Thanks to efforts by the FFA, the SPC and the SPF, Pacific island countries generally agree on who controls which resources and seldom encroach without authorisation.

After some initial attempts at operating large scale offshore vessels, Pacific island nations have let foreign fishing fleets harvest their tuna stocks for access fees. Some local fishers believed the huge tuna super clippers were taking so many fish that it ruined traditional, and vitally important, tuna grounds. Studies by the SPC and FFA confirmed there were, in fact, lower inshore catches of tuna when commercial fishing vessels operated within 60 miles of the islands.

FFA member countries are intent on maintaining sovereign rights over the resources of their EEZs, and are planning to increase their national capability to harvest, prepare, and sell tuna and related species. Some countries, such as Samoa, have made great strides in developing a fishing fleet suitable for their infrastructure. (Box 14.5 Samoa Tuna). As these capabilities increase, and as pressures mount to regulate the fishing activities, countries will need to identify management objectives that take account of biological, economic and social factors. National management plans will need to be drawn up and harmonised, to ensure compatibility at the sub-regional level. The FFA Secretariat is ideally placed to assist in this regard.

The FFA Secretariat will play an advisory role to national fisheries administrations, as they work through the political and legal implications of adopting and enforcing management measures. In the other direction, countries will utilise FFC and PNA meetings as venues to discuss conservation and management and economic issues of common interest, to identify where national interest will be best served through sub-regional and regional co-operation.

3. *Multi-level partnerships for sustainable coastal fisheries.*

(a) Sub-Regional Co-operation for inshore marine resources

The Secretariat for the Pacific Community (SPC) integrates the efforts of national fisheries agencies in the Coastal Fisheries Programme. The Coastal Fisheries Programme has two major divisions; the Integrated Coastal Fisheries Management Project and the Inshore Fisheries Research Project. These programmes assist nations with expert technical training in all aspects of fishing, including research, catching and processing sea foods, storage and marketing. The SPC plays a key role in building a consensus for sustainable development in National fisheries agencies. Regional technical and working group meetings bring key representatives of national fisheries together on a regular basis to share experiences on technical, scientific and policy dimensions of the fishing sub-sector.

Over the past decade, SPC coastal fisheries programmes have helped shift national fishing priorities from increasing commercial fishing capability to sustainable management of fisheries resources, and from there to an awareness of the need to decentralise fisheries management and involve local communities in self-management programmes. These changes represent a fundamental and necessary maturation of policy and behaviour of fishery agencies.

The process of facilitation offered by the staff of the SPC helped national fisheries departments understand the need for sustainable approaches to fisheries development. Technical publications from the fisheries meetings and the SPC fisheries newsletter were important influences but the meetings themselves were perhaps the key component to this reorientation process. This is because fisheries management staff in the Pacific islands is constantly busy and often does not have time to read reports and newsletters. The conferences enable the fisheries staff an opportunity to get out of the office and catch up on new developments in the theory and practice of fisheries and to gauge their policy decisions against the wider fisheries community. The topics discussed at the meetings now help focus the group on sustainability of fisheries activities and speakers from countries making progress towards sustainability strongly influence the thinking of other fisheries leaders. During the 1998 Technical Fisheries Workshop, for example, The presentation from the Fisheries Department of Samoa on its community extension project made a significant impression on the whole group. Many other fisheries departments are planning to follow the Samoan example or adapt their techniques to suit their social and cultural requirements.

The Coastal Fisheries Programme does not mount campaigns to protect endangered species, as does SPREP, but tries to shift fishing pressure away from over-exploited species and encourages management measures that would prevent their becoming endangered in the first place. Neither does the programme become involved with integrated coastal zone planning which is seen as SPREP's mandate, but it does compile data that will assist in understanding the ecological relationships of the coastal species.

The SPC Coastal Fisheries Programme is:

“going through a period of formalisation of its adapted mandate, with an emphasis on managing fisheries rather than just reacting to crises and circumstances; on directing development so that it is both socially appropriate and sustainable in the long term; and on patiently building the human infrastructure and knowledge-base that will be necessary for future survival. Appreciating all the time the need to measure progress against benchmarks that are both realistic and measurable.” (Adams 1998)

(b) National experiences with sustainability of inshore marine resources

Making laws and regulations to control small scale commercial and subsistence fishing has had a history of failure in the Pacific Islands. Command and control techniques are impractical in the widely scattered islands. Without the understanding and willing support of the village people there is no possibility of management of coastal resources. There have been two paths towards improving management of coastal marine resources; the development of Marine Conservation Areas (described later) and forming partnerships between government fisheries departments and local communities to form community resource use plans.

Fisheries departments in the Cook Islands, Tonga, Vanuatu, the Solomon Islands, PNG, Fiji and Samoa are at various stages of developing partnerships with local communities to sustainably manage their coastal resources. For example, the Cook Islands Ministry of Marine Resources is implementing two ADB funded projects on coastal resource management; the Outer Island marine resource management project and the Marine resources management and conservation programme (total cost USD 700,000). The projects include having local communities plan, manage and enforce management policy. In Samoa, the Fisheries Department is implementing the AusAID funded Samoa Fisheries Extension and Training Project, one of the most innovative and successful examples of community/government partnerships for coastal fisheries management in the Pacific sub-region (Box 14.6 Samoa Fisheries). In Tonga, community based giant clam reserves were initiated in the island group of Vava'u in 1988. Studies demonstrated the reserves increased settlement of the endangered species of giant clam on surrounding reefs (Chesher 1993). The original reserve was still operational in 1998. In association with the Tongan Ministry of Fisheries, community based giant clam reserves have spread throughout the islands of Tonga.

In Vanuatu, temporary reef closures are a traditional means of conservation management. These are now actively encouraged by the Fisheries Division and are in wide-spread use in the country. In some cases, the traditional system has been expanded to include the concept of formal, permanent community reserves. For example, in the Meskalyne Islands, a community set up a giant clam marine reserve in 1992. This reserve is entirely run and supported by the village people and, in 1998, had more than 1,100 giant clams. The villagers believed some of the clams were second generation from the original breeding stock.

In PNG, the Moma Coastal Fisheries Development Project (Box 14.7 PNG Fisheries) utilised an innovative, provincial task-force of cross-sectoral participants to assist in the community development of coastal resources. The project was placed in the provincial planning department and reported directly to the District Secretary. The cross-sectoral team was able to form and implement an integrated social, economic, and biological management plan for the sustainable development of the target area.

D. Regional and National Co-operation for sustainable forestry represents a highlight of practical environmental management.

1. The Heads of Forestry Meetings

Forestry Departments in the Pacific sub-Region, founded during the colonial period, were traditionally extractive in nature. Forest management was entirely based on extracting logs as economically as possible. In New Zealand, conservation of native forests was not possible until Government disbanded the National Forestry Service and turned the forests over to the Department of Conservation.

In the 1990's, the heads of forestry of the South Pacific sub-Region came under considerable pressure from the international community to implement

sustainable management of forests. In the Heads of Forestry Meeting (1992) the delegates noted,

"The increasing importance of social, environmental and other considerations in development programmes, has meant that timber production may no longer be the sole or even primary objective of forestry development programmes. There is an urgent need to inform and convince decision makers about the contribution of forests and watersheds to the long term stability and quality of communities, fisheries, water supplies, health, as well as other economic benefits."

The Heads of Forestry resolved:

"There was an urgent need to ensure the active participation by and equitable return of benefits to traditional landowners in forestry utilization. SPFDP can undertake a compilation and assessment of experiences (successful and unsuccessful) with land tenure and landowner participation in forestry development projects in the region.

"There is a continuing need to identify and designate areas of natural forest as conservation areas of ecological and cultural importance. Each member should work towards establishment of a nationally representative system of protected forest areas in ways that meet the tenorial, cultural, developmental and environmental requirements of the landowners and of the country.

"The resolution of the International Tropical Timber Organisation that all internationally marketed tropical timber be produced on a sustainable basis by the year 2000, makes it essential to define sustainable and unsustainable forest management practices. The Heads of Forestry will promote the adoption of forestry practices to ensure the life supporting functions and long term productivity of the forest resources."

A UNDP/FAO South Pacific Forestry Development Programme (SPFDP) was initiated in 1988 to, among other things, review legislation and forest practices in the region. The Heads of Forestry met annually to assess progress and make recommendations on future actions. The meetings were based on themes which illustrate the evolution of concern for sustainability by the Heads of Forestry of the South Pacific countries; 1992 – Experiences with portable sawmills in Pacific Island Countries. 1993 – What value forests and trees? 1994 – People participation and conflict resolution. 1995 – Working together for the future. 1996 – Setting the baseline for future forests and trees activities. 1998 – The role of forests and trees in mitigating the impacts of climate change on Pacific island communities.

Regional programmes on, or related to, forestry presented to the Heads of Forestry Meeting in 1998 included the Pacific German Regional Forestry Project, the South Pacific Initiative on Forest Genetic Resources (SPRIG), EU-FSPI Community and Eco-Forestry Project, South Pacific Regional Environment Programme (SPREP), South Pacific Applied Geoscience Commission (SOPAC), , USDA Forest Service's Institute of Pacific Islands Forestry, CIRAD-Foret in New Caledonia, the Nature Conservancy, FORSPA in Bangkok and ACIAR.

National programmes were presented from all members in the proceedings of the meeting.

2. *The Code of Logging Practice*

Of the multitude of forestry initiatives that have emerged from the Heads of Forestry recommendations, the development and implementation of a meaningful Code of Logging Practices is perhaps the most critical.

In response to increasing concerns over the rate of deforestation and forest degradation in Pacific island countries, particularly in the countries with commercial forest resources i.e. Papua New Guinea, Solomon Islands, Vanuatu and Fiji, the 5th meeting of Heads of Forestry of Pacific Island States in July 1994, issued a communiqué expressing "*profound concern for the ecologically unsustainable rate of*

forest exploitation now occurring within several island countries”, and accorded high priority to training in natural forest management and logging methods.

The 25th South Pacific Forum meeting in August 1994 also initiated the development of a common code of conduct for logging of indigenous forests. A “Code of Conduct for Logging of Indigenous Forests in Selected South Pacific Countries” was subsequently developed in collaboration with all parties and endorsed by the 26th South Pacific Forum meeting in September 1995.

At that time, only Fiji had developed its own national code of logging practice (launched in 1990 and fully implemented by 1996). The other countries subsequently developed their own national codes of logging practice (COLP) based on the regional code, and all four countries are now in various stages of implementing their national COLP. A fifth Pacific island country, Western Samoa, is also keen to develop a national COLP..

The Vanuatu Code of Logging Practice, for example, was published in March 1998 with the assistance of the Vanuatu Sustainable Forest Utilisation Project and following extensive meetings with representatives of the Vanuatu forest industry, NGOs and other interested parties. Government in November of 1998 formally accepted the Code. The Code is a legally binding instrument for all parties operating under the authority of a Timber Licence in Vanuatu. The Code details exact procedures for sustainable logging and requires applicants for a Timber Licence to produce a suitable logging plan that meets the criteria. Violation of the Code will result in suspension or revocation of the Timber Licence. No logging will be allowed without a current forest operator licence. The roles of participants are shown in Table 1.

Table 1. Roles of participants in sustainable forest management (Vanuatu Code of Logging Practice).

Government	<ul style="list-style-type: none"> • Provide policies, mechanisms, staff, resources and encouragement for the ecologically sustainable use and management of forests, land and water resources, on all classes of land ownership, for the benefit of the whole community.
Resource owners	<ul style="list-style-type: none"> • Use their resources wisely in a way that will maintain options for future development and so provide for their long term benefits. • Maintain the capacity of the forest resources to supply essential lifestyle needs.
Industry	<ul style="list-style-type: none"> • Protect neighbouring and down-stream resources. • Monitor operations for compliance with good practice. • Prepare harvesting plans in consultation with land holders and regulatory authorities. • Supervise and implement operations consistent with sustainable forest management. • Optimise the benefits to both the community and the company. • Train and employ local community members to increase their level of skill.
Department of Forests	<ul style="list-style-type: none"> • Assist land owners and the timber industry to implement sound harvesting practices consistent with sustainable forest management. • Evaluate harvesting plans. • Monitor and evaluate harvesting operations for compliance with the logging contract and the Code of Logging Practice. • Enforce compliance with legislation.
Community	<ul style="list-style-type: none"> • Assist to educate and train resource owners and users in the sustainable management of forest resources.

