Country Report for UNCED

Cook Islands

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Apia, Western Samoa

NATIONAL REPORT

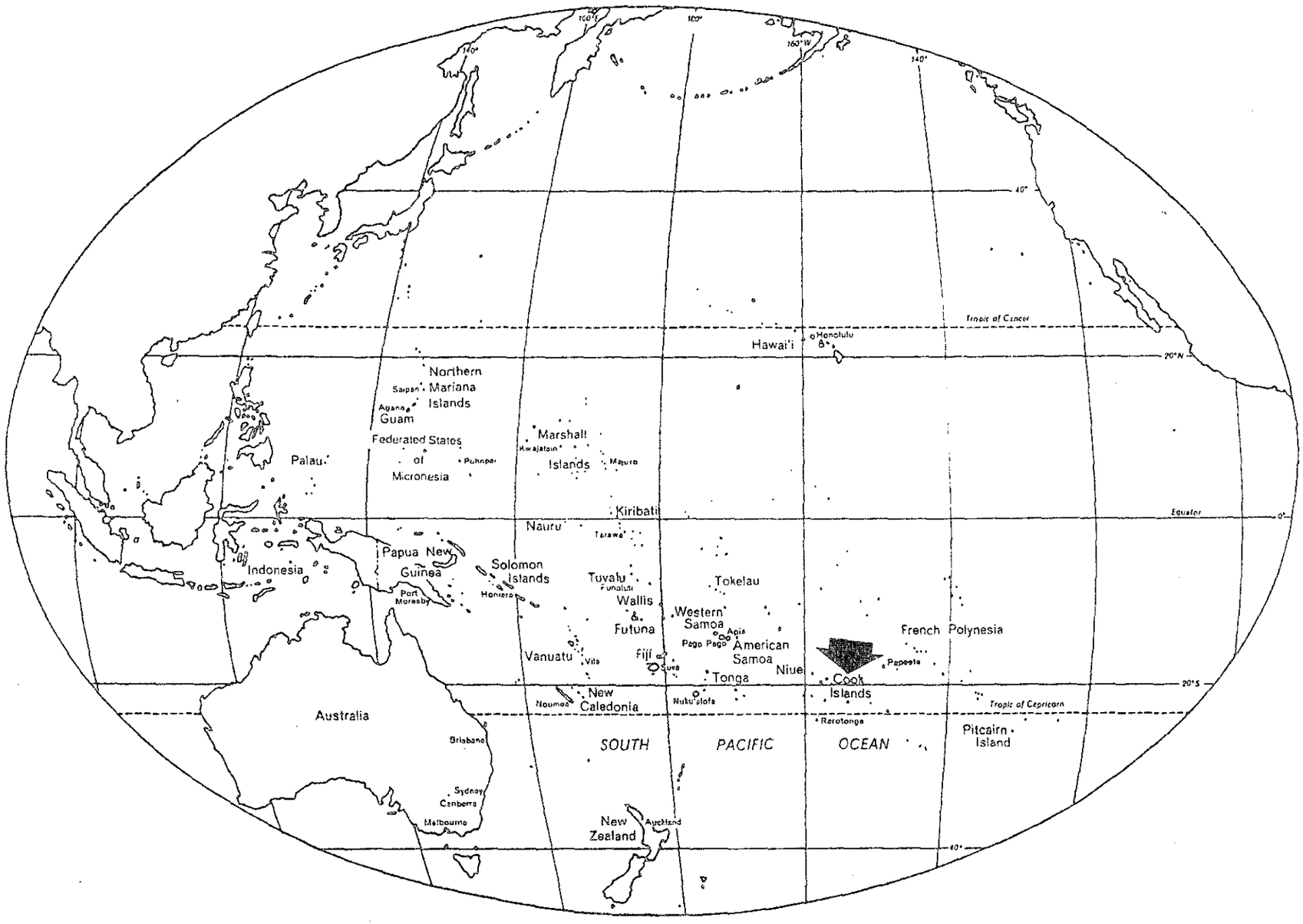
OF THE

COOK ISLANDS

TO THE

UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT

October 1991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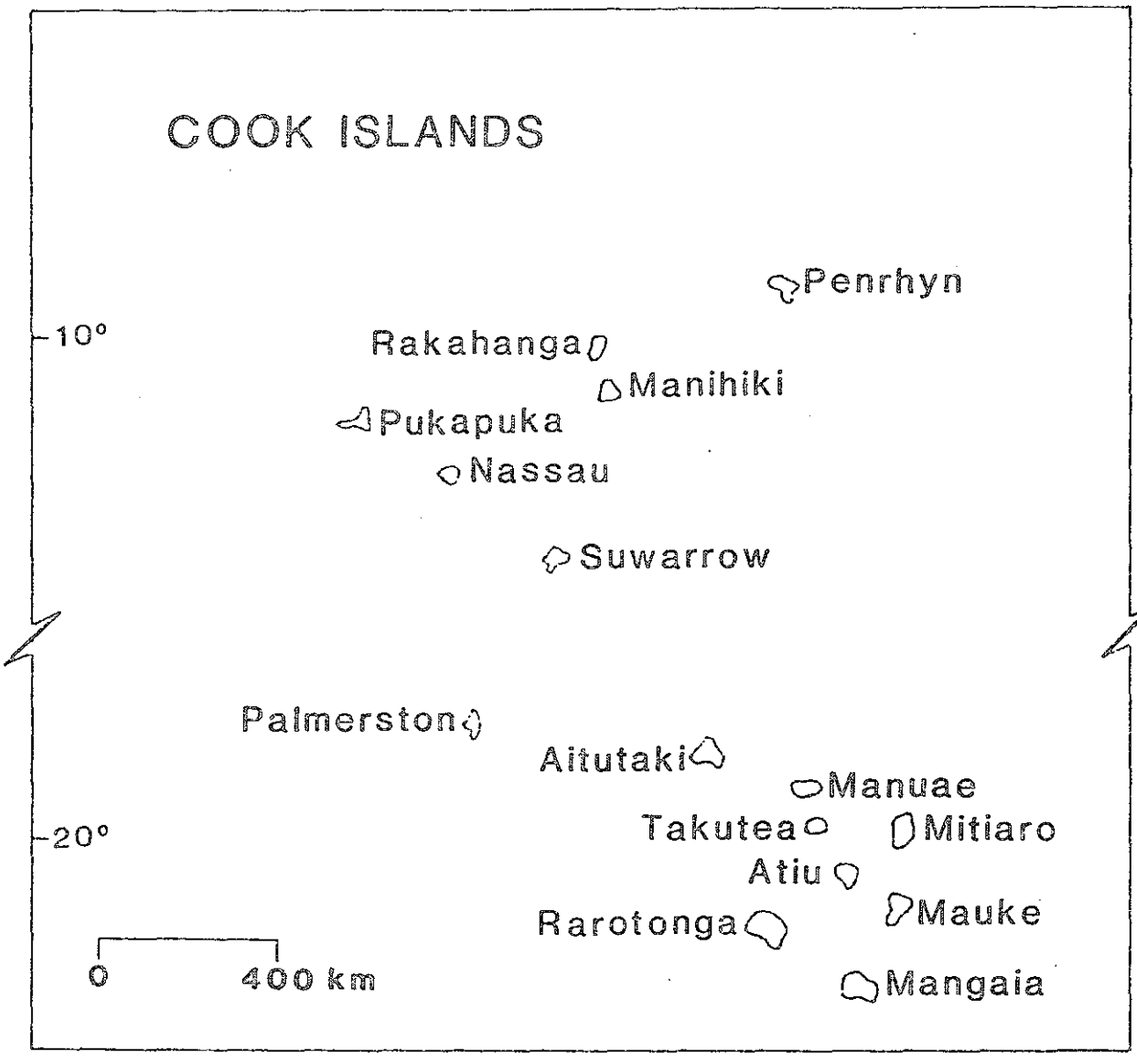
COOK ISLANDS
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Pukapuka
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Suwarrow
Palmerston
Aitutaki
Manuae
Takutea
Mitiaro
20°
Atiu
Mauke
Rarotonga
0
400 km
Mangaia

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ABBREVIATIONS

ADB	Asian Development Bank
AIDAB	Australian International Development Assistance Bureau
ANPWS	Australian National Parks and Wildlife Service
ASPEI	Association of South Pacific Environment Institutions
BDDP	British Development Division in the Pacific (UK/ODA)
CICS	Cook Islands Conservation Service
CIG	Cook Islands Government
CSIRO	Commonwealth Scientific and Industrial Research Organisation, Australia
CETC	Community Education Training Centre SPC
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
DSIR	Department of Scientific and Industrial Research, New Zealand
DTCD	Department of Technical Co-operation & Development, UN
DTLT	Department of Trade, Labour and Transport (CIG)
EC	European Community
EIA	environmental impact assessment
EMA	environmental monitoring and assessment
EMP	environment management plan
EMS	environment management strategies
EPOC	ESCAP Pacific Operations Centre, Vanuatu
ESCAP	Economic and Social Commission for Asia and the Pacific
ESS	environment sector strategies
FAO	Food and Agriculture Organisation, UN
FFA	Forum Fisheries Agency, SPF
FSPI	The Foundation for the Peoples of the South Pacific,International
GAW	Global Atmosphere Watch
GDP	gross domestic product
GEMS	Global Environment Monitoring System, UNEP
GIS	geographic information system
GLOSS	Global Sealevel Observing System
GNP	gross national product
GRID	Global Resource Information Database, UNEP/GEMS
ICOD	International Centre for Ocean Development
IFAD	International Fund for Agricultural Development
IFREMER	Institut Francais de Recherche pour l'Exploitation de la Mer
IGOSS	Integrated Global ocean Services System
ILO	International Labor Organisation
IMR	Institute of Marine Resources, USP
INR	Institute of Natural Resources, USP
IUCN	International Union for Conservation of Nature and Natural Resources
JICA	Japanese International Co-operation Agency
LATICAL	Laboratoire de Traitement d'Images Caledonien, ORSTOM
MOPED	Ministry of Planning and Economic Development (CIG)
NES	National Emergency Services
NGO	non-government organisation
NOAA	National Oceanic and Atmospheric Administration, US
NWFC	National Weather Forecasting Centre (Fiji)
ORSTOM	Institut Francais de Recherche Scientifique pour le Developpement en Cooperation, (Noumea)
PIDCs	Pacific Island Developing Countries
PNG	Papua New Guinea

RETA	Regional Environment Technical Assistance Project [national environment management strategies] (ADB)
RRA	rapid rural appraisal
SOPAC	South Pacific Applied Geoscience Commission
SPACHEE	South Pacific Action Committee on the Human Environment and Ecology
SPC	South Pacific Commission, Noumea, New Caledonia
SPF	South Pacific Forum, Suva, Fiji
SPREP	South Pacific Regional Environment Programme, SPC
TA	technical assistance
TNC	The Nature Conservancy, US
TOGA	Tropical Ocean Global Atmosphere
UFP	Universite Francaise du Pacifique
UG	University of Guam
UH	University of Hawaii
UN	United Nations
UNDP	United Nations Development Programme (W. Samoa, Fiji, PNG)
UNEP	United Nations Environment Programme (Nairobi)
UNITAR	United Nations Institute for Training and Research, (Geneva)
UNITECH	University of Technology, Lae, PNG
UPNG	University of Papua New Guinea, Port Moresby
USAID	United States Agency for International Development
USEPA	United States Environmental Protection Agency
USP	University of the South Pacific
WCU	World Conservation Union
WHO	World Health Organisation, UN
WMO	World Meteorological Organisation, UN
WWF	World Wide Fund for Nature
WWW	World Weather Watch

1. EXECUTIVE SUMMARY

Cook Islands comprises 15 islands with a total land area of 237 sq km, scattered over some 1.8 million sq km of the central South Pacific. They are grouped geographically into a Northern Group of low atolls --Penrhyn, Manihiki, Rakahanga, Pukapuka, and Suwarrow-- plus the sand cay of Nassau; and a Southern Group of volcanic islands --Mangaia, Rarotonga, Atiu, Mauke, Mitiaro, and Aitutaki-- plus the atoll of Palmerston and the sand cays of Manuae and Takutea. The Southern Group comprises 89 per cent of the total land area. Four of the southern volcanic islands have a coastal rim of uplifted fossil coral reef (or makatea). Rarotonga, the largest island of 67.1 sq km with 54 per cent of the total population of about 18,500 is a strongly dissected volcanic island rising to 652 metres above sea level.

Average rainfall varies from 1300-2800 mm per year with a 2012 mm annual average for Rarotonga. There is a summer maximum and winter minimum distribution. The mean annual temperature is 24o C with little seasonal variation. The Cook Islands lies in the cyclone belt, the last major cyclone being 'Sally' in January 1987.