Implementation of the code will be integrated with all forest and sustainable development policy initiatives and be based on a participatory approach involving all

interested parties, particularly local communities. To assist in this process the Code was published in English, French and the local Bislama language.

The Vanuatu Sustainable Forest Utilisation Project (VSFUP) produced training manuals for Forestry extension agents to teach villagers the Code and encourage their full participation. As part of this, the project engaged an NGO, the Wan Smol Bag Theatre, to produce a play about sustainable forest use and the Code of Logging Practice. The Theatre group wrote and performed the play in Port Vila, the capital of Vanuatu, and it was a major success. With support from the VSFUP, the Wan Smol Bag Theatre has begun teaching people from other islands in the Vanuatu Group to perform the play. For example, interested people were brought to the Wan Smol Bag Theatre in Port Vila from the island of Pentecost. They learned to perform the Forest Play and returned to Pentecost to give the play in their local language. The performances are a valuable part of the extension work as the villagers understand the play without difficulty and are willing to work with the Forestry Department Extension Agent in learning details of the Code. In addition to the play and discussions based on the training manuals, the Extension Agents use models of safety equipment, machinery, and artistic posters showing how sustainable logging should be carried out.

The development of the Code of Logging Practice illustrates a process of co-operation between international agencies, regional agencies, national agencies, provincial and community groups, NGOs, and industry. Within this network of co-operation is the SPC/UNDP/AusAID/FAO Pacific Islands Forests and Trees Support Programme (PIF&TSP).

3. *The SPC/UNDP/AusAID/FAO Pacific Islands Forests and Trees Support Programme (PIF&TSP).*

“It is important that the Pacific Islands Forests and Trees Support Programme is not seen as having any projects on the ground. We do not implement projects or control them, we simply help them along where we can. Otherwise the participants would not own the projects.” PIF&TSP co-ordinator Tang Hon Tat.

This orientation towards co-operation has facilitated the progress towards sustainable forest use in the South Pacific. It is also the crucial factor enabling the range of projects and activities facilitated by the programme. Originally a UNDP/FAO South Pacific Forestry Development Programme (SPFDP), the Pacific Islands Forests and Trees Support Programme emerged in 1997 to continue providing the functions and activities of the SPFDP under the umbrella of the Secretariat of the Pacific Community (SPC). The programme is funded by UNDP and AusAID, executed by the SPC, and implemented by FAO. The project will become fully integrated into the SPC at the end of 1999.

The program strives to network existing capabilities and interests – acting as a catalyst rather than a program manager. For example, the SPC has announced an annual Pacific Islands Community Forests and Trees Award Scheme. A scroll and cash prize will be given to the Pacific island community or person making the most useful and effective contribution in the use or management of forests and trees in the region. The history of the award illustrates the philosophy of the Pacific Islands Forests and Trees Support Programme and why it is so successful. In 1997 FAO presented the co-ordinator, Mr. Tang, the B. R. Sen Award for 1996 in recognition of his outstanding contribution to the countries of the South Pacific. Mr. Tang donated his USD5,000 award to the SPC to initiate the Pacific Islands Community Forests and Trees Award Scheme. The SPC, UNDP, and the Peoples Republic of China matched the donation bringing the fund to USD20,000. Other countries have been invited to contribute donations to this innovative scheme.

A 1998 sampling of the programme activities from the co-ordinator’s Annual Report include:

National/local level training workshops on codes of logging practice (follow-up to 1997 regional training workshop on implementation and monitoring of COLP, held from 08 Sept.-03 Nov. 1997 in Vanuatu). Fiji & Vanuatu have carried out local workshops, using the persons trained at the 1997 regional workshop, and their own other resources. Solomon Island national workshop carried out 31 Aug.-04 Sept. 1998. SOI Govt. provided SOI\$4,360 (AUD1,750) and three local resource persons and support for the activity. PIF&TSP provided one external resource person and SOI\$8,300 (AUD3,300) for workshop costs. PNG used their participants from the 1997 regional workshop to “pass on” the knowledge acquired to other national staff at PNGFA’s own regional workshops in Oct/Nov 1998. PIF&TSP provided one supporting resource person and Kina 1,500 for the COLP follow-up. The Report on 1997 training workshop was published as Working Paper No. 1 in July 1998.

Regional training programme on silvicultural and reduced impact harvesting techniques. AusAID approved (in April ‘98) AUD250,000 for the three-part training programme. USDA Forest Service approved USD15,000 for part one of the programme. PNG Forest Authority hosted Part 1 (4-week regional training workshop from 03-31 July ‘98) of the programme. Vanuatu Forestry Department has agreed to host Part 3 (a 1-week training workshop) of the programme. SPC signed contract with Margules Poyry of Canberra, Australia to implement the three-part programme, under the direction of PIF&TSP.

Part 1. Regional training workshop on silvicultural & reduced impact harvesting techniques, 06-31 July, Papua New Guinea. Workshop implemented as scheduled with 17 participants from FIJ (4), PNG (4), SOI (3), VAN (3), SAM (1), Cambodia (1) and Indonesia (1) (last two funded by US Ft. Service). Report of workshop to be published as Working Paper. Part 2. Follow-up national local level training workshops in Fiji, PNG, Solomon Islands, Vanuatu & Samoa, with limited support from PIF&TSP (within six months of above regional workshop). Solomon Island national workshop carried out 07-11 Sept. 1998 on Kolombangara.. Solomon Island Government provided SOI\$4,360 (AUD1,750) and three local resource persons and support for the activity. PIF&TSP provided one external resource person and SOI\$8,300 (AUD3,300) for workshop costs. National level workshops in PNG held in Oct/Nov ‘98. PIF&TSP provided one external resource person and Kina 1,500 for workshop costs. National level workshops in Vanuatu held –7-11 Dec. ‘98. PIF&TSP provided one external resource person and Vatu 85,100 (about AUD8,000) for workshop costs. National level workshops in FIJ to be held in 1999.

In addition, the PIF&TSP assisted with; (i) a Forest certification workshop; (ii) watershed management projects such as preparation of local/community level watershed management plans (this was done by arranging for the United States Forest Service to provide an expert for five weeks to travel to Tonga and the Cook Islands), (iv) a Bamboo Utilisation Workshop, (v) a Regional training workshop for SPC/CETC students and Fiji participants on the construction and use of wood-fired drum ovens(vii) construction of three wood-fired ovens in Fiji and one in Port Vila, Vanuatu ; (vii) Follow up survey on use and condition of clay ovens in Fiji (all used regularly by the villagers and in good condition).

The programme also; (i) organises the Heads of Forestry and the Tripartite Review Meeting once every two to three years, (ii) publishes the Quarterly Pacific Islands Forests & Trees Newsletter, Field Documents and Working Papers on forestry and meeting proceedings; (iii) administers a UNDP Small Grants Scheme, which approved grants for a Fasak Community Forestry Project in Vanuatu, a Kagaho Community Ecoforestry Project in Solomon Islands, the Honiara Youth Wood Carving Co-operative in the Solomon Islands, and the Mangaia Community Nonu Plantation Project in the Cook Islands in 1998.

The programme consistently networks the skills, interests and resources in the region and provides a focal point to promote sustainable use and management of forests and trees. The newsletter provides a comprehensive update on all forestry

activities. Although the Forests and Trees Support Programme assisted many of these activities in some way, the programme itself is seldom mentioned. The orientation of the newsletter is practical information to assist readers in developing forestry programmes – especially community programmes – and includes details on planting and caring for different species of trees. In the March 1998 issue, for example, the Foundation for the South Pacific International (FSPI) presented a discussion on the development of community forestry and small scale saw-milling, going into details on production and marketing issues (such as ISO standards and certification by the Forest Stewardship Council) as well as sustainability of the forests.

The South Pacific Regional Initiative on Forest Genetic Resources (SPRIG), assists with practical aspects of forest and tree management. For example, in 1997, key forestry personnel from five countries attended a 4 week training course on “Vegetative Propagation of Tropical Forest Tree Species.” The participants of SPRIG are preparing a code of conduct for sharing tree germplasm among SPRIG partners and examine potential methods of improving tree husbandry. SPREP and the Pacific Islands Forests and Trees Support Programme collaborate with SPRIG.

E. Pollution abatement and control in the South Pacific

1. National Experiences with hazardous wastes

In the late 1980's the United States Environmental Protection Agency increased its enforcement of strict regulations on disposal of hazardous and toxic wastes. In response, a number of private waste disposal enterprises were incorporated to remove hazardous wastes from industrial sites and dispose of them. Some of these companies approached Pacific island countries, offering them large sums of money to establish a hazardous waste disposal facility that could accept enormous amounts of hazardous wastes shipped from the United States and, later, from other industrialised countries, including Australia, New Zealand, the Philippines and Singapore.

The efforts to entice Pacific island governments were highly professional. One US based corporation, for example, set up a company called World Resource Recovery and Cogeneration in Tonga. One of the two Tongan shareholders was a Tongan noble who was widely known as an enthusiastic and dedicated environmentalist. The US corporation would, according to the proposal, provide technical expertise, funds, and equipment. Their Tongan subsidiary, the Tonga Environmental Corporation, was to be contracted by WRRRC to import 100 container loads of hazardous wastes a month and destroy this in a special hazardous waste incinerator that would cogenerate electricity for the entire island and, at the same time, operate a recycling plant to produce valuable raw materials, especially plastics. Another important benefit would be the destruction of Tonga's own solid wastes, especially their hazardous wastes that were, the company said, endangering the entire island by polluting the water lens with poisonous leechates.

Because Tonga had no regulations for the import or control of hazardous wastes, the company said it would build the facility and operate it following US EPA guide-lines. They assured the Tongan government that the company would not import nuclear waste, radioactive waste, infectious wastes, carcinogens, including dioxins and PCBs, or compounds with high heavy metal concentrations, or acids or substances that issued fumes if spilled. Burning the hazardous wastes would produce no effluent and the fumes would consist 99.9% of carbon dioxide and water. The project would provide jobs for 100 people at first and then up to 800 jobs in related industries – like manufacture of video cassette cases from the recycled

plastics. The Government would make untold millions on the project, with a guaranteed USD10 million up front for signing the agreement to proceed.

Tonga's only legislation dealing with waste was the Garbage Act of 1949 that detailed collection procedures in Urban areas. The country had no expertise in any aspect of the project and was concerned over a number of potential threats that the company minimised or left unanswered. Mainly, if the hazardous waste incinerator process was so benign, why was there not one commercially operating plant like it in California? (Matangi Tonga June 1988).

Virtually every government department head – especially the head of the medical services – was categorically opposed to the project. But they were unable to speak out against it or vote against it because a member of the King's family was championing it. Fortunately, the Cabinet had created a Tongan Interdepartmental Environment Committee to develop, with ESCAP assistance, an Environmental Management Plan for the Kingdom of Tonga. The hazardous waste proposal was handed to the committee for evaluation and the committee promptly set up a technical review committee of outside consultants to perform an Environmental Impact Assessment. The technical review committee, in turn, required that the proposing company supply necessary technical details so the project could be properly evaluated. The original generalised submission held no plan for exactly how the hazardous waste would be landed and transported in the country, where it would be stored, the actual process of evaluating and destruction of the wastes, the fuel requirements, or even details of the kinds of wastes expected.

The company produced a comprehensive technical report entitled "A Cogeneration and Plastic Recycling and Treatment Company" in an astonishingly short time. The review demonstrated that the documents and presentations submitted to the Government in support of the project contained false, contradictory, inaccurate, unsupported, misleading and evasive statements, lacked essential data and demonstrated a serious deficit of the management skill, attention to detail and absolute honesty required to conduct the organization, construction, management and operation of the proposed project. The EIA document was never released to the public nor were the deliberations of the Environment Committee made public. But the EIA was sufficient to prevent the plan from proceeding.

Similar proposals were rejected by the Solomon Islands, PNG, and the Marshall Islands. In most instances it was a close call, but the Pacific island nations did not give way to the economic promise at the risk of their environmental safety.

2. *Sub-Regional Co-operation to combat pollution*

The Waigani Convention - In the late 1980's there were at least 10 attempts to use Pacific islands as a place to install hazardous waste dumps, incineration sites, or storage areas. The governments of Oceania rejected the proposals. The Basal Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989) entered into force in 1992 with 57 signatories and 22 ratifications. It is based on the idea that member States take necessary measures to ensure that transboundary movement of hazardous wastes are consistent with the protection of human health and the environment, whatever the place of disposal. The convention encourages countries to dispose of their own hazardous wastes, but does include authorisation and control procedures for transboundary movements of hazardous wastes. Many Pacific island countries objected to the Basal Convention on the grounds that it allowed for transboundary movements of hazardous wastes. Papua New Guinea proposed a regional treaty that would completely ban imports of hazardous wastes into the Pacific.