The soils of the volcanic islands are fertile, supporting a wide range of crops; on these islands there is no shortage of good quality drinking water. On the outer atoll islands, the soils are inherently quite infertile and crop production is limited to those which can grow in the coarse, coral-derived soils with excessive drainage; drinking water there is at a premium and is supplied mainly from stored rainwater.

Significant sea-bed deposits of manganese and cobalt occur although commercial viability is not proven; there are no hydrocarbons.

Vegetation formations vary from montane rainforest on Rarotonga, through lowland limestone rainforest on Mauke, beach forest on atolls and reef islets, to scrub and grassland formations. The lowland rainforest has been almost entirely destroyed but upland forest on Rarotonga above 250 metres remains intact.

The islands are remotely located on a biological diversity gradient which decreases eastwards into the Pacific and southwards away from the equator with an impoverished flora and fauna. Endemism also is low with only six land birds endemic to the Cook Islands, Palmerston Is. and the northern atolls are significant common nesting areas for green turtle; coconut crab is common in Takutea and Suwarrow.

ECONOMIC TRENDS

The economy is characterised by considerable external support from New Zealand (including budgetary support), increasing financial assistance from bilateral and multilateral sources, and continuing high levels of remittances from family members working overseas. Tourism is the top foreign exchange earner, followed by offshore merchant banking. Imports of NZ$ 83 million in 1990 were ten times the value of exports. GDP grew at an average 8.2 per cent over the 1983-86 period to about NZ$ 77.4 million in 1987. Government revenue was about NZ$ 60 million in 1990, an increase of NZ$ 5 million over 1989. Taxes provide about 41 per cent of this with a further 10 per cent derived from customs duties. Total government expenditure in 1990 was NZ$ 60.1 million (i.e. a budget close to balance). Expenditure on the Conservation Service in 1990 was NZ$ 136,000, representing less than one-quarter on one per cent of total expenditure; nevertheless this figure represents a four-fold increase over funding for the three preceding years.

The Cook Islands' infrastructure is inadequate particularly in the area of inter-island transport and shipping facilities to foreign markets. Local revenue is quite inadequate to fund recurrent expenditure costs for infrastructure maintenance and consequently the expected life from the infrastructure investment is less than expected.

Agriculture remains the main activity of the Cook Islands, with 85 per cent of households reported as agriculturally 'active', and of whom 79 per cent crop on a subsistence basis. Agricultural activity in 1988 was confined to 11 per cent of the land area, (although more than 30 per cent is considered arable) made up of many

small parcels, the average size of which is 0.9 ha. Agricultural production mainly comprises small-scale horticultural production of fruit and vegetables for both domestic and export markets; livestock comprises mostly pigs and chickens but also some goats together with a few horses and cattle.

The agricultural sector has been contracting due to high input costs, inadequate collection and distribution systems, high external transport costs and fluctuating product quality on the export market. Until recently, the main export crops were bananas on Aitutaki; pineapple on Atiu and Mangaia; vegetables and root crops from Mauke and Rarotonga, and pawpaw, citrus and other fruit from Rarotonga. The pineapple industry is now defunct, and copra, once the major export earner, ceased production in the Northern Group in 1987 (due mainly to the depressed world market price). Banana exports from Aitutaki have also ceased; citrus continues to be produced on Rarotonga but only for the local market. Export pawpaw production remains high, and beans, eggplant and chilli also provide a favourable net farmgate return. It should also be noted that while cash crop exports have declined markedly, there appears to have a significant rise in the value of produce sold on the local market.

Marine resources provide a significant portion of the country's protein requirements, mostly sourced from lagoons and fringing reefs; on Rarotonga, the lagoon and reef are overfished. Offshore however, exploitation is far below the estimated level of sustainable yield. Only 8-12 people are totally dependent on commercial fishing with about 40 part-time commercial fishermen (offshore and inshore). The local market in Rarotonga is grossly under-supplied and the expansion of fishing activity must receive even higher priority if the expectations of the increasing numbers of tourists for fresh seafood are to be satisfied.

Tourism is the current outstanding area of economic activity, worth about NZ$30 million to the economy in 1990 from 30,000 visitors. Undoubtedly the significance of the tourism industry as an earner of foreign exchange will continue to grow providing the special ambience of the Cook Islands which attracts the tourist is not marred in any significant way.

Manufacturing makes only a small economic contribution as yet, but there has been increasing attention to the development of light industry on Rarotonga, with clothing and footwear manufacture having been significant export earners (although this may be contracting). There is a continuing thriving cottage industry producing artifacts for local sale to visitors.

DEMOGRAPHIC TRENDS

Cook Islands' population is estimated at 18,500, with about 13 per cent in the Northern Group and 87 per cent in the Southern Group, 56 per cent of whom were living on Rarotonga. The people are Maori and share with French Polynesia and New Zealand a bond of history and culture. The natural growth rate averaging 1.9 per cent per year is moderate by Pacific standards. This rate is tempered further by continued emigration, (mainly to New Zealand) of about 0.6 per cent annually to give a net annual growth rate of 1.3 per cent.

Unemployment was 5.8 per cent in 1986 (the last census) and is not considered a major social issue in the Cook Islands, although reduced employment opportunities overseas for young adults may swell the ranks of unemployed within Cook Islands. Employment in Rarotonga is heavily weighted towards the Public Service and other community services, and to the tourism trade.

ENVIRONMENTAL ISSUES

Climate change: The possible rise in sea-level predicted as a consequence of global warming is of particular concern to the northern atolls; the most pessimistic predictions would see their disappearance. Even with the cautious projections of the Intergovernmental Panel on Climate Change of between 30 and 100 cm by the end of the 22nd century, the impact on most atolls would be severe, with a likely loss of scarce freshwater resources in the lens underlying the larger islets and accelerated coastal erosion.

Land availability: Most of the land is in the hands of the people. In colonial times, land title became extremely fragmented, with occupation rights granted to one or more individual co-owners of a title. The sale of land is

prohibited and the only transfers permitted, other than inheritance, are by lease and occupation rights. Multiple ownership is so complex that many urban workers cannot obtain leases or occupation rights. These complex tenurial arrangements also make it more difficult to impose land-use controls than would be the case if land was held under simple title. But, as land use controls were devised by the people in the first place, there is no insurmountable bar to comprehensive physical planning and the imposition of controls through the process of consultation and cooperation.

Soil erosion: Accelerated soil erosion is a direct consequence of poor land management, although in one sense it is related first to the land tenure situation where, depending on the multiple-ownership and occupation arrangements, some land is intensively cultivated continually, while other land is not used or under-used. Soil erosion is mainly a result of poor tillage and crop management practices; but the improper use of heavy machinery for road-works and site clearing is also a major contributor. On Mangaia, pineapple plantations were planted on quite steep fernland slopes on highly erosive soils, the rows running straight up and down the slope. Massive, spectacular gully erosion has resulted in some locations. Severe sheet, rill and gully erosion have also occurred on the unfarmed fernlands which have frequently been denuded by fire. There is a similar picture on Atiu. The erosion on Mangaia and Atiu has had a serious effect on the production of the staple crop, taro. The increased surface water runoff has caused the stream beds to be lowered preventing irrigation water being taken off for the upper levels of the taro swamps; while sediment has blocked the swamp drainage outlets, causing the lower levels to flood.

Agricultural chemicals: The misuse of fertilisers and particularly of biocides constitutes a significant area of concern. The real magnitude of the problem though is unknown as there are few data. There is no regular monitoring system for chemical residues in soil and plants at the production end of the spectrum, nor of toxins and chemical residues in meat, seafood, vegetables and fruit at the consumption end.

Water supply and quality: Programmes have been under way for some years to increase storage of rainwater in the northern atolls, with the objective of providing ferro-cement tanks of 5000 litre capacity to each dwelling and 50,000 litre community storage tanks with larger public buildings. The wastage of water is of particular concern. Many domestic tanks are in poor condition and leak, and/or taps drip. Tank size is frequently too small for the household size, a minimum of 10,000 litres being needed for the average family to tide them over the usual 3-4 months dry season.

The volcanic islands of the Southern Group are well endowed with good quality drinking water, and Rarotonga has an excellent system of stream intakes and galleries which are now being upgraded by the construction of filter intakes. These intakes feed directly into the reticulation system. There is a water quality monitoring programme of both groundwater and surface water on Rarotonga, but in the Outer Islands only occasional tests are performed.

Coastal degradation: Degradation of the coastal zone and extensive loss of land is a major problem in Cook Islands, most notably on Rarotonga, and to a lesser extent on Aitutaki. Contributing significantly to environmental degradation have been: the development of infrastructure and the construction of houses on the foreshore; the construction of badly designed, wave-deflecting, retaining walls on Rarotonga; beach mining; erosion from inland gardens and other devegetated areas; soil and water pollution from agricultural and industrial chemicals; and litter. Volcanic silt washed down from poorly implemented development in the river valleys into the lagoons over the past 50 years and on to the fringing reef has badly affected lagoon productivity. The acidity and clogging nature of the sediment kills the coral, the basis of the entire coastal ecosystem. Concern for a diminishing tourist asset as a result of beach mining points to an urgent need for the development of alternative sources of construction material. In the meantime the practice continues.

Overharvest of marine resources: Over-harvesting of shellfish (eg paua) and crustacea is a recognised problem. The Local Island Councils, together with the Government, have been taking positive counter-steps to reduce over-harvesting of shellfish species through regulatory measures which are enforced. For example, the initial unsustainable harvesting of trochus shell (which was introduced to Aitutaki in 1957) has been curbed by controls on minimum size and restriction of harvest to one or more specified days per year.

Pearl shell is a valuable resource in the Northern Group and there is strong interest in the cultivation of

blacklipped pearl oyster, with a programme of artificial cultivation initiated in the Manihiki lagoon and with possible extension to Penrhyn and Suwarrow. The main environmental concern is for over-harvesting and, in Manihiki, also for lagoon pollution which may in future affect pearl cultivation.

Marine oil pollution: There have been no major spills in the past ten years; this is fortuitous as the Cook Islands has very little capacity itself to apply counter-measures, and would need to rely on external assistance.

Protected areas and conservation of biological diversity: The present protected area system comprises a single site, the 0.4 sq km uninhabited Suwarrow National Park, covering less than 0.1 per cent of the total land area. This leaves unprotected a number of important ecosystems, including various forest formations, closed lagoons and fringing reefs. The progressive loss of habitat has severely reduced the range of a number of endemics. Introduced plants and animals may also pose a particular danger to native and endemic species. Thus, for example, the Kakerori is endangered by both habitat loss and introduced rats (although man represents the biggest threat). A number of recommendations have been made over the years for the establishment of marine and terrestrial protected areas, but attempts to implement them have met with limited success to date, although the recent involvement by land owners in protected area planning. is a promising sign.

Solid waste: Rarotonga has a problem of acquiring suitable land for garbage disposal due to ownership constraints; the two operating dumps are in swampy, former taro gardens behind the foreshore zone where the owners of the land see garbage disposal as a means of site reclamation for real estate purposes. An effort is made at dump management with separation of solid wastes, but split departmental responsibilities fragment effort. Daytime management is also defeated to some extent by night-time phantom dumpers of all sorts of rubbish. Drainage is blocked, water ponds and provides a breeding ground for mosquitoes. Other unauthorised garbage dumps develop in areas where sand pits have been left from previous mining for building construction. On other islands, rubbish is dumped in any convenient location; an exception is Mauke which has a well managed dump.

The disposal of waste on Manihiki from cleaning pearl shell is a particular problem; this organic waste is dumped, along with other kitchen and household refuse, into the lagoon. Toilets also discharge directly into the lagoon. Thus there is concern that the pollution may constitute a real threat to the newly established black pearl culture in the Manihiki lagoon.

Sewage: Sewage disposal is seen as a problem only on Rarotonga. However, the extent of the problem and the possibility of similar problems with the disposal of human waste elsewhere, is not known. The environmental and health consequences of the practice of spreading septic tank sludge over orchard lands as fertiliser has also received recent attention. That a problem may exist in some areas of Rarotonga is suggested by the occurrence of algal growth on coastal rocks and in some stream sections, pointing to nutrient rich waters. Agricultural chemicals may also contribute.

RESPONSES TO ENVIRONMENT ISSUES

Cook Islands Conservation Service: The establishment of the CICS is of itself a measure of the response of the Government to national environmental concerns. The CICS currently has a staff of 9, of whom 7 are based on Rarotonga. With the localisation of the Director's position in May 1990, all CICS staff are Cook Islanders. The CICS budget is very limited, especially for recurrent operational funds; but so is every other government instrumentality. The CICS has requested the assistance of SPREP for the conduct of 17 projects. The current work programme has four elements: Foreshore; Wildlife; Public awareness; and Cultural conservation.