In March of 1994, Basal Convention was strengthened, outlawing export of hazardous waste for final disposal from OECD to non-OECD countries. The revised Convention agreed to phase out transnational shipments of waste destined for

recycling by 1998. In 1995, the South Pacific Forum presented its members with the Waigani Convention to Ban the Importation into Forum Island Countries of Hazardous and Radioactive Wastes and to control the Transboundary Movement and Management of Hazardous Wastes within the South Pacific Region. The Convention was signed in Port Moresby PNG and will come into effect upon ratification by ten countries. However, by 1999, only FSM, Fiji and PNG had ratified the Convention.

SPREP, as Secretariat for both the Basal and the Waigani Convention, will assist signatories with the administration and disposal of their existing hazardous wastes. Costs associated with the Waigani Convention include each country individually banning import of hazardous and radioactive wastes, minimisation of the production of hazardous wastes, and proper disposal of hazardous wastes. This will involve developing national legislation to prevent and punish illegal trafficking of wastes. The Secretariat will produce a standard set of documents based on those prepared for the Basal Convention. The Convention also requires parties to consider becoming signatories to the London Dumping Convention, the SPREP Convention and the Basal Convention.

SPREP's *Pollution Prevention and Waste Management programme* assists countries in preventing, reducing and managing pollution and wastes, including the development and maintenance of national and regional emergency response and planning capabilities. The programme commenced in 1995 with a terrestrial and marine component. The terrestrial component targets solid waste management and minimisation, chemicals management, waste water management and land use planning.

An EU-funded *Regional Waste Education and Awareness Programme* began in 1998 to improve public knowledge and awareness of the problems of solid wastes. The two year, USD700,000 project aims to; (i) review and acquire information on solid waste management in 9 Pacific island countries; (ii) develop and distribute a multimedia regional programme of general waste awareness education; (iii) identify, develop, and implement country and theme specific awareness and education campaigns; (iv) identify priority legislative measures relating to waste management; and (v) encourage and assist the implementation of recycling activities.

SPREP and the International Maritime Organization (IMO) have developed a *Strategy and Workplan for the Protection of the Marine Environment in the South Pacific*. The Strategy will assist with technical, legal and scientific co-operation between Pacific Island countries for the protection of the marine environment from pollution from ships and related activities, and the mitigation of the environmental impacts of such pollution. The strategy identifies six key activities: (i) operational discharges from shipping; (ii) coordinated marine pollution emergency response; (iii) control of waste disposal at sea; (iv) management of the port, estuarine and coastal environment; (v) acquisition of baseline data on marine environmental conditions to assess potential impact of pollution; and (vi) legal and institutional aspects of shipping and marine pollution.

A SPREP workshop in 1998 reviewed a proposed draft of a regional contingency plan for a major oil spill, and agreed to finalise it by June 1999. In addition, government and oil industry representatives from Australia, France, New Zealand and the United States outlined assistance that could be provided by their countries.

In addition to agreeing to move forward with a regional contingency plan, the workshop also agreed that each country will; (i) develop a national marine pollution contingency plan; (ii) establish a national marine pollution committee; (iii) develop national marine pollution laws and regulations; and (iv) that governments and the oil industry will work closely together to develop these initiatives.

There are two international conventions providing compensation for oil spills and other marine pollution. While there is no cost to Pacific island countries to sign

these conventions, only one independent Pacific island country has ratified the updated versions which offer far more comprehensive coverage than the original, 20-year old versions. The International Convention on Civil Liability for Oil Pollution Damage (CLC) and the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (Fund Convention) entered into force in 1969 and 1971 respectively. These were updated in 1992 to raise shipowner responsibility limits from \$US 18.7 Million up to \$US 80 million; and to increase the total compensation payable from \$US 81 million to \$US 180 million. Six Pacific island countries, Fiji, Marshall Islands, PNG, Tonga, Tuvalu, Vanuatu ratified the original conventions while Kiribati and Solomon Islands did so provisionally. But the only countries that have signed the updated conventions and thus stand to reap full available compensation if they are hit by a major oil spill are the Marshall Islands and the territories of France and the UK. Most Pacific island countries would get no compensation at all under these conventions because they have not signed up for them (Tutangata 1999).

PACPOL, the *Pacific Ocean Pollution Prevention Programme* will tie in with MARPOL in that one of PACPOL's main objectives is to get Pacific island countries to become party to and implement MARPOL. The only Pacific island countries that are currently party to MARPOL are Marshall Islands, PNG, Tonga, Tuvalu and Vanuatu.

SPREP is also a member of the *Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities*. The Global Programme of Action 1995, was initiated by UNEP in recognition that up to 70 per cent of marine pollution is derived from land-based sources. Seven key areas are targeted and SPREP will assist member countries with reduction of pollution from: (i) persistent organic pollutants including pesticides; (ii) sewage; (iii) heavy metals; (iv) excessive nutrients from organic sources and sediment mobilisation; (v) oils and solid wastes including plastics, and litter; (vi) radioactive substances; and (vii) physical disturbances including habitat modification and destruction.

SPREP's *Management of Persistent Organic Pollutants in Pacific Island Countries* project aims at identification of and removal of stocks of unwanted and waste chemicals and clean up of contaminated sites. SPREP will produce a comprehensive database on types, quantities and locations of waste chemicals and unused pesticides in the region. All chemical and oil contaminated sites in the region will be identified, and a preliminary assessment made of the extent of contamination.

SPREP will co-ordinate on the job training in safe methods of sampling, identifying, handling and storing chemicals. The project will produce a report assessing the facilities and technical expertise available to Pacific island countries to manage waste chemicals and contaminated sites. It will also review existing government legislation and regulations dealing with management of waste chemicals and contaminated sites, assess the effectiveness of current legislation and make recommendations for any necessary improvements.

It will produce a technical document detailing appropriate procedures for identifying and safely handling unlabelled substances and produce plans for appropriate storage facilities in each country. There will also be an assessment of disposal options for waste chemicals, including the criteria decision makers should consider when arranging transport or treatment of waste chemicals. Education, awareness and capacity building programmes will aim to reduce future problems with hazardous wastes and contaminated sites. The project includes the Cook Islands; FSM; Fiji; Kiribati; Marshall Islands; Nauru; Niue; Palau; Samoa; Solomon Islands; Tonga; Tuvalu; and Vanuatu.

3. *A wealth of programmes but a poverty of progress*

Granted that such things need to be repeated on an ongoing basis, the current SPREP programmes reflect similar past programmes with little noticeable progress in any of the categories. SPREP participated in a UNEP programme for the identification of land based sources of pollution in 1984 and public awareness programmes on waste disposal programmes have been operational in many countries since the same year. The island people in most of the region were made very aware of solid waste issues during the period when importation of hazardous wastes nearly became the region's economic mainstay. The hazardous waste problems that existed in Tonga in 1988 remain unchanged in 1998 and, after ten years, the urgent need to prevent transshipment of hazardous wastes has not enticed Pacific island countries to participate in the Basal Convention. In fact, since the hazardous waste threat originates in countries that are members to the Basal Convention, the Pacific island nations are already protected since those countries are now banned from exporting their hazardous wastes.

If the SPREP member countries are not interested in joining the Basal Convention (perhaps because of the expenses associated with reportage), why should they join the Waigani Convention? It seems a strange exercise, also, to initiate PACPOL with the major aim to get member SPREP countries to sign up for MARPOL. Requirements for ratification of the London Dumping Convention require significant expenses on the part of the members. New Zealand, for example, could not ratify the London Dumping Convention until 1996, following major modifications to international port facilities to meet convention requirements.

The exercise of identification and removal of hazardous waste sites has also been done before, by SPREP and by several NGO programmes. Some of these sites were, in fact, cleaned up but presumably many remain and more have been added.

The new Strategy and Workplan for the Protection of the Marine Environment in the South Pacific differs little, in substance, from *Convention for the Protection of the Natural Resources and Environment of the South Pacific Region (SPREP Convention)* (Noumea 1986). The SPREP Convention focussed on reducing, controlling or preventing pollution from ships, land-based sources, sea-bed activities, radioactive wastes, nuclear testing, dumping and atmospheric sources, and the prevention, reduction and control of damage caused by mining and coastal erosion. Article 14 obliges Parties to take "all appropriate measures" to protect and preserve rare or fragile ecosystems and depleted, threatened or endangered flora and fauna as well as their habitat in the Convention area. The SPREP convention included two protocols: (i) Protocol Concerning Cooperation in Combating Pollution Emergencies in the South Pacific Region (1986); (ii) Protocol for the Prevention of Pollution in the South Pacific Region by Dumping (1986).

South Pacific Nuclear Free Zone Treaty (1985). Thirteen Pacific island states including Australia and New Zealand are Parties to the Treaty creating a nuclear-free zone in the South Pacific. They agree to prevent testing, stationing, manufacturing and dumping of nuclear weapons and devices within their territories and to generally discourage areas of the region being used for nuclear testing and as waste disposal sites.

Despite the constant signing of funding agreements, organization of meetings, and offerings of regional conventions rather than National progress on pollution abatement, the tide of wastes is still rising in the sub-region. If the SPREP member countries took their obligations under the 1986 SPREP convention seriously, the waste and pollution problems might surely have begun to ebb by the end of the Century.

F. Conservation of terrestrial and marine resources.

1. Traditional co-operation for bioconservation in the South Pacific

Protected areas for nature conservation have been an integral part of Pacific island countries for thousands of years. While European “Reserves” were set up to reserve hunting rights in the estates of the nobility, Pacific island reserves were established by taboos to prevent anyone from entering the area, with the express purpose of allowing the wildlife to recover. Taboos were placed on garden areas as well as on coral reefs and lagoons. In some instances, particular species were protected. Many of these practices endure in rural areas of the Pacific, and sometimes also in urban areas. For example, fruit bats were introduced into Tonga as a gift from the King of Fiji to the King of Tonga. Although released into the wild, they – and their descendants (lots of descendants) remain protected by taboo as property of the King.

Colonial governments established laws relevant to wildlife reserves and parks in many Pacific island countries, but in general, these tended to be on paper only and were often regarded by the local inhabitants as governmental attempts to appropriate custom land. In the Solomon Islands, for example, the colonial government did attempt to set up Forest Reserves on custom land but met with sufficient opposition that they did not succeed.

2. Regional Co-operation for Nature Conservation

When SPREP began, its conservation programme was modelled on the European concept of establishing National Parks owned and controlled by National governments – as they are in Australia and New Zealand. But its member Pacific island governments did not own very much land, and had no mechanism by which custom land could be appropriated or even purchased. Consequently, even though international funds were available to set up and manage national parks, very few were created. Previous national efforts at park formation, especially marine park formation, had met with little practical success because people continued to use the areas for subsistence activities. The governments were unwilling to arrest and prosecute people for fishing or hunting for food. In fact, independent Pacific island governments have never prosecuted any of their citizens for violating national conservation laws or fishery laws. However, people who violate taboos set by communities are dealt with quickly.

Following a 1992 SPREP conference on nature conservation in Nuku’alofa Tonga, where NGOs from around the Pacific were able to illuminate SPREP on some of these issues, the organisation took a different, community based approach to nature conservation.

(a) The South Pacific Biodiversity Conservation Programme (SPBCP)

“The successful protection and management of natural resources will depend on the involvement and active support of all stakeholders, especially local communities. Building partnerships and capacities for community-based conservation areas and for species conservation initiatives that can meet the realistic economic and cultural needs of Pacific island communities is a key challenge. Models of successful conservation areas are urgently required.” SPREP Action Plan 1997 to 2000

The SPBCP approach focuses on strengthening the knowledge and skills of the communities who own the natural resources so they can make their own plans for protecting and managing biodiversity, and developing new ways of generating income from their resources without destroying them.

When the SPBCP started up in 1993, its goal was to establish at least one Conservation Area Project in each of the 14 participating Pacific island countries. By the end of 1998, 17 Conservation Areas had been established in 12 countries. These projects were located in the Cook Islands, Fiji, Federated States of Micronesia (2), Kiribati (2), Marshall Islands, Niue, Palau (2), Samoa (2), Solomon Islands (2), Tonga, Tuvalu, and Vanuatu (2).