Foreshore: Work effort is focussed on Rarotonga. However, the effort has been ad hoc in nature, with much of the business of the Conservation Council directed to wards applications for activities or development in the Foreshore Zones.

Wildlife: A species recovery programme has been operating successfully for the highly endangered Kakerori. Another endangered species is the Mangaian kingfisher; while the Tahitian lorikeet, Atiu swiftlet, and Rarotonga starling are considered species at risk. The most easterly known occurrences of the Tongan flying fox also are

found in the Cook Islands but while populations are believed to be declining (due to over-harvest), no hard data are available. Baseline wildlife studies have been completed on Suwarrow and Takutea islands.

Public awareness: The CICS has endeavoured to raise the level of public awareness of environmental issues through a number of initiatives, including print, radio, television and videos. A television documentary on wildlife of the Cook Islands has been produced with the New Zealand Wildlife Unit.

Cultural conservation: Maori traditional medicine uses many local herbs for effecting cures for a wide range of sickness. These traditional uses of medicinal herbs is being documented and a special herb garden is planned on Rarotonga to ensure their preservation.

Environmental Tools

Legislation: There is a considerable body of formal legislation of environmental import in Cook Islands; and there are traditional rules and practices, called Ra'ui. The revised Conservation Act 1986-87 established a Cook Islands Conservation Service as a Corporation, independent of day to day Public Service administration, and responsible through a Conservation Council to the Minister of Conservation. The Act is limited in its application; it does not apply to the Northern Group, while in the Southern Group it applies in whole only to the islands of Rarotonga and Aitutaki. The Act has numerous deficiencies, including the lack of provision for mandatory EIA processes on significant development proposals. The validity of the Act was recently challenged in the High Court and the Act is now being revised. A new Marine Resources Act came into force in 1989 which provides for sustainable development of fisheries resources and accession to regional conventions such as the Driftnet Convention signed in November 1989. Cook Islands has a body of other legislation which contains environmental management requirements, including a Plant Act and an Animal Act with quarantine provisions. Some of this legislation is dated, and review is needed to ensure the environmental provisions contained in them are still relevant, and not in conflict with other Acts, or with the Conservation Act itself.

Ra'ui: The traditional conservation practice, the "Ra'ui" (=prohibition), is applied by village leaders and enforced by the Island Council. The Ra'ui aims particularly at the conservation of food resources or at cultural safeguards, rather than as a specific environmental protection mechanism per se. A Ra'ui may be used to preserve or restrict access to land, lagoons and reef areas for the conservation of food, coconuts and marine resources. The traditional objective of Ra'ui was to allow a resource to recover for or after a special event, or to improve the yield of a particular resource, such as pearl shell. Unfortunately, it is often said that Ra'ui are these days more often observed in the breach, with the possible exception of Pukapuka and Nassau where the application of Ra'ui is really a matter of survival.

The Cook Islands has been an early signatory to a number of Conventions: the SPREP Convention; Apia Convention; South Forum Fisheries Agency Convention; Law of the Sea Convention; and the South Pacific Nuclear Free Zone Treaty (Rarotonga Treaty). While an informal environmental impact assessment (EIA) process operates between the CICS and the Ministry of Planning and Economic Development, the CICS has neither the legislative cover nor the capacity at present to conduct formal EIA. While the CICS can call for assistance from SPREP, the manpower resources of SPREP also severely limit the extent of help it can offer. The CICS aims to develop its own core team of professional expertise for EIA.

The CICS has drafted conservation plans for Mauke and Aitutaki Island Councils. With the current Regional Environmental Technical Assistance Programme, environmental management plans will be prepared for each of the inhabited islands of the Southern Group and for selected representative islands of the Northern Group by the end of 1992.

Other Specific Programmes and Projects

Other major programmes currently being implemented in coordination with the CICS include: land use capability project; management plan on oil pollution; soil conservation project; afforestation project; national parks and reserves development (Kakerori Nature Reserve, Te Manga Nature Reserve; and Takutea Nature Reserve); waste recycling project (with the Cook Islands Chamber of Commerce's Environmental Sub-Committee). Outer Island Development Plans are currently being prepared, initially for the Northern Group; and a Tourism Master Plan

has recently been completed.

Further projects on alternative energy supplies are planned for the outer islands. Mitiaro had a number of houses equipped with solar photovoltaic cell systems but failures of expensive low voltage fluorescent lights made the approach unpopular; new attempts are being made to introduce solar power systems and a pilot project is underway on Pukapuka. The government proposes to extend solar power systems to the remainder of the Northern Group, subject to the favourable results of the Pukapuka trial.

OPPORTUNITIES FOR SUSTAINABLE DEVELOPMENT

There are five main sustainability issues in the Cook Islands. These are: (a) foreshore/coastal development; (b) protected area development; (c) tourism industry development (eco-tourism); (d) human settlement development; and (e) agricultural practices. The principal constraints to effective resolution or prosecution of those issues are seen as: a lack of an effective EIA process; the need to broaden the application of the Conservation Act in consultation and coordination with the Island Councils in order to have the Act apply uniformly throughout the country, and assist implementation of environmental plans; the lack of capacity for environmental monitoring of pollution; the lack of a resource pricing policy and application of the 'polluter pays principle'; and perhaps most importantly, a limited perception of environmental issues by the public generally.

The report saw seven principal areas of immediate focus which would contribute to the ecologically sustainable development of the country. These were: (a) urban planning for Rarotonga and Aitutaki; (b) sustainable agricultural production systems; (c) location of economically viable, alternative, sources of construction aggregate and sand; (d) national park and reserve development; (e) further alternative energy programmes, particularly for the outer islands; (f) institution of regular water pollution monitoring throughout the country; (g) waste disposal systems, including design of a treated sewage system for Rarotonga and solid waste separation; (h) and a series of institutional and administrative supporting measures.

Urban planning for Rarotonga and Aitutaki: While the main business centre is in Avarua/Avatiu, business activity scattered around the perimeter of Rarotonga and intermingled with urban housing or agricultural activity. The provision of electricity, sewage, and other communal services such as rubbish collection is made that much more difficult, less amenable to efficient use of resources and more costly. But because of the nature of development on Rarotonga, the preparation of detailed town plans must be undertaken in concert with the preparation of a comprehensive, zoned, land use plan for Rarotonga as a whole. Urban planning for Aitutaki is basic to the efficient expansion of the tourist trade, and many of the problems which now confront Rarotonga can yet be avoided or reduced.

Sustainable agricultural production systems: Although it is not a solely a consequence of crop production, the immediate main rural environmental problem is soil erosion associated with inappropriate agronomic practices. This indicates a need to re-examine the degree of sustainability of larger-scale, intensive, horticultural production systems which have operated in the main agricultural areas of the Southern Group. These systems were developed along temperate lines of agricultural practice requiring the clearing of trees and mechanised cultivation. Afforestation of eroded areas has commenced as a rehabilitative measure, together with other soil conservation practices. But the removal of trees from the landscape, both in olden times when the degraded fernlands developed, or today to permit more extensive cleared areas for horticultural production, may have led (at least in part) to the degraded and eroded land condition for which corrective forest establishment is now required.

There is thus a need to look to the longer term for food production to supply the domestic market for the benefit of Cook Islanders and to feed the influx of tourists; to ensure that only sustainable agricultural systems are used, current agricultural production approaches may need to draw on those elements of traditional agriculture which permitted the sustained production of food from the same areas for centuries.

Construction sand and aggregate: The development of modern infrastructure, including resort development for the tourism industry, calls for large quantities of construction grade sand and aggregate. The beaches have

been the main source of sand. While this beach mining practice is legally banned, the regulation is largely ignored.

National parks and reserve development: Eco-tourism in the Cook Islands provides a major opportunity for the protection of the remnant biological diversity through the establishment of terrestrial and marine reserves as tour destinations. This nature tourism is one of the keystones of the recently completed Tourism Master Plan for the Cook Islands. A number of potential protected areas have been selected, and some land-owners are prepared to cooperate providing they are involved from the outset in planning for the protected area and for its management.

Energy: The Cook Islands have an opportunity for reducing the level of fuel imports, especially to the outer islands, by the greater use of alternative energy systems. Some systems of solar heating and photovoltaics which have already been proven effective could be promoted more widely, including the provision of soft loans to ease the cost of initial purchase of equipment. In the Cook Islands, where most communities have diesel generators the prospect of supplementing diesel generation with solar cell accumulators appears attractive.

Water monitoring: The concern for human health from pollution of the groundwater lens on the atolls, and from swimming in polluted lagoons, calls for a programme of regular water monitoring. The nature of the tests to be performed on the water samples precludes their being sent overseas; some tests must be made within 24 hours of sample collection. For analyses to be undertaken within Cook Islands upgrade of the analytical capability of the Public Health Department laboratory is required, including additional trained staff.

Institutional and administrative measures: The national report made a number of recommendations for strengthening the CICS, through fiscal measures, the recruitment of staff and their training, and legislative amendment. The staffing problems of the CICS are those of lack of balanced spread of professional skills, and insufficient numbers needed for carrying out the responsibilities with which it is charged under the Conservation Act.

Environmental education and public awareness: It has been suggested that environmental awareness programmes should first be directed to those at senior levels of government who are in a better position to ensure that the implementation of government policies and directives are carried out in an environmentally sensitive manner. There was also considered to be a ready-made channel for conveying the environmental message in an effective way to the public through the Religious Advisory Council which represents all the major faiths and denominations and plays such a central role in the everyday life of Cook Islanders. The curricula of students at the Theological College might possibly contain increased content on environmental concerns.

The curricula for students in primary and secondary schools would also benefit from further review to ensure an adequate content on environmentally related subjects. Possibly those who could be most influential in helping the CICS raise environmental awareness are school-teachers, and the extension staff of the Departments of Agriculture, of Marine Resources and Health. They have currently not been used in an environmental education role and would themselves require specialised on-the^^job training; but it is such extension staff who by the nature of their work maintain close contact with individuals and groups. Thus they could be made an ideal channel for conveying correct environmental messages on pollution control, environmental health, marine resource and land use and thereby assist in changing false environmental perceptions within the community.

2. DEVELOPMENT TRENDS AND ENVIRONMENTAL IMPACTS

2.1 Natural Resource Endowment

Cook Islands comprises 15 small islands scattered over some 1.8 million square kilometres of the central South Pacific, between 8-23 degrees south latitude and 156-167 degrees west longitude. From Penrhyn in the north to Mangaia in the south, the chain extends a distance of 1400 kilometres.

The Cook Islands are divided into a Northern Group of six islands -Penrhyn, Manihiki, Rakahanga, Pukapuka, and Suwarrow (plus the sand cay of Nassau)- and a Southern Group of Mangaia, Rarotonga, Atiu, Mauke, Mitiaro, Aitutaki, Palmerston, and Manuae and Takutea sand cays. Manuae and Takutea are uninhabited, as also is Suwarrow apart from the Cook Islands Conservation Service (CICS) caretaker.

The EEZ is nearly 2 million sq km. The total land area is 237 sq km (Census of Agriculture, 1988) of which 89% (with 19,000 ha land area) is in the Southern Group. Rarotonga is the largest island (6,724 ha) with 28% of the total land area.

All islands of the Southern Group, with the exception of Palmerston which is an atoll, have a central mass of basalt, rising in Rarotonga's strongly dissected interior to 652 metres a.s.l., and to less than 6 metres a.s.l. on Mitiaro. Four islands have a coastal rim of uplifted coral reef (makatea); this fossil coral rim rises to more than 60 metres a.s.l. on Mangaia, 20 metres a.s.l. on Atiu and Mauke, and to less than 6 metres a.s.l. on Mitiaro. Aitutaki and Rarotonga are surrounded by fringing reef. The islands of the Northern Group are low atolls.

Average rainfall varies from 1300-2800 mm per year with 2012 mm annual average for Rarotonga. There is a summer maximum and winter minimum distribution. The mean annual temperature is 24° C with little seasonal variation, reflecting the maritime tropical climate. The average relative humidity is 84% and with a total of 2116 sunshine hours. The Cook Islands lies in the cyclone belt, the last major cyclone being 'Sally' in January 1987.

2.1.1 Biological Resources

The Cook Islands are remote oceanic islands, the depths of the surrounding oceans reaching 1500 metres precluding the formation of land bridges during the glacial periods. The islands are also remotely located on a biological diversity gradient which diminishes with distance from the continental land masses, and north and south away from the equator. Within the country, the principal influence on biological diversity is the physical structure of the islands, with some shaping from episodic events such as cyclones and storm surge. The other main influence on the biological resources has been the changing pattern of land-use since the arrival of the missionaries.

Flora

Vegetation formations vary from montane rain forest on Rarotonga through lowland limestone rain forest on Mauke, beach forest on atolls and reef islets, to scrub and grassland formations (Paine, 1989). Freshwater marsh is found on Mangaia, Rarotonga, Mauke, Mitiaro and Atiu; tidal salt marsh is restricted to Ngatangiia Harbour on Rarotonga (Dahl, 1980). Lowland rainforest has been almost totally destroyed but upland forest on Rarotonga above 250 metres remains largely intact (Sykes, 1983).

Due to their remote location and small size, the Cook Islands lack many species. Forty-one genera with Palaeotropical, Malaysian-Australian or Australian affinities are found, compared with 104 such genera in Tonga. Pacific and pan-tropical components are most important in the strand flora. While there are a few endemic species, there are no endemic genera. (Paine, 1989)

Apart from the endemic flora, introduced species are becoming an increasingly dominant feature of the

landscape, with some species becoming weed pests.

Fauna

The terrestrial mammalian fauna is depauperate and mostly limited to anthropogenically introduced species, such as the pig, dog and cat. An exception is the insular flying fox *Pteropus tonganus*.

Native Rarotongan land birds are restricted to five species: long-tailed cuckoo (*Endynamic taitensis*), Pacific imperial pigeon (*Ducula pacifica*), Rarotongan flycatcher (*Pomarea dimidiata*), and the Rarotongan starling (*Aplonis cinerascens*), the last three being endemic to Rarotonga. Other endemics to Cook Islands include the Atiu Swiftlet (*Aerodramus sawtelli*), Mangaia kingfisher (*Halcyon mangaia*) and the Cook Islands reed warbler (*Acrocephalus kerearako*).

The islands of Palmerston and the Northern Cooks are significant common nesting areas for green turtle, *Chelonia mydas*. An important terrestrial invertebrate is the coconut crab *Birgus latro* which is common in the Northern Group, Atiu, Mauke and Takutea.

Reefs

All of the Cook Islands feature coral formations, frequently fringing and lagoon reefs. Within the southern islands, windward and leeward atoll reefs are restricted to Palmerston and Manuae, while barrier reefs occur only at Aitutaki.

Soil

The soils of the Northern Cook Group are derived from reef material with a thin organic mantle. These soils are inherently infertile and very porous, restricting agriculture primarily to coconuts and pulaka.

In the Southern Group, with the exception of Palmerston, Rarotonga and Aitutaki, the islands have an outer makatea which can contain small, shallow pockets of basaltic alluvium. These pockets are good for household gardens but are too small for more extensive horticulture.

The more fertile soils are those of volcanic, mainly basaltic, origin found in the interior of the islands and over a range of topographical provinces, including swamps, escarpments, terraces, foothills and uplands. On Rarotonga the swamp province is found at the toe of the foothills and on the coastal plains behind the foreshore storm ridge system; on the islands with makatea, the swamps extend from the inner foot of the makatea. These swamps are generally planted to taro.

The arable soils are well structured, high clay soils of reddish colour. Some soil types are quite susceptible to erosion, the soil loss being most evident on Mangaia and on Atiu. Most of this has occurred on inherently less fertile soil units (mostly former fernlands) which have been used for pineapple production, or are fernland slopes which are frequently burned.

The severe erosion does not affect large areas of the islands; some 89% of Atiu is largely unaffected by soil erosion, the productive volcanic terrace soils of the central lowlands exhibiting no evidence of erosion under the present land use regime. However, where erosion is evident, it is spectacular, in the forms of sheet, rill and gully erosion with some 10.6% (301 ha) of Atiu having lost a greater part of its topsoil (NZDSIR, 1990). The extent of loss emphasises the need for the application of soil conservation principles and practices.

Distribution of land and people

The distribution of land area and a brief description of main island features is given in Table 2.1 below.

Table 2.1
Island area and main features

Island	Area (Sq Km)	Island Type and Environmental Features
Southern Islands (214.4 sq km):		
Rarotonga	67.1	High, volcanic, strongly dissected, rising to 652 m. a.s.l.; largest of the Cook Islands; fringing reef varying in width from 400-800 m on the south coast, to 50-100 m on the windward east coast with large intertidal portions and accumulated coral rubble. No mangroves or seagrasses (throughout C.I.) Environmental features: coastal degradation from infrastructure development, pollution, and soil erosion; reef silting pronounced from erosion; Acanthaster predation.
Aitutaki	18.3	volcanic cone, rising from >4000 m depth; barrier reef, large 66 sq km lagoon, 10 sq km reef flat; plus 12 motu, 2 volcanic islets; 1 sand cay. Environmental features: lagoon silting; agricultural chemicals pollution; Acanthaster predation.
Atiu	26.9	raised island, surrounded by makatea; volcanic plateau to 91 m; fringing reef, narrow reef flat except along north portion of coastline. Environmental features: severe erosion of infertile farmland and former pineapple production areas with siltation of makatea outlets and affecting taro areas.
Mangaia	51.8	uplifted island surrounded by high makatea; low volcanic to 169 m. Environmental features: similar erosion problem to Atiu.
Mauke	18.4	low, volcanic to 30 m; uplifted island surrounded by makatea; completely surrounded by 50-100 m wide reef flat, much intertidal or supratidal.
Mitiaro	22.3	low volcanic; raised island surrounded by makatea; fringing reef with narrow living reef flat.
Palmerston	2.1	atoll with elongated lagoon and 8 islets; surrounded by reef. Environmental features: major nesting site for green turtle.
Manuae	6.2	atoll, with twin, flat, coral, sand, islets; shallow closed lagoon; surrounded by continuous reef with single boat passage. Environmental features: turtle nesting site.
Takutea	1.3	low lying, elongated, sand cay; surrounded by reef. Environmental features: turtle nesting site.
Northern Islands (22.3 sq km):		
Manihiki	5.4	pear-shaped atoll with 2 large isles and many smaller islets.

Pukapuka	1.3	atoll land area ca. 700 ha to 4 m a.s.l., lagoon ca. 30 sq km to 50 m depth; 3 islets, Pukapuka being the northernmost; surrounded by closed reef with artificial passage. **Environmental features:** Green and Hawksbill turtle nesting site; trochus and black lip pearl oyster both introduced.
Nassau	1.3	islet without lagoon; flat sand cay with few dunes; narrow reef flat.
Rakahanga	4.1	atoll with small closed lagoon; 9 smaller islets. **Environmental features:** Green turtle nesting site.
Penrhyn	9.8	largest atoll with many islets. **Environmental features:** Green and Hawksbill turtle nesting site.
Suwarrow	0.4	atoll of 40.5 ha to 3 m a.s.l., lagoon area of 133 sq km to 80 m depth; almost continuous rim with 22 vegetated islets; active lagoon flushing. Broad, surrounding reef flat 100-800 m wide. **Environmental features:** The Suwarrow Atoll National Park. Of major importance for nesting seabirds; turtle nesting site; potential site for blacklip pearl oyster cultivation.

2.1.2 Agriculture

Agriculture remains the main activity of Cook Islanders, particularly those in the Outer Islands, with 85% of Cook Island households reported (Census of Agriculture, 1988) as being agriculturally active. Of these, almost 79% are operated solely on a subsistence basis, about 15% are classed as mixed cash cropping and subsistence, with the remaining 6% purely commercial.

Agricultural activity in 1988 was confined to 11% of the total land area of 237 sq km, although more than 30% is considered arable. The productive land of 6,435 acres is made up of many small parcels or holdings, the average size of which was 2.4 acres. An estimated 22% of the land was in fallow, either short or long term (10 years or more).

Employment opportunities in the Northern Group are confined almost entirely to the agricultural/fisheries sectors, with about 88% of households engaged in subsistence production or pearling. In the Southern Group, there is a much more widely diversified agricultural industry due to the more fertile soils and cooler climate, and regular air and sea transportation.

The main export crops now are pawpaw, eggplant, beans, chilli, and taro, with small quantities of tarua, tumeric, ginger, mango, capsicum, snowpeas, cucumber, okra and tomatoes. The scented leaves of the 'maire' are exported to Hawaii for leis.

Some livestock is kept by about 70% of households, mostly pigs (16,500) and chickens (44,700), but also some 5400 goats together with a few horses and cattle. Until recently virtually all demand for red meat was met from frozen or chilled imports. Domestic production on Rarotonga has increased with the recent commissioning of a multipurpose abattoir designed to process cattle, pigs and chickens; but the butchery has yet to demonstrate that its meat can compete in price and quality with the imported product.

Table 2.2
Export tonnages of fruit, root crops and vegetables in 1990 (tonnes)

Commodity	New Zealand	Pago Pago	Hawaii	Total
Fruit[1]	625.2	-	-	625.2
Root crops[2]	51.6	-	-	51.6
Vegetables	71.6	1.5	-	73.1
Maire	-	-	7.4	7.4
Total	748.4	1.5	7.4	757.3

1- includes 1.5 tonnes of dried banana.
2- includes 0.8 tonnes of arrowroot and 0.1 tonne of starch.

2.1.3 Forest Resource

There are limited data on the natural forest cover and wood resources of the Cook Islands. An afforestation program is active in the infertile fernlands of four islands -Atiu, Rarotonga, Mangaia and Mauke- and to date a total of 456 ha has been planted, 102 ha in 1990. The current plantation area represents 25% of the 1820 ha of fernland targeted for afforestation.

The primary aims of the plantation program are help counter erosion on the fernland sites and protect low lying fertile agricultural land by afforesting the upper catchment areas. There will also be some future potential for supplying sawn timber and post material for the local market.

Table 2.3
Plantation establishment 1984-1990, Cook Islands

Island	Afforestation					
	Fernland to be planted (ha)	Area planted (ha)				
		84-88	88-89	89-90	90-91	Total
Atiu	300	22.0	21	22.0	12.4	83.4
Rarotanga	190	5.0	5	5.2	5.5	20.7
Mangaia	1250	102.0	77	85.0	74.0	341.0
Mauke	80	0.5	-	-	3.6	4.1
Total	1820	129.5	103	112.2	101.5	456.2

The exotic plantation species were selected for their ability to handle the infertile and often windblown fernland slopes. The species now favoured are *Acacia crassicarpa* and *Pinus caribaea var.* hondurensis, planted at a 3 x 3 metre spacing. *A. mangium* and *A. auriculiformis* which showed earlier promise have proven less resistant to windthrow and not as vigorous as *A. crassicarpa.*

A basal application of fertiliser at time of planting has proven most beneficial for tree establishment and earlier canopy closure to protect the soil surface from raindrop hammer.

The main problems facing afforestation have been fire and damage by goats on Atiu and Mangaia. The threat of fire in the fernlands is ever present, and in the past year fires were reported in both Mangaia and Atiu, with a small area of Acacia burnt on Atiu. In one case the arsonists were detected and subsequently prosecuted and fined.

The Forestry Division is also mass-producing Vetiver grass on Atiu to provide a vigorous ground cover for control of sheet erosion, and erosion control trials have been established on Atiu and Mangaia.

2.1.4 Marine Resource

Subsistence fishing provides a significant proportion of the protein requirement of the country. Subsistence fishing, which includes the collection of shellfish and seaweed, occurs mostly in the lagoons and on the fringing reef.

Artisanal fishing is confined mostly to the fringing reef and inshore areas, and usually using traditional hook and line, spear or net, although monofilament longlines have recently been introduced. Artisanal fisheries outside of the reefs are not considered plentiful because the water deepens so quickly; (there is no continental shelf with the volcanic islands).

The lagoon fisheries comprise mainly trochus, giant clam and pearl shell. Trochus was introduced to the Cook Islands on Aitutaki in 1957 and commercial harvesting commenced in 1980. Pearling began in the 19th century and still contributes to the Northern Cook Islands economy, with the main activity now on Manihiki and Penrhyn.

2.1.5 Water

The volcanic islands of the Southern Group are well endowed with good quality drinking water. Because of the topography it is frequently possible to feed water by gravity to settlements. Water pumping is necessary in the flatter areas of the lower Southern Cook group.

Small supply weirs are constructed on some streams, for example, in Mangaia, while on Rarotonga an excellent system of stream intakes and galleries has been operating and is now being upgraded by the construction of filter intakes. These intakes feed directly into the reticulation system.

On Rarotonga, a 6 million litre rubber-lined reservoir feeds water by gravity into Arorangi, while a 7 million litre capacity dam was constructed to feed Nikao but technical problems prevent it being commissioned.