According to SPREP, the Conservation Areas are planned, managed, and owned by local communities with government agencies and NGOs offering support as needed. This approach helps communities feel the Conservation Areas are their own decision on how best to utilise their own land. National Governments find the approach far more economical than the former National Park approach as the actual day to day management, including enforcement of rules, is done by the people themselves.

This ideal is assuredly a good one, made even more evident because some of the Conservation Areas did not begin with community acceptance. For example, The conservation area in Pohnpei, FSM, began as a government initiative that was met by armed protestors (Box 14.8 Pohnpei CA). However, after the government retreated, and later the communities were invited to assist in conservation planning, the project made considerable – and peaceful - progress. In Vanuatu, the Environment Unit initiated the Vathe Conservation Area without input from the communities because the communities had a serious land dispute problem and other issues that needed to be worked out (Box 14.9 Vanuatu CA). After the project obtained SPREP funding, the community was slowly brought into the planning and management process.

SPREP's proposal requirements precluded most Pacific communities from even attempting to participate. Government or conservation NGOs made most of the plans with guidance from the SPREP Secretariat. Ideally, communities were involved from the start. In Samoa, the proposal for the Uafato Conservation Area (Box 14.10 Samoa CA) was prepared by a Samoan NGO (O Le Siosiomaga) and the NGO worked with the local community and many government sectors in the earliest stages of planning and development of the proposal.

SPREP assists the local training programme in many ways. For example, members of the Conservation Area management teams attend regional workshops to share experiences and learn conservation management tools such as monitoring and evaluation. Exchange study tours by land owners from different conservation areas help in the long term understanding of conservation area management. A training centre for Pacific island protected area managers and conservation personnel is in the planning stage.

Community based conservation projects have been set up with assistance of other agencies. These are not included in SPREP's Biodiversity Programme, or reported in their quarterly newsletter CASOLink, because they were not initiated or supported by SPREP. NZODA supports a conservation area in PNG (Maisin land, Oro province), a bird park in Tonga, and eco-tourism areas in World Heritage sites at Rennel and Marovo Lagoon in the Solomon Islands. The Nature Conservancy helped establish a Marine Conservation Area in at Kimke Bay in PNG. The United States provided support for the Crater Mt Wildlife Management Area in PNG, a Community Marine Conservation and Enterprise Development in the Solomon Islands, Community based conservation areas in Fiji and Vanuatu (in association with SPACHEE and the Bio Conservation Network). WWF assisted with the creation of marine conservation areas in PNG, the Solomon Islands, Vanuatu, Fiji, and the Cook Islands,

The AusAID funded Samoan Fisheries Extension Project encouraged coastal villages to set up their own coastal resource management plans that included coral reef conservation areas (Box 14.6 Samoa Fisheries). At least 16 of these community marine conservation areas have been established. The Cook Island Fisheries

Department encourages communities to establish marine conservation areas. In Vanuatu, the Fisheries Extension programme has encouraged the creation of many community conservation areas. Some Vanuatu villages have spontaneously set up their own conservation areas, complete with village by-laws, and without outside financial assistance or tourism oriented goals. Their motivation was to conserve their resources.

The SPREP conservation areas are all at varying stages of development. SPREP identifies two different, but interactive management tracks for conservation areas. The first is an informal/traditional management system based on intuition, common sense and anecdotal evidence (e.g. the traditional system that has proved successful for millennia). The second is a more systematic and formal approach with emphasis on information gathering and planning. Community based conservation areas begin with the informal track, with the main activity being awareness raising and community discussion of resource issues. Four of the SPREP Conservation Areas were still at this stage in 1998. The next level includes: (i) allocation of resource rights by traditional authorities; (ii) regulation by taboo (or village by-laws in some cases); (iii) prescriptions are imposed on an ad hoc basis but without delay and with immediate effect; (iv) resources or species are managed individually; (v) compliance is assumed with no formal enforcement or monitoring. (SPREP is probably wrong about the last characteristic as little goes on in the village setting that is not quickly common knowledge. Enforcement can be swift and effective).

SPREP evaluates progress by how management moves along the formal track. The more progressive conservation areas have a single biodiversity value managing all species together, data gathering and monitoring systems installed and maintained, and a management plan that is being implemented and reviewed. Of SPREP's 17 Conservation Areas, only North Tarawa, Kiribati, has reached the final stage, with Arnavon (Solomon Islands), Takitumu (Cook Islands), and Uafato (Samoa) close behind.

SPREP's formal track is based on the need to have accurate stock assessments to enable verification of the success of the conservation effort. These data are not easy to come by and require rigorous field work, especially in marine environments. The sponsors of Conservation Areas, including SPREP, hobble the formal effort by extolling the potential economic benefits that will come with the establishment of the Conservation Areas – through enterprises like eco-tourism. Understandably, the community sees the economic benefits as more alluring than counting trees or fish to provide scientific proof of conservation success. For most people, intuitive observations suffice. SPREP meets this constraint (if it is a constraint) by providing assistance with design surveys and studies, recruitment of technical experts, co-ordination of field work implementation, and review of any technical reports. This may have the undesirable side effect of lowering community initiative in order to service SPREP's need to demonstrate the value of Conservation Areas to its various international sponsors.¹

It would, perhaps, be more useful to get the community leaders to understand why SPREP needs the surveys, provide training in easily mastered survey techniques, and pay the people to collect the data for the scientific community. Data gathering for money is a standard practice in the scientific community and costs of

¹ The 1998 SPBCP Report of the Project Manager states, "In several cases, the value of information from resource surveys are not well understood and as a result, resource surveys are perceived as wasteful of project funds that would otherwise be allocated to priorities such as income generating activities. The Secretariat's involvement in designing surveys and co-ordinating these specialised activities is proving useful in getting things moving."

accessing data from remote parts of the world are very high. This is discussed further below.

A number of Conservation Areas have made progress in developing sustainable benefit-generating activities such as eco-tourism, handicrafts, agroforestry, alley-cropping, whale watching, butterfly ranching, and others. These types of activities improve the potential sustainability of the projects. SPREP assists by providing training in small business management and regional conferences on eco-tourism. However, despite the repeated attempts at small eco-tourism operations in the Pacific islands, most have been unsustainable, and none bring in the level of funding needed for long-term management. SPREP has proposed a Pacific Island Regional Conservation Trust Fund to provide long-term funding for conservation areas (see below).

3. *National Experiences with Conservation Areas.*

Community participation is, indeed, critical for the success of conservation areas in the Pacific island countries. But not all communities agree on who controls what land and disputes are frequent and sometimes violent. FSPI and its local NGO affiliates have found that conflicts over the utilisation of natural resources are a major stumbling block for community participation. In the Pacific islands, the problems are amplified by high levels of dependency on natural resources for both subsistence (food and fuelwood) and national wealth creation (timber, commercial agriculture, and fisheries). Land and resource ownership patterns complicate decisions on resource use, generating a wide range of conflicts. These are summarised by FSPI in Box 14.11 (Conflicts). National examples are provided in Box 14.8 (Phonpei, FSM) and Box 14.9 (Vanuatu). Participatory processes helped resolve conflicts in both these examples. Where conservation areas were reasonably free of community conflicts, they were implemented with much less difficulty. Examples are given in Box 14.12 (Tuvalu) and Box 14.10 (Samoa).

The French and American island territories of the Pacific have established national park areas that function as they do in their parent countries. For example, in New Caledonia there is a sophisticated network of forest and marine parks that are carefully supervised and well developed for tourism purposes. They are zoned parks, with areas set aside that do not permit entry for any reason without special permit. In total, 3.3% of the land is set aside as forest parks, representing most of the remaining forest types. New Caledonia's marine parks total 59,469 hectares. The Southern Lagoon Park system includes one section that is perpetually closed to entry of any kind except for licensed scientific investigations. The Southwest Lagoon permanently protects a large section of the barrier reef and a series of lagoon islands and reefs. Tourism is allowed in these areas but not fishing. The response of the sea life to total protection has been rewarding. Isle Canard, for example, directly off the major tourist beach area of Noumea, has a flourishing coral reef that is readily accessible to novice divers and snorkelers. The fish have become extraordinarily abundant and divers hand feed swarms of them.

New Zealand has a high proportion of its native forests under protection, but it is also one of the most deforested countries in Oceania, with 79% of its original forest cover gone. New Zealand's Fiordland National Park, with 12,519 square kilometres of land under protection, is one of the largest parks in the world and a World Heritage Area. In total, New Zealand has 12 National Parks covering 20,000 km², 20 Forest Parks covering 17,000 km², and nearly 4,000 reserves including 30 km² of private land set aside for scenic, scientific or ecological reasons. New Zealand's National Parks are an integral part of the New Zealand tourism industry. Park facilities are excellent and even include special paths for disabled people. There are special educational facilities for training park staff in environmental management and tourism.

New Zealand has a network of 7 marine reserves and 3 marine parks covering a total of 7,550 square kilometres. The marine reserves are strictly no-take areas where all creatures are fully protected. Populations of fish and invertebrates have showed substantial population recovery in these reserves. The reserves were initially set up to satisfy a need of marine scientists to observe what the marine life of New Zealand was *supposed* to look like. The results were so spectacular that the public and government quickly understood the need for more. The network of marine reserves is expanding to cover all types of marine habitats and create vital breeding stocks to replenish the already depleted coastal fisheries.

Australia, with 6.2 million hectares of National Forest Parks, has the most native forest under protection but logging is still active in many indigenous forests and only 14% of the unlogged forests are in protected areas. Australia's parks are, like those of New Zealand, extremely important tourism and recreation resources. There are 126 National Parks in New South Wales alone.

The Australian Great Barrier Reef World Heritage Area is the largest protected marine area in the world, covering 350,000 square kilometres of coral reefs. The commonwealth Great Barrier Reef Marine Park Authority has zoned the reefs according to use, with about 5% of the park being totally protected. In the rest of the park, any activity may be permitted except mining and drilling for oil. CSIRO conducted a 5 year study that revealed fishing trawler's were making a significant impact on the park. They are authorised to operate in 80% of the park area but are reported to operate in protected areas as well. The trawls remove between 5% and 25% of the seabed organisms and capture between 6 to 10 tonnes of bycatch for each tonne of prawns netted. The bycatch includes juvenile fish, crustaceans, and sea turtles. No restrictions have been introduced to control this problem.

The Great Barrier Reef Marine Park Authority (GBRMPA) has no authority over land-based activities. Nothing has been done to stop non-point source pollution along the Queensland coast and ecological distress is still evident on many of the nearshore coral reefs. GBRMAPA was not consulted when government provided grants and incentives to develop a USD157 million pilot plant for extracting and processing oil shale at Gladstone. By 2007 the oil shale companies plan to have a production plant producing 85,000 barrels of oil a day on the coastline inshore of the southern Great Barrier Reef. The extensive mines will eventually produce an estimated 1.5 million barrels a day. In responding to mounting objections by NGOs, the companies point to the creation of 5,000 jobs and a USD 9.5 billion improvement in the balance of payments from just the first oil shale mine. The Oil Shale production is expected to reach major production just as Australia and its trading partners will have to meet the obligations of the Kyoto Protocol on greenhouse emissions.

A few scientists have been warning of significant threats to coral reefs for more than 30 years, suggesting that the emerging wide-spread infestations of the coral predator crown of thorns starfish was related to human activities and represented an early warning symptom of serious reef imbalances. But the majority of scientists insisted that the Great Barrier Reef was simply too large to be significantly harmed by human activity. Thirty years of research revealed some of the multitude of ways the Great Barrier Reef is being damaged, including trawling, the live fish trade, aquaculture, coastal development, neighbouring land use for sugar cane and cotton, pollution, oil spills, oil shale mining, global warming and, of course, the crown of thorn starfish that continue to plague the reefs. The continued and wide-spread decline of coral reefs during this time has now made formerly sceptical coral reef scientists seriously concerned. As Tom Goreau pointed out at the 1998 ICRI meeting in Townsville, "Reefs are the ultimate downstream ecosystem and they are the best test of ecologically sustainable development." One of the areas of scientific concern is the steady downsizing of the GBRMPA which had a million dollars stripped from its budget in 1998. The United Nations World Heritage authorities will

conduct an investigation of the Great Barrier Reef World Heritage Site and GBRMPA in June 1999.