Potentially exploitable underground water resources exist on the volcanic islands, but surface water is generally easily accessed. While the freshwater lens of the larger atolls can also provide some potable water, the lens are susceptible to contamination from toilet septic systems and, if over-pumped, from intrusion of saltwater.

In the atolls of the Northern Group where there are no streams, drinking water is mainly supplied from community and household rainwater tanks. Programs have been underway for some years with the objective of providing ferro-cement tanks of 1000 gallon capacity to each dwelling and 10,000 gallon community storage tanks with large public buildings.

2.1.6 Minerals

Known mineral deposits are confined to seabed deposits of manganese and cobalt, but the commercial viability of these is considered doubtful. There is no indication of hydrocarbons. The term 'mineral' is commonly applied to the sand deposits of the beaches or old sand dunes.

2.1.7 Energy

The Electric Power Supply (EPS) supplies electricity to islands of the Northern Group except for Pukapuka and

Nassau. The electric generators are all diesel-powered. Wood and coconut husk/shell continue to be used extensively for cooking, with the major wood consumption for traditional oven (umu) cooking.

On Rarotonga, gas stoves are common, and there is an increasing use of electric or solar hot water systems in private houses.

In the Northern Group, electricity is used by most consumers for lighting and, usually, refrigeration. The unit cost for electricity is 23c per unit for the first 120 watts and 29c thereafter plus a 10% surcharge. A typical household electricity bill with both lighting and refrigeration is about $20 per month; more if electric stove or hot water systems are used. These domestic charges apply uniformly throughout the Cook Islands, and are not set on a cost recovery basis even for Rarotonga.

For the Northern Group, where freight on diesel supplies adds greatly to costs (MOPED Draft Manihiki Island Development Plan, 1991), the rates represent a considerable subsidy. MOPED states that while the Northern Group generates in general less than 1% of the CI total electricity output, it accounts for more than 33% of the total Government subsidy.

2.2 Patterns of Economic Growth

2.2.1 Sectoral growth patterns

Agriculture has been the mainstay of the economy but the sector is contracting due to high input costs, inadequate collection and distribution systems, high external transport costs and fluctuating product quality on the export market. Tourism has become the dominant sector and this is likely to continue with the CIG seeking both direct and indirect support for the tourist industry.

Agriculture

Due to the limited land area and remoteness, agriculture in the Cook Islands faces disadvantages, in comparison to other developing countries of the region, in transportation, communication, marketing, and economies of scale.

The agricultural sector is characterised by: a traditional land system which can restrict full land utilisation; a high level of 'part-time' activity in agricultural production; suitable soils and climate for a wide range of agricultural crops; excessive dependency on bulky perishable products; limited and expensive inter-island and international shipping and air transport services; limited labour supply; restricted availability of long-term credit; and a high level of government subsidy for agriculture.

In the past, the main export cash crops have been bananas on Aitutaki; pineapple on Atiu and Mangaia; vegetables and root crops from Mauke and Rarotonga, and pawpaw and other fruit from Rarotonga.
The pineapple industry is now defunct, and copra, which was once the mainstay of agricultural production, ceased production in the Northern Group in 1987 due mainly to the depressed world market price.

Banana exports from Aitutaki ceased due partly to inconsistent quality, irregular shipping, and inability to compete with imports to New Zealand from other countries. An attempt to reopen banana exports is now being made.

Citrus continues to be produced on Rarotonga for the local market from an estimated orchard area of 353 acres (1988), but exports to New Zealand of both fresh fruit and juice could not compete with South American produce and export has now ceased.

The value of agricultural production in 1989 was reported to be down by almost 20% from 1981, and with the gloomy agricultural export prospects in 1991, further falls in export value are expected.

But there are still some brighter production commodities. Although pawpaw production peaked in 1988 at 1000 tonnes and fell to 600 tonnes in 1990, production interest remains high and the total farmgate return to farmers

in 1990 was estimated at NZ$ 1.52 million. Beans, eggplant and chilli production remain high with a favourable nett estimated farmgate return on chilli in 1990 of about NZ$ 11.50 per kg. While copra production ceased, commercial production of coconut picked up with the establishment of the Coconut Cream Factory in early 1987.

Export of cash crops has declined markedly, but the indications are that there has been a significant rise in the value of produce sold on the local market. While it is extremely difficult to gather statistics on the domestic market, production of cash crops for the domestic market was estimated by the Agriculture Department to be about NZ$ 8 million in 1990.

In the Outer Islands, with the exception of the well organised production and marketing effort on Mauke, the Agriculture Department is leading a move away from bulk perishable crops to those with long storage life, ease of transportation, no quarantine restrictions and more assured markets. The focus is on arabica coffee and vanilla. Coffee has been successfully developed on Atiu, and both crops show particular promise for Mauke, Aitutaki and Mangaia, as well as Atiu.

Fisheries

There has been only limited harvest of available fish resources within the almost 2 million sq km EEZ. There are a number of bilateral fishing agreements and the licenses for foreign fishing vessels have made a useful contribution to foreign exchange earnings.

There are only from eight to twelve people totally dependent on commercial fishing in the Cook Islands, (Rarotonga and Aitutaki) with about 40 part-time commercial fishermen on both islands to supply the local market. There is frequently a chronic shortage of fish in Rarotonga, and expansion of artisanal fishing activity must remain a high priority area if the expectations of the increasing numbers of tourists for fresh seafood are to be met.

Manufacturing industry

There is limited industrial development. Clothing and footwear production has been a significant export earner, although there are signs that this is contracting. Other light production activity includes a coconut cream factory, coconut soap and perfume manufacture, pig feed factory, a brewery, and a soft-drink bottling plant. There is also a thriving cottage industry producing artifacts for local sale to visitors.

Tourism

Currently about 30,000 people visit Rarotonga each year, remaining on average for 10 days each and spending $100 per day per person. The tourism industry thus is worth in the order of NZ$ 30 million annually to the economy, making tourism the major industry of the Cook Islands in terms of foreign exchange earnings; merchant banking ranks second to tourism.

Undoubtedly, the significance of tourism to the future economy will continue to grow -providing the special ambience of the Cook Islands which attracts the tourist in the first place is not diminished. That appeal derives from a blend of people, scenery, and nature tourism opportunity.

2.2.2 Gross national and domestic production

GDP grew at an average rate of 8.2% over the period 1983-86, after allowance for inflation. A collation of GDP data for the period 1986-90 is not yet available, but in general manufacturing, construction, and tourism services have increased, while agriculture has decreased. GDP was estimated at NZ$ 77.4 million in 1987, equivalent to US$ 45.4 million. Data were not available to calculate GNP. Foreign aid was shown as 21% of GNP in 1987.

2.2.3 Household expenditure and income

Remittances from Cook Islanders living overseas have for many years made a significant contribution to the economy, raising household expenditure and living standards beyond the level which could otherwise be sustained. For some years the remittances passed through the Post Office Savings Bank in the form of money orders have totalled around the NZ$ 2 million mark annually, with a peak of NZ$ 2.64 million in 1987, the year of Cyclone Sally. In 1990 there was a marked slump to about NZ$ 1.44 million, possibly as a result of the constrained economic circumstances in New Zealand.

In addition to the money order transfers, it is estimated that further remittance monies of NZ$ 1 million enter Cook Islands annually through the two commercial banks, Westpac and ANZ.

2.2.4 Balance of payments

Statistical material is not readily available which would help assess the current balance of payments position. Published National accounts for the period 1982-86 were published in 1990, and MOPED is currently reviewing the national accounts to bridge the gap 1986-1990.

While export earnings from agricultural production have declined, clothing and footwear manufacturing sector have been important export earners. However the importation of basic manufactures far outstrips exports.

In 1988 the external trade deficit was reported as NZ$ 57.9 million, NZ$ 68.4 million in 1989, and NZ$ 75.2 in 1990. The servicing of foreign loans secured to stimulate the construction industry will also have a significant impact on future capacity for reducing the deficit.

2.2.5 International trade

Exports and imports

Tables 2.4 and 2.5 below list imports by standard international trade classification for the period 1986-1990. The data show a large rise in the level of imports of basic manufactures and manufactured goods over the past five years, reflecting the relatively affluent society of the Cook Islands compared to some other PICs.

Table 2.4
Imports by SITC section for the period 1986-90

	1986	1987	1988	1989	1990
Food/live animals	10285	11862	13318	15079	17267
Drugs (beverages & tobacco)	3090	3341	3826	4370	4939
Crude materials, excluding fuels	1097	1192	1342	1548	1754
Mineral fuels	6020	6490	7750	8617	9785
Animal & vegetable oils	326	320	340	425	467
Chemicals	3766	3967	4536	5235	5880
Basic manufactures	9849	9143	12757	14462	16565
Machines, transport	8723	10440	11628	13074	15051
Miscellaneous manufactured goods	7084	7770	8821	10086	11427
Unclassified goods	69	194	174	182	242
TOTAL	50309	56982	64526	73078	83577

The changing export pattern over the past five years is most marked in the manufactured goods categories. The export of basic manufactures has increased 100 fold to almost NZ$ 4.4 million, but this has accompanied by a tenfold decrease in the export of miscellaneous manufactured goods.

Table 2.5
Exports by SITC section for the period 1986-90

	1986	1987	1988	1989	1990
Food/live animals	1771	1675	2532	1891	1913
Drugs (beverages & tobacco)	-	-	-	1	23
Crude materials, excluding fuels	933	1229	545	1113	566
Mineral fuels	-	-	-	-	2
Animal & vegetable oils	-	-	-	-	-
Chemicals	25	13	10	26	3
Basic manufactures	49	72	12	504	4370
Machines, transport	364	532	426	286	599
Miscellaneous manufactured goods	5918	8435	2965	644	526
Unclassified goods	-	-	137	202	-
TOTAL	9060	11956	6627	4667	8002

Table 2.6
Value of Agricultural exports, NZ$'000 F.O.B.

	1985	1986	1987	1988	1989	1990
Fruit						
Avocado	17.0	27.0	0.6	0.1	0.6	
Bananas	745.0	194.0	83.3	344.6	209.2	
Citrus	36.6	4.2	2.9	1.4	36.4	
Mango	20.8	22.4	17.1	29.8	38.6	
Pawpaw	1046.3	1055.9	925.3	1687.0	1169.0	
Pineapple	42.5	1.0	25.2	-	23.9	
Tomatoes	21.5	15.7	14.6	24.9	10.4	
Vegetables						
Beans	258.2	269.3	390.1	208.4	161.0	
Capsicum	21.5	19.5	17.6	7.6	5.7	
Chillies	18.1	15.8	20.8	42.4	21.9	
Courgette	35.8	15.5	19.7	7.2	2.1	
Eggplant	87.4	59.1	111.0	48.9	51.3	
Taro	52.7	64.8	51.9	13.0	64.7	
Fruit juice	23.2	57.3	0.9	30.5	36.4	
Other fruits & vegetables	44.0	32.8	20.5	12.1	14.4	
Copra	628.0	201.3	64.5	-	-	-
TOTAL	2238	1771	1675	2532	1891	1913

Table 2.7
Value of non-agricultural exports, NZ$'000 F.O.B.

Commodity	YEAR					
	1985	1986	1987	1988	1989	1990
Pearlshell	346.7	641.1	1149.3	543.3	1109.6	565.0
Clothing/Footwear	2436.9	5783.4	8227.5	2931.0	578.1	337.0
Handicrafts/'Eis	62.2	54.9	7.8	34.9	1.8	-
Other Exports	268.3	685.0	888.7	661.4	1130.0	5350.0
Total	3114	7164	10273	4171	2819	6252

2.2.6 Revenue and recurrent expenditure

Government revenue for 1990 was estimated at NZ$ 60 million, an increase of NZ$ 5 million over 1989. Taxes provide 41% of this, of which income tax is the largest contributor, followed by sales tax. Customs duties provide 10% with the remaining 49% lumped under the 'Other ' category.

Table 2.8 gives the estimated and actual expenditures for the Government for the three years 1988-90. When compared with direct expenditure on Conservation, it represents a very small percentage -less than a quarter of one percent; nevertheless the increasing importance of conservation to the Government is reflected in the expenditure growth of the Conservation Service over the three-year period.

Table 2.8
CIG and CICS expenditure for the period, 1988-90

Expenditure	1988	1989	1990	1988	1989	1990
	CI Government (NZ$ million)			Conservation Service (NZ$'000)		
Revenue	56.9	55.1	60.3	-	-	-
Total Expenditure	55.9	57.1	60.1	36.5	99.8	136.0
Recurrent expenditure	45.0	47.4	48.8	33.3	91.2	113.7
Recurrent/total per cent	80.5	83.0	81.2	92.2	91.4	83.6
Conservation as per cent of total spending	.065	.175	.226			

2.2.7 Investment policy

The Cook Islands has an inadequate infrastructure, particularly in the area of inter-island transport and shipping facilities to foreign markets. Infrastructure development is largely funded by loans together with a significant contribution from foreign aid; but the maintenance of existing infrastructure suffers because locally raised revenue from its small tax base is quite inadequate for recurrent expenditure needs. Such reduced maintenance results in less than expected life from the infrastructure investment.

The level of domestic savings is considered to be limiting the availability of funds for private investment within Cook Islands; at the same time it is noted that there is still considerable investment overseas by Cook Island interests. The trend is towards increased local equity in business ventures. Land can be leased or used as equity, and its capital value realised by sale.

The investment in Cook Islands by foreign companies is encouraged, with recent effort reflected in the pearlshell industry development on Manihiki, and in the planned development of a major tourist resort facility on Rarotonga.

The Cook Islands has an active Chamber of Commerce with 121 members which encourages private investment within Cook Islands and supports the interests of local business.

2.2.8 Development assistance

N.Z. is the single most important source of support, inclusive of budgetary support, and this is likely to continue for some years to come. But Cook Islands receives increasing financial and technical assistance from a range of bilateral, multilateral and regional sources. In addition to New Zealand, the bilateral donors include Australia, Canada, Germany, Netherlands, UK and USA. The ADB heads in importance a long list of multilateral donors (see Table 2.9), while the SPC, and Forum Secretariat and their agencies are main sources of regional assistance.

The level of project aid is tabulated by type of donor in Table 2.9 for the financial years 1987/88 to 1990/91.

Table 2.9
Project aid by donor - 1987/88 - 1990/91 (NZ$'000)

Donor	87/88	88/89	89/90	90/91
Bilateral				
New Zealand	4130	5120	5420	5620
Australia	1200	1300	1280	1514
Other[1]	630	752	478	232
Sub total	5960	7172	7178	7366
Multilateral				
ADB[2]	-	420	884	1603
Other[3]	1396	980	688	204
Sub total	1396	1400	1572	1807
Region[4]	287	300	290	250
Total	7643	8872	9040	2423

1 Mainly Canada, Germany, Netherlands, UK, USA
2 Drawdowns on ADB Loans
3 Mainly UNDP, WHO, UNESCO, UNFPA, FAO, UNPEDP, ICAO, UNICEP, ESCAP, CFTC
4 Mainly SPC, Forum Secretariat, FFA, SPREP, PIDP, CCOP/SOPAC.
Technical advisory/consultation services

2.3 Demographic Trends

At the 1986 Census, the population totalled 17,614 with 13% in the Northern Group and 87% in the Southern Group, with 56% living on Rarotonga. The people are Maori and share with French Polynesia and New Zealand a bond of history and culture.

2.3.1 Population distribution, growth and migration

The population in the Cook Islands at the 1986 census enumeration is summarised below for northern and

southern regions, and with the figure for Rarotonga extracted. The Cook Islanders are citizens of New Zealand, and the population of Cook Islanders in New Zealand is said to exceed 20,000, larger than the home population.

Table 2.10
Population numbers at the 1986 Census and % of total population

Census Year	NORTHERN Region #	%	SOUTHERN REGION Southern #	%	Rarotonga #	%	Total
1996	1810	21.2	6708	78.8	2441	28.7	8518
1916	1685	19.1	7120	80.9	3064	34.8	8805
1926	1788	17.1	8321	82.5	3936	39.0	10082
1936	2007	16.4	10243	83.6	5054	41.3	12246
1945	2139	15.2	11949	84.8	5573	39.6	14088
1956	2504	15.1	14166	84.9	7212	43.2	16680
1966	2389	12.4	16858	87.6	9971	51.8	19247
1976	2046	11.3	16082	88.7	9802	54.1	18128
1986	2247	12.8	15367	87.2	9826	55.8	17614*

* - Note that these are corrected data taken from the May 1991 Statistics Office Report CPD 17/91. The provisional population figure of 17,463 is commonly quoted in the literature.

The natural growth rate is moderately high, averaging about 1.9% per year. The effect within Cook Islands is tempered by continued emigration, mainly to New Zealand, and to Australia and, to a lesser degree, to the USA, at about 0.6% annually. The net annual growth rate therefore is estimated at 1.3%. If that nett increase is applied to the 1986 census figure, the 1991 population is estimated at 18,500.

In 1976, the Census recorded a significant decline in the population of young adults in the 20-24 and 25-29 age classes. There was heavy migration at the time to New Zealand. Since 1976, the population has aged with an increasing percentage of adults aged 20 years and over, and the percentage of youth aged 0-19 years has declined by 11% over the decade 1976-1986.

2.3.2 Religion

There are four religious groups legally established in the Cook Islands, all of Christian origin. These are the Cook Islands Christian Church (67%), Roman Catholics Church, Church of Jesus Christ of Latter-day Saints, and the Seventh Day Adventist Church. At the 1986 Census, only 1.4% of the population either did not state a religion or indicated they had no religion.

The environmental significance is the prospect of utilising the Religious Advisory Board on which these denominations have representatives as a vehicle for raising public awareness of significant issues concerning the natural, social and built environment.

2.3.3 Education

Although attendance at school is compulsory to 16 years of age, there has been considerable dissatisfaction with the educational standard and the level of literacy. This culminated recently in an in-depth review and the publication of a report, "The Polynesian Way", and subsequently the preparation of an "Education Plan" to implement the findings of the review.

The main concerns were for the institutional capacity and arrangements, and for the level of resources available for education at all levels.

The curricula for primary and secondary education also came under strong attack, with the need seen for broadening the educational base through the introduction of wider arts and science training in the social and biological environment. The initial focus is on the Primary Schools with the recent establishment of a Science Curriculum Section.

2.3.4 Employment

Statistical data on the economic characteristics of Rarotonga people (aged 15 years and over) in 1986 indicated that of 5922 residents in that age category, 69.5% were employed, 2.7% unemployed but actively seeking employment, and 27.8% not economically active (Statistics Office Report CPD9-90). By comparison, of the total Cook Islands resident working population of 10,226, 65.6% were economically active, of which 5.8% were unemployed. The group not economically active includes retired workers, disabled, full-time students, persons not looking for work, and housewives (who comprise 18.8% of the total population).

Unemployment is not considered a major social issue in the Cook Islands, but with an unemployment level of 5.8% in 1986 and reduced employment opportunities in the depressed economic circumstances of New Zealand and Australia, migration of the young adult age class could be reduced and swell the ranks of unemployed within Cook Islands.

The economically active category used above includes workers producing for their own or their families consumption (5.4% of category) and unpaid family workers (6.7%).

A breakdown of the 6722 economically active category is tabled below by major industry division and occupation for Cook Islands as a whole and for Rarotonga.

Table 2.11 illustrates well the total dominance of Rarotonga in the paid employment categories, and the heavy focus for employment on service industries and the tourism trade in hotels and restaurants. The greatly reduced involvement in agriculture and fishing on Rarotonga is also clearly seen. It is also worth noting that few of the professional or technical occupations are located outside of Rarotonga.

Table 2.11
Economically active population 15 years and over by major industry division and occupation for Cook Islands and for Rarotonga

By Industry Division			By Occupation		
Category	CI %	Rarotonga %	Category	CI %	Rarotonga %
Agriculture & Fishing	17.7	6.7	Professional & technical	14.5	14.9
Manufacturing	7.0	9.5	Clerical & administrative	17.9	23.1
Construction	6.7	7.0	Sales & service	18.7	22.9
Trade, hotels & restaurants	16.7	21.7	Production workers & labourers	27.7	30.1
Business & Finance services	3.1	4.4	Agriculture & Fishermen	15.2	5.2
Community Services	42.5	46.5	Other	6.0	3.8
Not classified	6.3	4.2			

2.4 Natural Resource and Environmental Issues

2.4.1 Land availability

Through Land Court policies during the early part of the colonial era (1901-1965), land title became extremely fragmented. From 1946 occupation rights were granted to one or more individual co-owners of a title and it was on these lands that agriculture became highly productive. Except for a small area of Crown Land used for public purposes, all land is in the hands of the people. The sale of land is prohibited and the only transfers permitted, other than inheritance, are by lease and occupation rights (Crocombe, 1987).

With its narrow coastal fringe of arable land and a population of about 10,000 people, Rarotonga is more urban than rural. Most live on wages and salaries, some by casual employment supplemented by a little farming for subsistence or cash, but only a few are full-time farmers. Multiple ownership is so complex that many urban workers cannot obtain leases or occupation rights (Crocombe, 1987).

These highly complex tenurial arrangements also make it more difficult to impose land-use controls than would be the case if land was held under simple title. But this does not mean that comprehensive physical planning and the imposition of controls can not be applied. Land use can still be controlled through a consultation and cooperation process involving the people. After all, the land use controls are devised by the people.

2.4.2 Agriculture

Soil Erosion

Soil erosion is the main land management problem, although in a sense, some erosion can be allied to the land tenure problem where, depending on the multiple-ownership and occupation arrangements, some land is intensively cultivated continually, while other land is not used or under-used.

Soil erosion does not result only from poor cultivation and other agricultural practices. Any land disturbance, notably the improper use of heavy machinery for roadwork and site preparation, can contribute. Nevertheless, it is the poor cultivation and tillage practices of farmers and of the roads constructed to service the farmers which have produced some of the worst examples of soil erosion, particularly on Atiu and Mangaia, but also to lesser degrees on Rarotonga, Mauke and Aitutaki.

On Mangaia, the roads constructed to support the pineapple industry became major sources of soil erosion. Roads were frequently constructed up steep slopes, and without any attention to surface drainage. Where roading required cut and fill, the cuts were not battered to assist revegetation but left vertical; the fill batters were not sown to aid revegetation. Culverts to drain runoff from the road pavement are absent. Severe erosion has consequently occurred of the table drains, pavement and batters.

The pineapples were planted on quite steep fernland slopes, the rows not following the contour but running straight up and down the slope. Severe sheet, rill and gully erosion have also occurred on the unfarmed fernlands which have frequently been denuded by fire.

Atiu was also formerly a major pineapple producing island, but high transport costs and declining market prices caused the industry to collapse. During the peak production period, the available central hills of Atiu were planted to pineapples. Again, quite steep slopes were cultivated with lack of attention to soil conservation practices. As a result, severe erosion has occurred. The rates and volumes of surface runoff are much higher, flash flooding occurs and streams which previously were perennial are now dry for up to eight months of the year.

This erosion on Mangaia and Atiu has had a serious effect on the production of taro. The increased surface water runoff has caused the stream beds to be lowered preventing irrigation water being taken off for the upper levels of the taro swamps, while topsoil and clay deposited in the drainage areas of the taro swamps have blocked drainage outlets, causing the lower levels to flood.

The installation of new and improved diversion weirs, improved irrigation and drainage canals, and of access tracks within the taro swamps is planned for Atiu, and an irrigation dam is under construction on Mauke.

Agricultural chemicals

The use and misuse of fertilisers and particularly of biocides must constitute an area of significant concern. But this is of conjecture as there is a lack of data; and there is no proper chemical residue monitoring system for soil, plant and water at production end of the spectrum, or of toxins and chemical residues in meat, seafood, vegetables and fruit at the consumption end.

However, it would indeed be surprising if there were no problems; that this might be otherwise is suggested by Carew-Reid (1989) who reported the pouring of a 44 gallon drum of dieldrin into a lagoon in 1976 to kill fish. Such spills can constitute a long-term threat to consumers of seafood because of both the toxicity and the persistence of such pesticides in the food chain.

2.4.3 Water

A major environmental concern for the Northern Islands is wastage of stored rainwater. Many domestic tanks are in poor condition and leak, and/or taps drip. Tank size also is frequently too small and MOPED (1991) considered households needed a minimum tank capacity of 2000 gallons, twice the size of the current Government-sponsored tank supply scheme. With a usual 3-4 months dry season, an average household of 4 persons using 4 gallons a day needs a 2000 gallon storage to tide them over till the rains return.

Many tanks, on public buildings also are poorly maintained, and so in need of cleaning as to constitute a health risk. Self-cleaning tank designs and cheap but safe compounds for sealing porous concrete and cracks in tanks need to be introduced. Household training is needed in tank maintenance.

The current program for monitoring groundwater or surface water consists of limited analysis for quality on Rarotonga, and on the Outer Islands, of occasional samples for coliform counts and biological oxygen demand. The monitoring system needs upgrading.

2.4.4 Coastal resource and marine environment

Coastal zone

The coastal zone is the area of greatest concern to the CIG. Coastal degradation and extensive landloss is a major problem in Cook Islands, most notably on Rarotonga, and to a lesser extent on Aitutaki.