Australia also maintains reserve status over five off-shore coral reefs in its EEZ protecting important, remote wilderness areas. These include: Elizabeth and Middleton Reefs in the Tasman Sea, Coringa-Herald and Lihou Reefs in the Coral Sea, Ashmore and Mermaid Reefs in Northwest Australia. All of Australia's marine parks are "multi-use" and allow fishing activities. WWF has given an annual report card on Australia's park system and Marine Parks rated a "D", based on their multi-use status and lack of coverage of representative environments. A recent survey has identified 56 different marine biotypes and Australia will protect samples of each of these under its new Australia's Oceans Policy (Box 14.13 Australia's Oceans Policy).

4. *The Pacific Island Regional Conservation Trust Fund*

Funding is basic to the sustainability of community based conservation areas. Wealthy countries like Australia, New Zealand, or New Caledonia can afford to create, maintain and protect National Parks. But the small Pacific island countries simply do not have the funds to support conservation areas. Rural Pacific island communities are willing to set aside conservation areas based on practical or moral understandings of traditional resource management, but conservation experts fear these areas will be too small, isolated and somewhat fluid in their permanence. Modern concepts of nature conservation require relatively larger areas where whole ecosystems are able to recover and funds are available to cover management costs.

The efforts at community conservation areas supported by eco-tourism and basket weaving are already showing signs of economic failure. In a few areas, logging companies are waiting on the side-lines with ready cash. Conservationists need to come up with a truly sustainable solution to financing conservation areas. SPREP has proposed a Pacific Island Regional Conservation Trust to satisfy this need.

ESCAP's Pacific Operations Centre assisted SPREP by preparing a concept paper for the framework of the trust fund (Rosenberg 1998). The Trust will have an initial target funding level for grants of USD1 million, based on the current SPREP expenditures for Conservation Areas. This will require a principal of about USD30 million. Possible donors include GEF, UNDP, UNEP, ADB, EU, bilateral aid, private donors and foundations.

Proposals for grants from the Conservation Fund will be open to all individuals, public and private organizations from within the Pacific island nations. The grants would not need to be specifically for the establishment or maintenance of conservation areas, but would include related activities that contribute to conservation.

5. *The Natural Resource Conservation Programme*

SPREP's Natural Resource Conservation Programme focusses on endangered species. For example, they organised a 1995 Year of the Sea Turtle that spawned turtle conservation programmes in their member countries that are expected to run for many years. In Fiji, the Government of Fiji responded by placing a moratorium on the commercial harvesting of sea turtle and has developed a long-term strategy for the conservation of this valuable resource. Public awareness efforts include a popular video "Let our turtle family live," and a turtle education program by the Wan Smolbag Theatre and the Department of Fisheries in Vanuatu. The people of Vanuatu enjoyed the presentation and understood its message, establishing a village based network of turtle monitors and bans on turtle harvesting.

A new programme on invasive species was implemented in 1998 to eradicate or control non-indigenous species that threaten native ecosystems, habitats and

species in the region. The project will review invasive species issues as they pertain to conservation values and work with the United States on methods to deal with the brown snake problem in Guam. Invasive species introduction through ballast water on ships will be addressed through SPREP's Marine Pollution Programme.

6. *The SPREP Coastal Management and Planning Programme*

The Coastal Management and Planning Programme is intended to assist SPREP members with the planning and managing the multiple use, ecologically sustainable development and conservation of coastal areas. Unfortunately, funding for this project has not been sufficient to make much progress. SPREP feels the normal form of integrated coastal zone management is inappropriate for the Pacific islands because it is based on zoning concepts and sector management approaches. The programme proposed an Integrated Coastal Management (ICM) framework loosely built on the theme of local community responsibility to deal with issues holistically. Indicative factors for establishing the ICM programmes are (i) extensive consultation at all levels of decision making; (ii) education and awareness; (iii) ample time to develop and mature; (iv) sanction and support from the highest levels; (v) a high degree of flexibility; (vi) development based on a specific issue; and (vii) initial compatibility with existing institutional capacity and data available (Kaluwin 1996).

Lacking sufficient funding, the ICM project has made little headway. The project held sub-regional workshops on Coastal Reef Survey and Monitoring Techniques in Palau and in Vava'u Tonga. The training exercise included coral reef survey techniques as part of the Global Coral Reef Monitoring Network. SPREP is co-ordinator for this programme in the Pacific Region.

SPREP produced a directory of agencies involved in coastal management in the Pacific islands region and of institutions and educational courses available.

7. *SPREP/ICRI Coral Reef Programme*

In 1997 SPREP organised the Year of the Coral Reef to heighten public awareness about coral reef problems and what people can do to help them recover. Eighteen Pacific island countries participated, each appointing a national campaign co-ordinator. SPREP assisted financially with the development of information materials, displays and videos to heighten community awareness on the biology and plight of coral reef ecosystems.

The SPREP project was part of the International Coral Reef Initiative (ICRI), a world-wide group concerned with the global decline of coral reefs. The Secretariat for ICRI has only enough funds to support its internal communication network and host annual conferences. In 1999 the Secretariat passed from Australia to France and called for a major thrust to bring the issue to the subsistence fishers who are one of many contributors to the declining vitality of coral reefs. The public awareness programme tries to mitigate abusive and unsustainable use of the coral reef by educating the public on coral reef conservation measures.

G. Promoting sustainable tourism



Figure 25. The Meridian Hotel in Vanuatu aspires to an ecologically friendly visage.

Large resorts and hotels remain by far the most successful tourism enterprises in the Pacific. Major tourism centres with large hotels and resorts include Guam, Saipan, New Caledonia, Fiji, and Tahiti. Large tourism complexes are, however, striving to achieve the most environmentally friendly profile possible. They help support eco-tourism and adventure tours and help influence government policy on the value of maintaining environmental values – such as safe freshwater supplies healthy reefs and reduction of litter.

Eco-tourism, including wilderness walks, diving, and cultural exhibitions has become a major industry throughout the region, including Australia and New Zealand. Small scale resort development has replaced the Grand Hotel concept and has helped tourism to spread to rural areas.

The Tourism Council of the South Pacific (TCSP) was founded in the early 1980's and is now a regional intergovernmental organisation based in Suva, Fiji. Its fundamental objective is to foster regional co-operation in the development and promotion of tourism in the island nations of the South Pacific. Membership includes the Cook Islands, Fiji, French Polynesia, Kiribati, New Caledonia, Niue, Papua New Guinea, Solomon Islands, Tonga, Tuvalu, Vanuatu and Samoa.

Since mid- 1986 the TCSP has been assisted by the European Union through the Pacific Regional Tourism Development Programme (PRTDP). In its initial stages, the project helped develop guidelines for sustainable development, including recommendations for Environmental Impact Assessments of new tourism developments. The TCSP is now more market oriented and the current Corporate Plan includes three divisions; (i) Marketing and Communications, networking marketing and promotional activities including participation in international travel fairs through a combined exhibition stand the "South Pacific Village." (ii) Human Resources and Training, assessing human resource requirements and training needs for crafts, hotel operations, catering, tour guides, travel agents, other tourism related activities; (iii) Research and Development, planning for sustainable development and management as well as market research surveys, research into product development opportunities.

National Tourism offices supply information to both tourists and local populations. They often play a vital role in helping communities appreciate the need to reduce litter, conserve natural beauty, and respect parks and recreational areas. For example, the Visitor's Bureau in Tonga has an educational programme that includes its officers giving regular presentations to primary and secondary schools. They co-operate with development of conservation areas, such as the Ha'apai Conservation Area, by helping people develop sustainable eco-tourism projects. In Vanuatu, the National Tourism Office in Port Vila assists the Vatthe Conservation Area by distributing pamphlets on the project and making reservations and arrangements to book tourists into the resort.

SPREP provides training in eco-tourism for conservation area managers. BCN has an ecotourism and handicrafts project in PNG. NZODA supports ecotourism projects in Fiji, the Solomon Islands and – through contributions to SPREP’s ecotourism training project – the region. WWF has helped develop an ecotourism project in the Marovo Lagoon of the Solomon Islands.

H. Provision of adequate, safe, freshwater resources

The lack of positive action on fresh water issues is astonishing considering the fact that fresh water is a limiting factor for development of any kind, and that lists for priority environmental needs for the Pacific islands always include provision of adequate, safe, freshwater. The Asian Development Bank declared provision of safe fresh water as one of its major priority funding areas, yet of the 14 major ADB programmes in the Pacific only one is explicitly on water – the rebuilding of the water and sanitation system in Tarawa, Kiribati (a USD 12 million project that has had difficulties getting started). The Kiribati water supply is indicative of problems with co-operation for water supply throughout the Pacific islands. The water systems were built by colonial governments and have been maintained by foreign aid. The governments have generally regarded provision of fresh water and sanitation as basic services – provided free of charge.

In most countries, the pumping equipment and reticulation systems are owned by the government and run by Public Works or a Public Utilities Board. Water is normally subsidised, if not freely available – but people have to pay for electricity. Governments are happy to cut off a person’s electricity but feel, understandably, uncomfortable cutting off a family’s drinking water. In fact, this is exactly the problem in Kiribati. The ADB insists that the government privatise the new water system and that the new company must shut off the water of anyone who fails to pay their water bill. The Government does not want to privatise and says it cannot, under its constitution, withhold water from anyone. The ADB, as part of its Government Restructuring programmes in the Pacific islands, generally insists on the governments privatising power and water utilities. Many governments are unsure that this will be sustainable or beneficial, especially since the only private concerns with enough money to buy and manage their utilities are foreigners. They fear privatisation of their basic services will result in significant leakage of money offshore; in the same way Telecom profits already tend to leak offshore.

The ADB insists that privatisation of water services will improve water delivery because lost water will mean lost profits, and they are probably right. Six Pacific island countries have privatised their water supplies. Vanuatu, Nauru, Guam, Marshall Islands, and parts of the Federated States of Micronesia. However privatisation does not automatically result in improvement in treatment, distribution, price, services for disadvantaged peoples, or customer relations. It all depends on who buys the utility and how much money they are willing to spend to fix and maintain it. Port Vila’s water services have been privatised since 1994. The Union Electrique du Vanuatu gets funds from consumers and supplies 98% of Port Vila’s population. The amount of unaccounted water dropped from 42% to 26% between 1990 to 1996. Connections increased by 45%. Fiji is in the process of privatising its water services. Water is currently run by the public works department at an estimated cost of about US\$12.5 million a year.

SOPAC is the regional body that assists the Pacific islands with water and sanitation issues. Their Water Resources Unit has a staff of highly qualified water engineers and the best library on water related issues in the region. In 1998, SOPAC had projects assisting with water and sanitation in the Marshall Islands, Samoa, Solomon Islands, Tuvalu, Tonga and New Caledonia.

Fixing water delivery is only part of the problem, however. Pollution of supplies is the other part. Programmes to mitigate pollution of water supplies seek to improve sanitation, waste disposal, and contamination from agricultural chemicals. There are about USD36 million worth of sanitation projects underway in the Pacific sub-region in the 1998-2000 period. These include sanitation in Tarawa, Kiribati (Part of the USD12 million water and sanitation programme of ADB), the Marshall Islands (ADB Ebeye Health and Infrastructure Programme USD 8.2 million), Nuku'alofa (ADB Nuku'alofa Urban Development USD 10 million), Port Vila, Vanuatu (ADB Sanitation Master Plan for Port Vila USD 10 million), Regional Pacific Waste Management Project for improvement of urban solid waste management, septic tank sludge management, management of persistent organic pollutants (AusAID USD\$600,000), SPREP Regional Waste Awareness and Education Programme (EU 600,000 ECU), SOPAC village based, small scale sewage treatment systems (NZODA USD 37,000), Sewer project in Saipan (USA USD2.8 million), American Samoa waste water treatment facility (USA USD 1million), Palau village waste water project (USA USD 1.1 million).

The SPC on-going Regional Agriculture Programme and the Pacific communities plant protection and tissue culture programme assist countries in developing alternatives to pesticide use to reduce contamination of water supplies.

I. Developing environmentally and economically sustainable energy resources.

Renewable energy accounts for around 6 per cent of Australia's energy input: an amount broadly comparable with the OECD average of 6.4 per cent. Renewable energy is consumed in all Australian States, but the types vary widely depending on the available resources. For example, hydroelectricity accounts for nearly 40 per cent of Tasmania's power generation capacity, but is less significant in other States. In Queensland, nearly 11 per cent of energy is from renewable sources, particularly in the form of bagasse, used in the sugar industry. Other forms of renewable energy, include: (i) solar for domestic and commercial uses, (ii) biomass fuels; (iii) gas from land fill and sewerage. These account for small levels of energy consumption in each State. The renewable energy sector is important in employment terms, accounting for around 10 per cent of employment in the electricity, gas and water sectors, even at this early stage of its development. (Department of Primary Industries and Energy 1997)

Reforms to Australia's gas and electricity markets currently being implemented suggest that additions to capacity in the future will increasingly be met by co-generation, gas and renewables. These reforms to Australia's electricity industry have improved decision making in relation to future investments in Australia's energy industry. The act of corporatisation of utilities to impose commercial sector disciplines, and the introduction of a market where new players can enter the industry, open up competition from alternative energy services.