Beach mining has been a major environmental problem Other significant contributors to environmental degradation have been the development of infrastructure and the construction of houses on the foreshore. The construction of badly designed, wave-deflecting, retaining walls on Rarotonga has also proved to be quite destructive to neighbouring foreshore areas.

Enormous quantities of sand and gravel have been removed from the beaches of Rarotonga since the 1960's for use in construction and as road metal respectively. The marked degradation of the beaches sparked a strong reaction because of the loss of intrinsic value.

The voiced concern was strengthened by the realisation that a major economic asset for tourism was diminishing. Legal approaches were adopted for protection of the foreshore against mining but these have not worked; nor are they likely to until alternative economic sources for the supply of construction grade sand are established.

Inland erosion from garden and other devegetated areas, soil and water pollution from poor agricultural practices and from industrial chemicals, plus litter all contribute to coastal degradation on Rarotonga. Siltation of volcanic soil washed from poorly implemented development in the river valleys down into the lagoons over the past 50

years has badly affected lagoon productivity. The acidity and clogging nature of the sediment kills the coral, the basis of the entire coastal ecosystem.

Marine resource

Shellfish and crustaceans are highly prized and over-harvesting is a recognised problem. Trochus, for example, which was introduced to Aitutaki in 1957 was initially harvested beyond the sustainable level of production. But the Fisheries Division quickly introduced controls on minimum size and restricted harvest to a specified period of one or more days per year.

Pearl shell continues to be a valuable resource in the Northern Group and there is now strong interest in the cultivation of black pearl. A production scheme has been successfully initiated in the Manihiki lagoon over the past two years, and there is interest in extending cultivation to the Penrhyn and Suwarrow where wild oyster stocks exist. USAID has assisted with financing a revolving fund for the supply of equipment for pearl farming and a major USAID project is in the pipeline for pearlshell cultivation on Suwarrow, subject to the preparation of a satisfactory environmental management plan.

The main environmental concern would be for over-harvesting of the shellfish resources, and, in Manihiki, of increasing pollution of the lagoon to the point where pearl cultivation is affected.

Marine oil pollution

It is well recognised that a major oil spill could spell disaster for island economies. The Cook Islands Country Report (UNDP, 1990) states that "Apart from the odd oil spills on the harbour and diesel spills into one of the major streams on Rarotonga from its electric power plant, there are no major spills of toxic substances in the Cook Islands .....". Such harbour spills have been dealt with by the Department of Trade, Labour and Transport.

Carew-Reid (1989) refers to a 1981 incident where a fishing boat broke up off the Cook Islands and spilled 70 tonnes of fuel oil along the fringing reef; he also refers to a much earlier incident when a tanker carrying coconut oil foundered at Fanning Island to the north of the Cook Islands and the oil caused extensive damage to the reef and coastal zone.

There have been no spills in the past ten years; but this is simply fortuitous.

2.4.5 Protected areas and conservation of biological diversity

The rationale for conservation is based on the concept of sustainable use of living resources (IUCN, 1980). Specific objectives are to maintain ecological processes and life-support systems, preserve genetic diversity, and ensure the sustainable utilisation of species and ecosystems. Biological diversity refers to the variety of living organisms and the variety of habitats, biotic communities and ecological processes in the biosphere (UNEP, 1988).

The establishment and management of protected areas through legal or customary processes is an effective way of conserving biological resources to help a nation, and mankind, meet the material and cultural needs of this and future generations.

On Rarotonga, development pressure has focussed on the narrow coastal strip, frequently no more than a kilometre wide, and this strip has long been cleared of virtually all lowland rainforest for agriculture and human settlement. The steep mountainous terrain has protected much of the native vegetation above 250 metres, and biotic communities of considerable conservation importance are still found.

The Outer Islands have also been reshaped by man mainly for agricultural development, but the development pressure has been less intense and consequently there are areas which still form a valuable part of the natural heritage of the Cook Islands (Paine, 1989).

The present protected areas system comprises a single site, the 0.4 sq km uninhabited Suwarrow National Park, covering less than 0.1% of the total land area. This leaves unprotected a number of important ecosystems, including various forest formations, closed lagoons and fringing reefs, as well as endemic plant and animal species.

The progressive loss of habitat has severely reduced the range of a number of endemics. Introduced plants and animals may also pose a particular danger to native and endemic species. Thus, for example, the endemic Rarotongan flycatcher (Kakerori) is endangered by both habitat loss and introduced rats.

A number of recommendations have been made over the years for the establishment of marine and terrestrial protected areas, but attempts to implement those recommendations have been unsuccessful due to rejection by landowners or of insufficient financial resources to compensate landowners.

Even given the necessary funds, there is still a need for the conduct of a sustained educational program for landowners before the protected area principle is likely to be more readily accepted. But it is also heartening to note that, in recent years, land owners have been involved in protected area planning from the outset to avoid land use conflict and this in combination with the education program is likely to generate significant future improvement in the protected areas system.

2.4.6 Waste

Solid waste

Solid waste disposal is a common problem for the Pacific. In the Cook Islands, the problem is seen in the major population centre of Rarotonga, and also in some of the northern atolls.

A garbage disposal problem in Rarotonga is the acquisition of suitable land due to ownership constraints. There are two garbage dumps now, one at Titikaveka and the other near the airport at Panama. The site for a third dump is under EIA investigation at Arorangi. Both the Titikaveka and Arorangi sites are in swampy, former taro gardens behind the foreshore zone. The owners of the land see garbage disposal as a means of site reclamation for real estate purposes.

An effort is made at dump management with separation of solid wastes, but split responsibilities between Internal Affairs, Works and Health Departments fragment effort. Daytime management is also defeated to some extent by night-time phantom dumpers who dump all sorts of rubbish indiscriminately. Drainage is blocked, water ponds and provides a breeding ground for mosquitoes.

Other unauthorised garbage dumps develop in areas where sand pits have been left from previous mining for building construction. An example is seen at Arorangi.

On other islands, rubbish is dumped directly into the lagoon in Manihiki and Rakahanga, is piled into World War 2 aircraft dispersal bunkers on Aitutaki, and simply dumped beside the road on Mangaia. In contrast, Mauke has a well managed dump. In the Outer Islands, all dumps are, in theory, under the control of the Island Councils. But that control is severely hampered by the lack of a small dozer and truck to handle rubbish.

Another problem is the increasing volume of waste products of the modern packaging industry in the form of plastic bags and wrap, aluminium drink cans, and glass bottles. This is being tackled by the Environmental Sub-Committee of the Chamber of Commerce which has adopted waste management as an ongoing project, concentrating initially on aluminium can recycling and rubbish separation to assist other recycling opportunities.

A particular problem has been reported on Manihiki with the disposal of waste from cleaning of pearl shell which is dumped along with other kitchen and household refuse into the lagoon. Toilets also discharge directly into the lagoon. Thus there is concern that the pollution may constitute a real threat to the newly established black pearl culture in the Manihiki lagoon.

3. RESPONSES TO DEVELOPMENT/ENVIRONMENT ISSUES

3.1 Government, Policies, Legislation, and Other Developments

3.1.1 Environmental policy of the Cook Islands Government

Current environmental policy is stated within the Manifesto of the ruling Cook Islands Party. This manifesto (31 January 1989), with regard to the environment, can be summarised as:

1. Continued support for the Conservation Council but with the Council membership more representative of community views and concerns.

2. To improve environmental education with conservation as a part of the school curriculum and a subject for the Cook Islands School Certificate.

3. The CICS to work with Island Councils to develop and implement practical, island-specific, conservation plans.

4. The appointment, in due course, of a conservation officer to assist each Island Council implement its conservation plan.

5. Review of the operation of the Conservation Act 1986/87, especially with regard to coastal zone management and regulation.

6. The application of EIA procedure to all major development projects to assist planners recognise and mitigate adverse impacts.

The RETA/NEMS project will generate further policy recommendations for consideration by Cabinet.

3.1.2 Legislation

There is a considerable body of formal legislation of environmental import in Cook Islands; and there are traditional rules and practices, called Ra'ui.

Conservation Act

Separate environmental legislation was first promulgated in 1975 as the Conservation Act (1975). This Act was subsequently repealed and replaced by the Conservation Act 1986-87. The Act binds the Crown. It established the Cook Islands Conservation Service (CICS), provided for protection of the environment and natural resources, and for the establishment of National Parks and Reserves. The original draft also included an EIA process but this was left out of the final Bill.

The Conservation Act 1986-87 established the CICS as a Corporation, independent of day to day Public Service administration, and responsible through a Conservation Council to the Minister of Conservation. The Minister appoints the five Members of Council, of whom the Director of the CICS is one. The Director serves as Council Chairman. The Director's activities are subject to the consent of Council.

However, the Conservation Act does not apply to the Northern Group islands which are still working to the old Ordinance of the Cook Islands (1916-1965) which contains by-laws to protect wildlife, and designate areas for specific public purposes. In the Southern Group, the Act applies in whole only to the islands of Rarotonga and Aitutaki. Only Parts VII and VIII of the Act (which relate to pollution of the territorial sea and all inland waters, and marine casualties) apply to other southern islands; environmental protection and regulation on those islands remain the responsibility of the individual Island Councils (local government). The Act will not be brought into full force on the other islands until island concerns about the application of the Act, including the definition of

Flies are a real problem on Manihiki, and must, at least in part, stem from poor organic waste disposal practices.

Sewage

Sewage disposal is considered a problem only on Rarotonga. However, the extent of the problem there and the possibility of similar problems elsewhere in the Outer Islands, is simply not known because there has been a lack of monitoring of surface and groundwater, and of marine water quality particularly in the lagoons. Nor has the environmental and health consequences of the practice of spreading septic tank sludge over orchard lands as fertiliser received recent attention. That a problem may exist in some areas of Rarotonga is suggested by the occurrence of algal growth on coastal rocks and in some stream sections, pointing to nutrient rich waters. Agricultural chemicals may also contribute.

the foreshore zone, are addressed, and then not until such time when suitable officers from those islands have been trained and made familiar with the Act and its enforcement.

The main concern has been for Rarotonga and Aitutaki as these are the principal islands affected by pollution and damage to beaches (or potential damage).

The Coastal Zone provisions (Part VI) and the Control of Litter (Part X) are the most widely known specific provisions of the Act. Indeed this is so to such an extent that in some quarters the CICS is seen as a body of litter inspectors and the like; and conservation is seen as a negative activity, opposed to economic development, rather than as the foundation on which economic development must be built if it is to be sustained in the long term.

The Coastal Zone is defined as the Foreshore and Coastal Waters. The Foreshore Zone is defined as the area extending 50 metres landward of the mean low water (tide) mark and including all streams and a 5 metre strip along each stream bank. For such small islands as the Cook Islands, where any disturbance from the watershed divide to the fringing reef could impact the Coastal Zone, the restriction of environmental regulation to that zone would seem somewhat narrow.

The Foreshore Zone definition is also inappropriate to those Outer Islands with a makatea and has been a contributory factor to the rejection of the application of the Conservation Act to them.

The Act has again been under review and it is the intent that the essential EIA provisions which were lost are again introduced, as well as address other administrative deficiencies.

Marine Resources Act

A new Marine Resources Act, 1989 came into force on 1 February 1990. This Act repealed and consolidated various separate statutes previously administered by the Ministry of Marine Resources.

Part 1 of the Act provides for the management and development of fisheries and related matters. In particular, it empowers Island Councils together with local fisheries committees with the management and development of their fisheries, including all aquatic plants and animals. Part 2 of the Act provides for the regulation of foreign fishing or research vessels operating in the EEZ, while Part 3 empowers the arrest of vessels illegally fishing within the EEZ and Territorial Waters.

In essence, the Marine Resources Act provides for sustainable development of fisheries resources and accession to regional conventions such as the Driftnet Convention signed in November 1989.

Other legislation

There is a wide body of other legislation which contains provisions relating to environmental management.

Cook Islands Act, 1915: taking and reserving land for public purposes such as Recreation Reserves, establishing Native Reserves for the protection of historic sites or areas of scenic interest, water supply sources, recreation grounds.

Cook Islands Amendment Act, 1970

Territorial Sea and Exclusive Economic Zone Act, 1977

Outer Islands Local Government Act, 1987

Landuse Act, 1969

The Public Health Act and Ordinances, 1984

Building Control and Standards Act, 1968

Local Government Act, 1989: there are currently no conservation bylaws.

Harbour Control Act, 1971

Animal Act, 1975

Crimes Act, 1969

Noise Control Act, 1986

This body of legislation should be reviewed to ensure the environmental provisions contained in them are still relevant, and not in conflict. Relevant provisions should be mirrored in the Conservation Act, 1986-87, as this Act must serve as the 'umbrella' environmental legislation, taking precedence over other legislation on environmental matters.