Increased use of co-generation technologies, where waste heat from industrial processes is converted to electricity, is expected to quadruple by the year 2010. Another example is the Queensland sugar mills, which only recently have been able to sell power into the Queensland electricity grid. Solar power is growing, but remains competitive only at the fringes of the electricity grid (where the costs of grid supply are higher). (ABARE 1997).

The Australian Government continues to provide support for renewable energy technology through the Renewable Energy Initiative. Additional support is provided for Cooperative Research Centres with a primary objective of developing technologies to assist climate change abatement, especially renewable energy.

France has promoted sustainable energy programmes in the South Pacific. New Caledonia, for example, meets most of its energy needs from hydroelectric

power and has recently installed a series of wind generators. Solar water heaters and Solar Electric Panels for lighting and refrigeration are now in common use in rural New Caledonia and French Polynesia. The government subsidises alternative energy for rural homes. It's 1998-2001 budget for promoting sustainable energy sources in the Pacific islands is USD1 million.

SOPAC is the regional agency co-ordinating energy programmes in the Pacific. They provide training and technical assistance to utilities in all areas of energy. Their alternative energy programs include: (i) Environment education and action programme for wind and solar energy; (ii) Cook Island wind energy project; (iii) small energy projects programme.

The SPC has a Rural Energy Development Programme that assists countries throughout the region with alternative energy requirements. This includes, for example, development of coconut oil as a biofuel.

The United States has assisted the Solomon Islands with the transfer of solar photovoltaic technology for rural electrification. In Tonga, Solar photovoltaic systems now power lighting in the entire southern Ha'apai island group and in rural primary schools throughout the country.

J. Developing tools for co-operation in environmental management. Consultative techniques.

1. Horizontal and vertical co-operation in National Sectors

The sectoral and hierarchical structure of Pacific island governments, and the split between traditional governance versus colonialist imposed governments, results in extremely poor communication horizontally and vertically. Without communication there is little co-operation. For example communications between central and provincial governments have been poor in most Melanesian countries. In the Solomon Islands the National Government voted to abolish provincial governments in 1997 but the Supreme Court overturned the decision as a violation of the constitution. Historically, there has been very little communication between rural island villages and National Governments except for Government edicts broadcast over radio or passed down the chain of command to village officials. Information flow in the other direction, from the villages to the National Government has been more difficult.

Conflicts between agencies are more common than co-operative efforts. For example, in Tonga the Pesticides Act of 1975 established a committee to regulate the importation, safe use and evaluation of the environmental impact of these hazardous chemicals. The committee included representatives from both Agriculture and Health. The first meeting of the committee resulted in such a fierce argument between these two sectors that the committee never met again. As a result the Act, which is a good one, was never implemented. In Kiribati, arguments between representatives of the Public Utilities Board and the Environment Unit resulted in the PUB changing the locks on the water reserves to prevent the Environment Unit from visiting the sites without supervision.

Horizontal communication normally takes place only at the Cabinet level, between Ministers. This is often facilitated by the Central Planning Office (or comparable agency) that assists each sector with preparation of plans and budget submissions to Cabinet. The Ministers are expected to detect and resolve conflicts between the various submissions and thus co-ordinate national objectives. Cabinet decisions are passed to the Permanent Secretary or Director by the Minister. The Permanent Secretary is normally (but not always) a bureaucrat without political affiliations who will carry out the Minister's decisions. The Director actually runs the day to day affairs of the Ministry and the amount of co-operation between divisions of

the Ministry or between the Ministry and other concerned parties depends on the Director's personal inclinations and skills.

Co-operation between line ministries on the Director level was facilitated by the formation of departmental environmental committees to assist with the development of National Environmental Management Strategies in the late 1980s and early 1990s. Some of these committees continued to function after the plan was completed. In Samoa, the 1997 members of the National Environmental and Development Management Committee included representatives from the Attorney General's Office, Agriculture, Forestry and Fisheries, Education, Foreign Affairs, Health, Internal Affairs, Lands, Surveys and Environment, Public Works, Statistics, Tourism, Trade, Commerce and Industry, Treasury, Woman's Affairs, Youth, Sports, and Culture, and three NGOs. Committees. The Committee meets to review and develop national policy recommendations. In other countries, such as the Federated States of Micronesia, their interdepartmental committee meets on a regular basis to address environmental issues, often creating sub-committees to co-ordinate developing national responses. Cross sectoral technical committees on a professional level are sometimes set up to conduct or evaluate Environmental Impact Assessments.

2. *Conferences and workshops facilitate cross-communication*

Communications between different countries is greatly facilitated by regional conferences and workshops. For example the heads of various departments or ministries get together on a regular basis to compare issues and seek common solutions. The heads of state or their top representatives meet together as the South Pacific Forum or the South Pacific Conference, which is the governing body of the Secretariat of the Pacific Community. Finance Ministers and Heads of Forestry organise their own conferences while Heads of Fisheries attend regional technical meetings or conferences organised by the SPC. SOPAC helped to set up a regional energy association and organises regional meetings for the heads of water utilities. SPREP organises meetings on sustainable development for a wide variety of government and non-government sectors including education, finance, planning, media, and tourism.

SPREP and the other regional and international organisations (like ESCAP, FAO and UNDP), also hold topic specific meetings that can assemble representatives from many different sectors. For example, participants in SPREP's Climate Change and Sea Level Rise training courses include representatives from many sectors. The ESCAP Regional programme on Integrating Environmental Considerations into Economic Decision Making Processes brought together representatives from many disciplines from throughout the Asia Pacific Region to discuss the environmental decision making process. This regional cross-pollination has established many lines of communication and co-operation horizontally, vertically, and internationally.

Most of the regional meetings are open to observers, including the media and the general public. For example, the Multilateral High Level Conferences on South Pacific Tuna Fisheries included anyone who wished to attend. The SPREP conservation meeting every four years has been a cornerstone of information flow for conservation in the South Pacific. SPREP has taken this process to a major success in the 1997 6th South Pacific Conference on Nature Conservation and Protected Areas held in Pohnpei, FSM. The conference had over 170 delegates, including representatives from all 26 SPREP member governments and 87 NGO delegates from conservation and development organisations, the private sector and traditional and community leaders concerned with conservation. Partnerships and participation were the keys to the success of the conference. The agenda and methodology for

the conference was itself a participatory exercise that included a wide range of government and NGO conservation groups.

The published proceedings for regional meetings are available on request, often without charge.

3. *The Internet is creating a revolution in information exchange*

One of the greatest constraints for co-operation in environmental management has been the expense and time delay of communications in the Pacific islands. At the end of the Century, news and information on any topic at all can be found at low – and decreasing – cost on the Internet. For example, many of the papers presented at the meetings and minutes of the regional meetings are now on web sites of the respective regional bodies and thus freely available to anyone in the world. In 1998, Kiribati became the first country in the world to begin making regular use of the new satellite phone technology, giving remote islands instant access to the global telephone network as well as to the Internet. This new technology is expected to revolutionise connectivity in remote areas throughout the Pacific.

Email communications and the World Wide Web make networking and exchange of information inexpensive and rapid. Most government departments in Australia and New Zealand now have their own web site where details on programmes, personnel, and reports can be viewed and downloaded by any interested person. The State of the Environment of both countries is available on the Internet. All the regional organisations in the Pacific sub-region now have web sites. Sub-groups with common interests often communicate by group email or list-server distributions. For example, there is a list server dealing with traditional fisheries management and several on sustainable development. The United Nations Earthwatch programme includes an entire tutorial on good governance for sustainable development.

Methods for searching the World Wide Web for information are improving daily, making it easier for Pacific island people interested in conservation to stay current with regional and global events.

4. *Co-operation between regional organisations*

Lateral co-operation between regional organisations has been facilitated by the South Pacific Organizations Co-ordinating Committee (SPOCC). Its membership includes the heads of the South Pacific Forum, the Secretariat of the Pacific Community, the Forum Fisheries Agency, SPREP, the University of the South Pacific and the Tourism Council of the South Pacific. It is a voluntary committee and although it might have resolved some conflicts, it does not seem to have increased actual collaboration between the agencies on specific projects.

5. *Vertical communications are enhanced by media and the world wide web.*

Vertical communications are improving rapidly, again facilitated by the general improvement in global communications offered by satellites, television, and the World Wide Web. Government secrecy was common throughout the region, including Australia and New Zealand until the 1980's. Information about government decisions is still hidden from the people – even in Australia and New Zealand where there are freedom of information laws. In New South Wales, for example, more than 55% of requests for information from the Premier's office are turned down. A reporter from the Sydney Herald had difficulties getting the name of the officer who is in charge of administering the Freedom of Information Act because the Press Relations Office would not release the information. The Australian State of the Environment Report laments that accurate information on forestry activities is scanty from some States

because some State Governments heavily subsidise logging in virgin forest areas and do not want the amount of subsidies nor the amount of logging to become public knowledge. In New Zealand, Freedom of Information does not mean the information is without cost and some of the Crown Research Organisations require NZ\$200 per hour to answer requests for government held information that was gathered at tax payer expense.

The idea of the government seeking consensus or input from the civil society was given a major boost during the United Nations Conference for Sustainable Development. Public response is now invited on most new development proposals in Australia and New Zealand and these comments are often debated in government policy decisions. All governments in the sub-region are undertaking various experiments with public participation in the planning, policy making, and implementation of environmental programmes.

6. *Consensus Conferences in the Pacific*

One of the latest tools for public participation is the Consensus Conference. New Zealand and Australia are pioneering this tool for incorporating public input into government policy making processes.

The process resembles a trial by jury. The organization convening the conference must be seen to be impartial and respected. In Australia, for example, the Australian Museum hosted the conference in the Senate Chamber of the Old Parliament House. The topic was "On Gene Technology in the Food Chain." Government was preparing to reach a decision on this vital issue and wanted input from the public.

A steering committee, chaired by a former Chief Justice, organised the selection of a panel of 14 people, representing a cross-section of the population. The panel included different age groups, levels of education, urban and rural people, farmers, industrialists, educators, men, women, and people of both Aboriginal and European descent. The selection process, as in a jury trial, tried to find people who had no special knowledge of or bias towards the subject to be investigated.

Prior to the Conference, the people were assembled for two week-end introductions to the topic, presented by impartial teachers who were not themselves involved in the controversy but were able to present complex ideas to people. The jury listened to the presentations and then got together to work up a series of specific questions they wanted answered by the experts.

A three day conference was then convened and was open to anyone, including the media. The citizen's questions were presented to the expert panel and they answered them so the ordinary people represented on the panel (and the audience who later viewed the ABC special report) could understand the answers. The citizens cross examined the experts and heard evidence from both sides of the issue. This provided an opportunity to debate the scientific and moral issues on a level playing field. If the panel did not understand the reply, they did not accept the answer and, in all likelihood, most of the public would also find the answer unacceptable.

The citizens then retired to develop a consensus on the key questions (or as close to a consensus as possible) and make recommendations for or against the inclusion of genetic manipulation in the food chain. Their report was presented to the Speaker for the Senate as a statement from the public on this critical issue. Coverage by the media gave considerable power to this process.

The conference was sponsored by 28 different groups including government scientific, environmental, agricultural, and consumer protection agencies, private industry, environmental NGOs, and academic institutions. Sponsors included organisations that were actively engaged in gene manipulation as well as

organisations opposed to gene manipulation, industries expected to buy or sell products of gene manipulation, and neutral academic organisations.

7. *GIS as a consultation and management tool (Coastal Zone Management).*

Geographic Information Systems (GIS) and remote sensing are becoming increasingly important tools for integrating sustainable development in the Pacific sub-region. There are two basic sub-regional approaches to the use of GIS. SPREP introduces GIS as a strategic environmental planning tool for coastal zone management and population planning. SOPAC uses GIS as a project planning and management tool with the intent that once governments get the system up and running on a practical day to day basis they will then be able to expand its use to an island wide planning tool. Historically, the SOPAC method has been the most successful.

Project oriented Geographic Information Systems have been used, for example, in the mining, forestry, and map making for many years. Several countries, including Australia, New Zealand, New Caledonia and Vanuatu have expanded the project oriented GIS maps as an aid to better integrated planning. New Zealand has the sub-regions most advanced, integrated GIS, offering statistical and economic information on nearly every subject with sufficient detail to be used regularly by both government and industry for development planning. Vanuatu has developed a very advanced GIS land-use planning system currently used by more than 30 government agencies and groups. It is described in detail in Box 14.14 VLUPO. New Caledonia integrated resource information about the marine resources within its 200 mile EEZ into a powerful GIS and has used this as a basis for government and industrial decisions on resource use (Box 14.15 ZoNeCo). The GIS has proved so successful that New Caledonia is now in the process of integrating all of its governmental and resource information into a single GIS database that will streamline future development decisions.

SOPAC claims the regional mandate for the development of GIS for the Pacific island countries. It has conducted a wide range of project-oriented GIS programmes and assists its member countries in the installation and capacity building of GIS systems to create management maps for Energy and Water utilities, forestry, quarry activities, EEZ natural resource distribution, and urban disaster planning. SOPAC has a practical, engineering orientation to GIS. Their GIS training programmes target applied needs in management of energy and water systems. The SOPAC projects are in-country, hands-on, development programmes. The Power Utilities GIS programme began in May 1997 with a five month pilot project to implement a GIS for the Tonga Electric Power Board (TEPB). The objectives were improved asset and financial management together with faster response to faults and enhanced planning with an overall goal of improved efficiency of operations as well as an opportunity to transfer the technology to other utilities. During the pilot project, the GIS was developed using MapInfo/MapBasic and the introduction of image backdrops. Once the system was operational, SOPAC held a regional workshop at the TEPB to demonstrate the system to participants from Fiji Islands, Palau, Samoa, Solomon Islands and Tonga. The power utilities of Fiji and Solomon Islands decided to proceed with similar systems.

In 1998, SOPAC assisted the Fiji Electricity Authority and the Solomon Islands Electricity Authority with the installation of GIS systems and held another workshop to discuss improvements and developments with member countries. The projects were able to demonstrate the ease of transfer of technology, data and skills from the power to the water, telecommunications and other utilities. SOPAC intends to help member countries add maps of all utilities to the GIS. The next step will be the adoption of a more holistic approach to integrate these technologies and implement them nationally within an Islands Systems Management program.

SPREP has developed its own GIS system and conducts its own urban disaster surveys in relation to sea level rise and pollution. SPREP also hosts regional GIS workshops. For example in September 1997, SPREP conducted a GIS workshop in Pohnpei with representatives from FSM, Guam, Kiribati, Marshall Islands, Nauru, Northern Mariana Islands and Palau. They demonstrated the use of GIS for population and coastal zone management.

This is surely an area where the two regional organisations could combine their talents for the benefit of all parties.

8. *Partnerships for research create partnerships for response.*

Forming partnerships for research or monitoring has had excellent success in the Pacific sub-region. Government extension agents and academic research personnel throughout the area now utilise a growing toolkit of participatory research techniques.

People find research activities entertaining and enlightening. Participatory tools are designed to promote interest as well as find answers.

Australia has mobilised one of the most extensive and successful water assessment and monitoring programmes in the world. Every Australian State has water quality monitoring partnerships with volunteer groups and there is a Commonwealth "Waterwatch" programme to co-ordinate information and activities between the state volunteer organisations. In 1995, more than 20,000 Australians sampled streams, rivers and lakes all around the Nation. In one week they created a co-ordinated image of the state of the nation's waters. Schools, fishing, boating, canoe and kayak clubs, rotary and lions clubs, all work together in the Waterwatch network. Data collected by the more than 2000 volunteer groups is integrated on the World Wide Web. When the students find a water pollution problem (and they do) they immediately notify the water authority and in a number of cases have actually forced polluters in their community to stop polluting - all without legal complications or expense to the water authority (Ramsay, Sydney Water Corporation, personal communication 1997).

Programs such as Waterwatch and Ribbons of Blue are important in helping communities understand the role and importance of monitoring water quality, as is the National River Health Program for developing protocols and standard biological indicators of water quality and catchment change. Extensive testing has shown that, despite the greatly reduced cost, the information the community groups collect is often as useful as that collected by water management agencies. (CSIRO 1996).

The Australian Coastal Zone Management Plan includes a public participation segment called Coastcare. Coastcare is a well supported programme that has met with considerable success in all Australian States. Projects and educational opportunities are advertised on the Internet, radio and television. Examples are given in Box 14.16 Coastcare).

Communities throughout the Pacific have participated with meteorological research and monitoring for more than 40 years. Recently, more than 130 schools joined in the Schools of the Pacific Rainfall Climate Experiment (SPaRCE). The project links schools with researchers investigating climate change. Students benefit by obtaining educational material on climate and instruments to measure it, while the scientific community benefits by having climate monitoring centres on widely scattered islands in the Pacific Ocean. (Box 14.17 SPaRCE).

Farmers in Australia and New Zealand have participated in intensive research into soil salinisation and agricultural production in association with government agencies. Volunteer Landcare groups work as partners to governments on a wide range of erosion control research and replanting programmes in both countries. New Zealanders also regularly volunteer to assist with the development and maintenance of parks and reserves and participate in extensive coastal dune care projects.

In Fiji, farmers and National Agriculture extension agents now work together in farm assessment, development planning and monitoring (Box 14.18 Farm Research Fiji). The research partnerships resulted in a significant improvement in relationships between the farming community and the government agriculture officers.

IV. THE MAJOR CHALLENGES TO SUSTAINABLE DEVELOPMENT IN THE PACIFIC

A. ENVIRONMENTAL ISOLATION

1. The thin green line

Economic reform and development was the theme for the 29th Annual South Pacific Forum meeting. Mr Jioji Kotobalavu, the secretary to cabinet for the Fiji government and one of the country's representatives at the pre-forum officials planning session said,

“We want issues which are really going to be of relevance to the development of Pacific Island countries in immediate terms. Yet what we actually see is that the agenda has been hijacked by peripheral issues. There is lot of irrelevance, a lot of inconsistency. A lot of issues have been brought in because of the green environmental lobby in Australia and New Zealand”.

Despite 20 years of awareness raising, capacity building and educational effort, key political and economic decision makers continue to see environmental management and economic development as opposing goals. The concept of a holistic, sustainable planning process remains elusive and poorly defined in the Pacific. Environment is the business of environment units, scientists, academia and NGOs. Development refers to economic and social issues and is the business of industry and the rest of the government. A thin green line divides environment from “issues which are really going to be of relevance to the development of the Pacific Island countries in immediate terms.”

This is the largest challenge facing the Pacific sub-region, even in Australia and New Zealand. It is a difficult issue, and not easily diagnosed or solved. In March 1999, for example, 5,000 people marched on the State Parliament House in Perth to protest continued logging of Australia's remaining natural forests. The demonstrations concern new Regional Forestry Agreements that establish percentages of natural forests to be protected (for the time being) and those to be logged now. The leading “Green” Senator and the Minister of Forestry were interviewed on ABC television and brought the division between economic development and environmental management into clear focus. The Minister of Forestry said “My job is to be the advocate for the Forestry Industry.” He was openly hostile towards what he termed, “Greenies,” saying that the agreements (which excluded public participation) were conducted following an economic, social and environmental impact assessment. Although the forests are clear-felled at the rate of 1 million hectares a year, burned, and then poisoned with 1080, he claimed there was no evidence that wildlife was killed or habitats.

The Senator claimed that 80% of Australians were opposed to further logging of natural forests. The regional forest agreements locked the people and conservation interests out of the process and were not being followed anyway. In some States 99% of the trees taken from natural forests were processed into woodchips and exported to Japan where they were used for making paper products

that wound up in the rubbish dumps of the world. The logging industry was laying off people because of increased mechanisation, while jobs were opening up in the plantation forestry and tourism industries. Industry and government had accrued a total debt of AUD500 million from the logging activities. Australia was thus paying to have its native forests removed, so it could not be claimed to be either socially or economically sustainable and it certainly was not ecologically sustainable.

Both agreed the solution was to take all of Australia's wood needs from Forest Plantations. Although 75% of the country's wood requirements are now met from Forest Plantations, the Minister was adamant that Australia could not afford to stop clearing its native forests because Australia needed the wood for domestic purposes and foreign credit.

ABC broadcast another programme, the same evening, on the development of the oil shale industry in Queensland (described earlier). The massive Canadian/Australian mining project, producing the dirtiest form of petroleum known and contributing about 1.5 times more greenhouse gas emissions than oil wells, has substantial subsidies and tax incentives from Government. It has already been granted mining rights that extend offshore into the Great Barrier Reef World Heritage Area. The industry representatives were confident they would be able to counter the greenhouse emissions by planting trees and assured the public that they could extract the oil shale, process and ship it, without harming the environment or the Great Barrier Reef. Conservationists did not believe them.

If a large, wealthy, and educated nation like Australia is unable to afford protecting its native forests, how can PNG, the Solomon Islands or Vanuatu do it? If the leaders of Australia, with highly qualified scientific and legal advisors are unable to negotiate a way across the thin green line to sustainability, how much more of a challenge is it for Pacific island leaders?

SPREP is the de facto regional organisation that must, somehow, help the Pacific island countries make it over the thin green line, but how? Even for SPREP, money and physical development come first and are the real issues. Without money to pay for salaries and programmes and without physical offices and facilities, SPREP would not exist.

This is a critical point. SPREP is not supposed to be based on a rapidly growing physical entity dependent on a steady flow of cash from the United Nations and other donors. The South Pacific Regional Environment Programme was intended as a concept, an idea, a strategy, to nurture a sensitivity to the fragile island ecosystems and a commitment to long term sustainability of these ecosystems, and to the culture and peoples who depend on them.

SPREP must, to succeed, be a common understanding threading through the plans and actions of all sectors of government and all the people of the South Pacific. Yet, for the moment, SPREP lacks the co-operative flavour of, for example, the Pacific Island Forests and Trees Support Programme. It also lacks the subtle approach with line ministries evidenced, for example, by the SPC marine resources programme. But SPREP, at 17, is only a teenager, not much older than many of its member countries. Just as the small Pacific island nation governments are learning the benefits of co-operation with the civil community rather than co-ordination of the civil community, SPREP is maturing towards a true democratic process for sustainability. But, as yet, neither SPREP nor its member countries have managed to whole-heartedly come down off their colonialist foundations.

In summary, the general consensus by people on both sides of the thin green line is that physical organization and a flow of cash is a prerequisite to sustainability. Correcting the inverse error of this consensus is the most difficult challenge for environmental management in the Pacific sub-region.

2. *Environmental isolationism*

SPREP is now an independent organization in Apia, Samoa. SPREP's 1997-2000 Action Plan states:

"The vision for SPREP is a community of Pacific island countries and territories with the capacity and commitment to implement programmes for environmental management and conservation. This SPREP community shares responsibility for implementation of the Action Plan, facilitated by its Secretariat. The Secretariat also co-ordinates regional initiatives and supports country participation in regional and international agreements, and action programmes to protect the environment."

Contrast the SPREP vision with the South Pacific Forum vision (Box 14.19 Forum Vision). In the Forum Vision the Secretariat is mentioned once, at the end, briefly and supportive to its members' wishes. It is a vision for mutual co-operation, not for co-ordination.

SPREP's "Guiding Principles" in the Action Plan include:

"The Secretariat will work through governments, existing institutions and expertise in the region, and in co-operation with appropriate regional bodies and mechanisms, such as the South Pacific Organisations Coordinating Committee (SPOCC) and the Forum Secretariat's Regional Strategy, to promote co-ordination and remove duplication of effort."

Unfortunately, SPREP's vision and operational emphasis is on the last few words "to promote co-ordination and remove duplication of effort" rather than co-operation with other organisations. Notice that the word "co-operation" does not appear in the SPREP Vision. Environmental programs that are not funded through SPREP, and co-ordinated by SPREP, are generally ignored by SPREP. The organization seldom taps the extensive resources of other Regional organizations to carry out its own programmes.

The South Pacific Applied Geoscience Commission (SOPAC), for example, has many capabilities that could contribute to the SPREP programme and the two organizations often carry out similar projects. In 1997, SPREP co-ordinated a GEF funded programme to develop a Strategic Action Programme for International Waters of the Pacific region. A Regional Task Force to prepare the Strategic Action Programme included representatives from 5 Pacific island countries, the South Pacific Organisations Coordinating Committee; private sector; non-government organizations, the World Bank, UNEP and UNDP. The resulting SAP had a fresh water action plan that was of great interest to SOPAC's Water Resources Unit. SPREP used the SAP as a proposal to obtain USD12 million in funding from the GEF. SPREP administers how the funds are spent. SOPAC's Water Resources Unit has not been invited to participate in the execution of the programme despite its acknowledged capability in all aspects of fresh water development. In fact, funding problems have required that SOPAC reduce its staff of qualified water engineers despite growing fresh water problems throughout the region.

SOPAC developed, at the request of the South Pacific Forum, an Environmental Vulnerability Index to assist donor countries in establishing priorities for environmental funding. But during a 1998 meeting to prepare materials for the State of Environment Report for the South Pacific that will be used to help donors target funding priorities, SPREP decided not to include the Environmental Vulnerability Index.

SOPAC's Disaster Reduction Unit prepares countries for disasters and has a GIS database on low lying urban areas subject to flooding. SPREP's Climate Change Programme also examines potential areas of flooding and storm damage from global warming, but makes no use of the SOPAC's GIS or expertise.

SPREP undertakes Coastal Zone Management without enlisting active integration with the SPC's Coastal Fisheries Programme, Integrated Coastal

Fisheries Management Project or the Pacific Regional Marine Resources Development Programme. SPREP does not actively participate in the Regional Forest and Tree Support Programme, even though SPREP made a determined effort to acquire it because of its many overlapping areas of interest.

SPREP's Environment Newsletter, originally intended to inform Pacific islanders about important news on environmental issues, only reports on SPREP's own programmes. Other regional newsletters, such as the Regional Forest and Tree Support Programme Newsletter and the SPC Fisheries Newsletter, are oriented towards all relevant activities in the Region and seldom, if ever, applaud their own efforts.

SPREP repeatedly points to the importance of Environmental NGOs in the Region but although Greenpeace, The Nature Conservancy and WWF have contributed to SPREP, SPREP seldom provides financial contributions to NGOs beyond paying travel for some NGO personnel to attend SPREP conferences. While SPREP itself does not often contribute directly to NGOs, SPREP does encourage its member governments to form partnerships with NGOs.

Environmental NGOs also tend to be isolationist, deliberately segregating themselves in opposition to industry and government. For example the battle between conservationists and Government subsidised logging went on for 40 years in New Zealand and has gone on for 30 years in Australia. Environmental NGOs form co-ordinating associations, such as the Pacific Island Association of Non Government Organizations (PIANGO) or national NGO associations such as the Environment and Conservation Organisations of New Zealand (ECO) that co-ordinates New Zealand's 400 environmental NGOs. But NGOs seldom collaborate on common projects. International NGOs like WWF, Greenpeace, the Foundation of the Peoples of the South Pacific International and The Nature Conservancy collaborate with the International Union for the Conservation of Nature (IUCN) on global issues and each international organisation establishes partnerships with its own network of national NGOs to work on common projects.

3. Isolationist tactics can bring the desired results

Despite, or perhaps because of, the opposition policy of the environmental organisations in the Pacific island region, they have had a profound impact on government and civil awareness of environmental issues. Without a staged demonstration by 6,000 people in Perth, for example, there would have been no ABC Television interview of logging practices that evening. As a result, government policies and attitudes have improved, even if actual changes in behaviour are slow to follow.

Within the past decade, Agriculture, Forestry and Fisheries agencies have done a complete about-face on the need to form and implement environmental policies. Government Fisheries, Forestry, Agriculture and even Mining departments are taking up decentralised sustainable management of resources and downsizing their former colonialist extractive policies. Development assistance programmes have also re-oriented towards sustainable management and moved to assist in this process. For example, the total budget for environment management assistance programmes operating in the small Pacific islands as of January 1999 was more than USD228 million –excluding NGO expenditures or SPREP's ongoing budget of about USD7 to 8 million a year.

National line ministries, sometimes through regional organisations are implementing the projects. They include programmes like urban infrastructure development in Vanuatu and Tonga at USD10 million each, Sanitation Master Plan for Port Vila at USD10 million, Sanitation and Water in Kiribati for USD12 million, Sustainable fisheries ECU15.4 million, Sustainable Agriculture and plant protection

ECU19.8 million. These are, for the most part, practical engineering oriented programmes to improve environmental and social conditions in the Pacific islands.

In discussing the decision to place the Pacific Islands Forests and Trees Support Programme with the SPC and not SPREP, the head of a national sustainable forestry programme said, "Thank God for that." When asked to clarify the statement, he said, "Because SPREP's programmes are always up in the air, not real. Forestry programmes have to be on the ground, understandable to people in the village. SPREP programmes are words in meetings, not trees in the forest." Which may mean SPREP has talked the opposition into submission.

B. EMERGING ENVIRONMENTAL CHALLENGES

1. Emerging Issues

A summary of emerging issues prepared by the GEO2 preparation team are:

- Population control
- coastal protection
- sustainable tourism
- waste management
- drinking water
- energy
- climate change
- backlash on environmental programmes
- invasive foreign species
- impacts of environmental degradation on human health
- intellectual property right and traditional knowledge
- maintaining protected areas
- land security
- conflicts between economic development and traditional resource ownership
- technical issues
- economic reform
- coastal and marine development
- food security
- freshwater and energy
- integration of environment into consideration of development policies
- carbon dioxide offsets
- deep sea bed mining

Other issues are the development of skills in forming partnerships and links between all levels of society, and the willing duplication of effort to merge human behaviour with the needs of the ecosystems that support life on earth.

2. Time for work

While conferences and meetings have played an essential role in facilitating environmental awareness in the Pacific islands, they are expensive and take up a surprising amount of everyone's time. For example, between 12 May 1995 and 21 July 1995 there were at least 17 major regional and international meetings on environmental issues, with attendance taking up 50% of the days in any of the months, with many of them overlapping days. There is concern in the region that these expensive and time consuming meetings are overdone. They take key people

away from their normal activities and result in few observable changes in environmental conditions.

3. *A World Wide conference every day.*

The continued spread and improvement of Internet allows rapid dissemination of information and interactive communication between scientists and environmental workers at very low cost. Mechanisms for teamwork and conferencing over the net may soon result in fewer international and regional traditional conferences. Computer conferences via Internet are now highly interactive and include the capability for different participants to write or draw on a common screen, speak directly to each other and even see each other. Internet conferences have many advantages - such as:

- Instant availability of specific papers, downloaded directly into computers and thus available for responsive use.
- Electronic voting that can be tallied, summed up and reported anonymously and instantly.
- Increased participation by people who might be shy speaking out in a major meeting.
- Development of reference libraries and databases available on-line at any time.
- Periodic follow-up committee meetings without travel or significant communications costs and access of other conference members to the committee workings at any time, day or night.
- Huge savings in travel costs, time, and associated expenses.

On the other hand, the ease of communication with email has also resulted in an increased flow of messages that need to be answered. Until participants work out how to streamline their electronic communications and make them more efficient, email will require an increasing amount of time for most managerial staff. Management staff that are unwilling to acquire computer skills will be increasingly left behind unless they have assistants to facilitate their communications for them. This constraint is vanishing as computers and communication software packages become easier to use. Advances in voice recognition may even eliminate the need for keyboard skills within a few years.

4. *The sustainability of environmental units and of SPREP*

Environmental units, and SPREP, are unsustainable without foreign aid. They will probably be reduced in size, if not eliminated, as environmental considerations become integrated into daily operations of individuals, industry and government. SPREP's Action Plan states that the member governments would like "to see the SPREP Secretariat as a lean organisation, appropriate to the region's culture and economic circumstances and embodying modern management principles." If SPREP can succeed in its objectives, it may not be needed at all in 50 years.

V. CONCLUSION

The Ocean Hemisphere of the planet plays a critical role in the biogeography of our world. The major environmental issues facing the Pacific sub-region originate in the land hemisphere and are caused by greenhouse emissions, ozone destroying chemicals, intractable wastes, and inconsiderate trade practices. Local environmental problems stem from the 60 year effort to tune the island governments to the global industrial ethos through job creation and economic development. These efforts have resulted in an assortment of unsustainable activities including urbanisation, unsustainable commercial agricultural practices, wide spread liquidation of natural forests for foreign exchange, mining without safeguards to waterways or

soil needs, commercial fishing using destructive but efficient methods, and pollution of drinking supplies and coastal waters by sewage and agricultural chemicals. These abuses lower the capacity of the island ecosystems to maintain human resilience and amplify the complications induced by overzealous sexual endeavours.

The 22 nations of the South Pacific co-operate on the sub-regional level, on three major environmental issues; (i) Condemnation of the nations of the land hemisphere for the poverty of action on reducing CO₂ emissions; (ii) Prevention of the use of their islands as a global dump for toxic or hazardous wastes; (iii) Regulation of high seas fisheries by fishing fleets from the land hemisphere.

The focus for this successful co-operation is the common protection of the island countries against environmental threats by outsiders.

The national governments in the Pacific sub-region are considerably less dynamic and co-operative when it comes to changing their own unsustainable activities. In fact, with the exception of Australia and New Zealand, almost all of the environmental programmes in the Pacific sub-region are international initiatives; conceived, funded and managed by foreign organisations.

The South Pacific Regional Environment Programme (SPREP) has played the central co-ordinating role on environmental issues for the small Pacific island countries since 1982. It's main contributions have been; (i) assistance with the creation of environmental units and national environmental management strategies in national governments; (ii) formation of international agreements for conservation of nature; (iii) assistance with the creation and maintenance of (17) community based conservation areas; and (iv) an enormous increase in environmental awareness in both the government and civil sectors of all Pacific island countries.

SPREP has been good at coaxing the member nations into signing international agreements. The aim was to generate commitments from the National Governments during regional meetings that would result in later enactment of legislation and National action to meet the requirements of the agreements. For example, Australia has enacted a new law to meet the demands of each international agreement (Box 14.20 Australia Laws). Unfortunately, this strategy has not been very successful as the Pacific island governments have been slow to follow their leaders' conference enthusiasm by ratification and action.

The major accomplishments of National Governments include; (i) decentralising responsibility and authority for environmental management; (ii) forming partnerships with NGOs; (iii) stressing environmental sustainability in plans and government policies; (iv) support for community run conservation areas and reserves; (v) recognition of community resource rights; (vi) understanding (if not strengthening) the links between environment, economic and social development.

The regional successful environmental management programmes demonstrate co-operation is more critical than co-ordination in progress towards sustainable development. The goal of co-ordination is avoidance of duplication of effort, the goal of environmental programmes is to have as many people and agencies as possible engaged in duplication of effort within a set of guiding principles. These guiding principles are not, themselves, decisions but rather ways to approach the decision making process. For instance, all levels of government and civil society need to think about and practise ways to reduce, recycle and responsibly dispose of their waste products.

SPREP realises that co-operation is the key to success, but when SPREP began, the line ministries and the other regional organisations were not inclined to co-operate because SPREP's concepts of EIA and co-ordination created threats to the sovereign right of ministers and directors to make all the decisions for their ministries.

With the exception of the Ministry of Education, which regularly benefits from SPREP environmental materials, the line ministries of the Pacific islands still do not co-operate proactively with SPREP or the national environmental units. The resource

sectors are, however, initiating their own environmental management initiatives as a result of pressures from donor organisations and environmental organisations (Government and Non-Government).

This still leaves the idea of environmental networking within the whole government, or integrated coastal management, without any evident support. The SOPAC strategy, of getting the line ministries using GIS systems for practical day to day management and then networking the maps to form a Whole Island Management system is a more likely approach.

In future, it will be important to establish and improve co-operation and minimise co-ordination for progress towards sustainable development. Co-ordination of a programme is always easier and faster without having to co-operate with other programmes. It may be the only path if ready and willing partners are not available. It is not clear if SPREP will be able to revise its operational inclinations from co-ordination to co-operation, but it is clear that the ministries and other regional organizations are unlikely to co-operate with environment units, laws, or conventions that co-opt their own decision making processes.

Including environmental considerations into all human activities is essentially a planning exercise. Planning departments suffer many of the same problems as environmental units. They are often small and complain of lack of funds and staff, insufficient valid data, and poor co-operation from either ministers or politicians (Lavea 1996). Planning agencies in the Pacific islands are also oriented towards obtaining foreign aid and most country plans were, in fact, more useful to aid donors than the national governments. But planning departments are integrated into the national decision making processes, while environmental planners are not. Merging environment units into the existing central planning agencies would help bring all aspects of sustainable development into focus.

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