Ra'ui

The literature also refers to the traditional conservation practice, the "Ra'ui" (=prohibition) applied by traditional village leaders and enforced by the Island Council. The Ra'ui appears to be aimed particularly at the conservation of food resources or at cultural safeguards, rather than as a specific environmental protection mechanism. A Ra'ui may be used to preserve or restrict access to land, lagoons and reef areas for the conservation of food, coconuts and marine resources. The traditional objective of Ra'ui was to allow a resource to recover for or after a special event, or to improve the yield of a particular resource, such as pearl shell. Unfortunately, it is often said that Ra'ui are these days more often observed in the breach, with the possible exception of Pukapuka and Nassau where the application of Ra'ui is really a matter of survival.

3.1.3 International and regional conventions

The Cook Islands has been an early signatory to various conventions. These are:

a) South Pacific Forum Fisheries Agency Convention, signed 1980.

b) Law of the Sea Convention; signed Sept 1982, not ratified;

c) South Pacific Nuclear Free Zone Treaty (Rarotonga Treaty), signed 1985;

d) Convention for the Protection of the Natural Resources and Environment of the Pacific Region:

Protocol on the Prevention of Pollution of the South Pacific Region by Dumping; protocol on Co-operation in Combating Pollution; signed 25 Nov 1986, ratified 9 September 1987;

e) Convention on the Conservation of Nature in the South Pacific (Apia Convention), signed and ratified 24 June 1987;

It is understood that, prior to self-government, New Zealand signed CITES on behalf of Cook Islands and Tokelau. After self-government, the Cook Islands has to approve such treaties signed for it by NZ. In the case of CITES, however, this approval can not be given because the traditional use of turtle in the Cook Islands would be banned under CITES.

3.1.4 Environmental impact assessment (EIA)

The CICS has no capacity at present to conduct environmental impact assessments. As a member of SPREP,

it does have recourse to that organisation's assistance which is freely given; SPREP, having decided that the problem is one with which it should be concerned would either undertake the EIA from within its own specialist resources or commission a study. Nevertheless, the CIG needs to have some EIA capacity and that is being addressed both through attendance by two CIG officers (MOPED and CICS) at the recent regional EIA Training Course, and through the RETA.

The RETA training should involve staff from all relevant CIG departments. A workshop is planned for this purpose, and should raise awareness of the importance of the EIA tool for sustained economic development within government ranks. Government ministers and other politicians would normally have little access to such workshops, and special attention will be paid to the conduct of a closed session for the policy makers.

At the operational level, with both MOPED and CICS having fundamental involvement in the conduct of EIA, improved dialogue is needed between these two groups and a system devised whereby all project proposals submitted to the CIG for economic consideration are automatically referred to CICS through MOPED for CICS opinion on whether or not an EIA should be conducted. Where it is deemed that an EIA should be required, then there may be merit in the Cook Islands context of the MOPED taking administrative responsibility for the EIA conduct, calling on CICS assistance for its technical expertise.

Private investment proposals are submitted to the Monetary Board, and it would therefore be necessary to make mandatory the referral of such proposals by the Board through MOPED for consideration of an EIA need by the CICS.

3.1.5 Environmental management planning

The Cook Islands has sought the development of national environmental management plans since the enactment of the Conservation Act in 1987 and the establishment of the CICS. At the request of the Mauke and Aitutaki Island Councils, the CICS has drafted conservation plans for each island, and the Mauke Island Council has recently taken the initial step of indicating acceptance of their draft in the process leading to formal acceptance.

With the Regional Environmental Technical Assistance Program, conservation/environmental management plans will be prepared for each of the inhabited islands of the Southern Group and for selected representative islands of the Northern Group. This activity is planned for completion by the end of 1992. The preparation of management plans will be greatly assisted in Manihiki, Penrhyn and Mangaia by the earlier preparation of integrated island development plans for those islands, and by the planned separate preparation of similar plans for other islands of the Northern Group.

3.1.6 Institutional Developments

Cook Islands Conservation Service

The Conservation Act 1986/87 established a Conservation Council which is responsible for the Administration of the Act. Administration is discharged through a Corporation, the Conservation Service.

The CICS has a staff of 9, of whom 7 are based on Rarotonga. With the localisation of the Director's position in May 1990, all CICS staff are Cook Islanders. Staff comprise:

- Director, CICS
- Senior Conservation Officer (Coastal Zone),
- Conservation Officer (Medical Herbs),
- Conservation Officer (Aitutaki),
- Conservation Officer (Wildlife),
- Park Ranger,
- Secretary/Information Officer,
- Administration Officer, and

. Caretaker of Suwarrow National Park.

There is a large operational gap in the CICS structure between the Director and his next senior officer of about 3 levels -Principal Conservation Officer, Chief Conservation Officer and Deputy Director. This forces the Director to undertake tasks which would be more properly handled at a more junior level, freeing him to tackle the major issues of environmental planning and implementation.

The CICS budget is very limited, especially for recurrent operational funds.

3.2 Specific Programs and Projects

3.2.1 Work program of the CICS

The CICS currently has four work programmes apart from administration of the Service: Foreshore; Wildlife; Education; and Cultural Conservation.

Foreshore: Environmental attention has focussed primarily on the main island of Rarotonga for obvious reasons. However, the effort has been ad hoc in nature. Much of the business of the Conservation Council is directed towards applications for activities or development in the Foreshore Zone of Rarotonga and, to a lesser extent, Aitutaki.

Wildlife: The Kakerori (Rarotonga Flycatcher) is an endangered species endemic only to Rarotonga. A species recovery program has been operating successfully through the efforts of the CICS and the Ecology Division of the New Zealand DSIR, and with funding assistance from SPREP and the Rainbow Warrior Trust Fund. Another endangered species is the Mangaian kingfisher; while the Tahitian lorikeet, Atiu swiftlet and Rarotonga starling are considered species at risk. Baseline studies have been completed on Suwarrow and Takutea islands.

Public awareness: Effort has been directed towards public education through radio programs and, until privatisation made the advertising exercise effort too expensive, the local newspaper. Wildlife posters have been prepared and the first in a planned series of Pacific Wildlife Readers has been produced. A television documentary on wildlife of the Cook Islands has been produced by the New Zealand Wildlife Unit.

Cultural conservation: Maori traditional medicine uses many local herbs for effecting cures for a wide range of medical conditions. The traditional use of herbs for medicinal purposes is being documented and a special herb garden is planned at Ngatangiia on Rarotonga to ensure their preservation.

There are 17 specific projects for the Cook Islands included in the SPREP 1990-1991 Work Plan. These are:

1. Traditional resource management knowledge, Pukapuka. NR3/91-92
2. Status and conservation of Kakerori. PA 1/91/92 (see above)
3. Medicinal herb conservation PA 18/91-92 (see above)
4. Sewage outfall EIA for Rarotonga. CM 2/91-92
5. Coastal management plan, Rarotonga and Aitutaki. CM 3/91-92
6. Alternatives to beach sand mining. CM 25/91-92
7. Baseline marine water quality study for Rarotonga and Aitutaki. SPOL 16/91-92
8. Recycling programme. LWP 1/91-92
9. Nature programme series. EE 3/91-92
10. In-country environment media workshop. EE 5/91-92
11. Public education nature programme. EE 32/91-92 (see above)
12. Outer island conservation plans. EP 2/91-92
13. EIA assistance, Cook Islands. EP 3/91-92
14. Northern Cook Islands archipelago conservation strategy. EP 4/91-92
15. EIA workshop. EP 5/91-92
16. EIA of dredging plan for Ngatangiia Harbour. EP 23/91-92

17. In-depth studies of potential sea level rise impacts on a low island and a high island. CLIM 2/91-92

3.2.2 Land use capability project

This major New Zealand-funded project will apply to the whole of the Southern Group. The project commenced in 1989 and Atiu was completed in 1990 as a first case study. Mangaia will be undertaken next. The project involves a multi-departmental CIG team including Survey, Forestry, Agriculture and the CICS, coordinated by the Chief Surveyor.

The project aims for the Atiu case study were to:

- develop a land use capability method from which Cook Island officials can retrieve information relevant to sustainable land use;
- prepare orthophoto map bases;
- provide a system which allows the physical land resource information to be integrated with the agronomic requirements of present and potential crops;
- assist in the prevention of soil erosion;
- identify areas of land requiring protective or preventative action, or which would assist diversification of sustainable agricultural development;
- train Cook Island project team members to maintain, develop and apply the landuse capability system; and
- develop a training program so the system can be used on other islands by Cook Islands staff.

3.2.3 Management plan on oil pollution

While serious spills have occurred in the past, the last decade has been accident-free. But this is only a matter of good fortune and the important question for Cook Islands is whether it is fully prepared to handle a major oil spill swiftly and effectively. To do that requires ready access to equipment, chemicals and practice. A Contingency Plan was drafted in 1981, and has recently been reviewed by an Implementation Agencies Group comprising representatives of the CICS, Police, TLT and the Oil Companies. When finalised, the plan will be implemented as a Management Plan on Oil Pollution under the provisions of the Conservation Act 1986-87.

The development of an efficient response capacity will require close collaboration between CICS and TLT in mounting a number of dummy action runs, preferably in concert with New Zealand authorities.

3.2.4 FAO Soil Conservation Project

It is recognised that the problem of soil erosion, flooding and blocked access drains on Mangaia and Atiu will not be overcome unless considerably greater effort is devoted to a planned combination of reforestation and groundcover establishment, especially in the gullies and steeper areas of the catchments, coupled with simple and affordable soil erosion engineering control works.

Recent emphasis has been on reforestation alone, and while this will help to retard sheet and rill erosion, the gully erosion problem is so severe in some fernlands and in the former pineapple cultivation areas that a major effort is now required on engineering works, including gully headworks, water diversion works, reshaping of

gullies and rill areas, bedding down of roads, and establishment of a vigorous ground cover.

The FAO Soil Conservation Project aims to draft regulations under the Conservation Act to assist consolidate efforts of the Forestry Service and the CICS to control, manage and protect soil erosion.

3.2.5 Afforestation project

An afforestation program with exotic tree species was initiated with New Zealand funding, mainly on Mangaia, but also on Atiu. The primary purpose of the afforestation was to help control severe erosion which has developed on those islands, and thereby reduce the rate of deposition of sediment in the taro production areas.

While advanced gullying continues on the former pineapple cultivation areas, the afforestation efforts have concentrated on the eroding uncultivated fernland catchments as these were considered the immediate direct threat to the taro planting areas. On Mangaia, runoff from much of the old pineapple area does not drain into the main taro gardens, but rather to the inner wall of the makatea.

When the pineapple industry collapsed, most -but not all- of the cultivation area rapidly developed a ground cover of weeds/grass and shrubs. However, areas of bad topsoil erosion have not been colonised to anywhere near the same degree and are still actively eroding. Thus an urgent need is seen to extend the afforestation activity on Mangaia to the former pineapple areas, particularly those sub-catchments with severe erosion; activity on Atiu should also be greatly expanded.

Although erosion on Mauke is much less severe than Atiu or Mangaia, active erosion is evident. A small afforestation program has commenced on Mauke, and this should continue.

Labour is limited on the Outer Islands, but a concerted afforestation effort needs to be mounted using all available labour, rather than continue to plant trees at a rate perhaps timed more to the expected plantation rotation length and future needs for sawn timber and post material. As discussed elsewhere, afforestation should be undertaken within the framework of a soil rehabilitation plan for the eroded areas employing both engineering and vegetative means.

3.2.6 National parks and reserves development

The only formally established protected area is the Suwarrow National Park. This is the uninhabited island of Suwarrow, 0.4 sq km in area. Baseline studies of the National Park have been commenced by the CICS. A CICS caretaker and his family live on the island.

The CICS has investigated three areas of special biological interest and have prepared Nature Reserve concept documents on each. These are the Kakerori Nature Reserve which aims to increase the protection for the Rarotongan flycatcher; the Te Manga Nature Reserve which could assist protection for unique flora of the Mist Zone; and the Takutea Nature Reserve, which would draw attention to the need for protection for five species of sea-birds which breed only on Takutea and Suwarrow. The species are the Brown Booby, Masked Booby, Black Noddy, Red-footed Booby and the Greater Frigatebird.

With the full support of the CIG and the landowners of Atiu, the CICS intends to declare Takutea as a National Park which would provide official protection for the wildlife.

An earlier move by the CIG to establish a World Marine Park on the atoll of Manuae was successfully resisted by the traditional owners who objected to inadequate community consultation, seeing the proposal as a concept of outsiders from Rarotonga which was being imposed on them.

3.2.7 Waste disposal -solid waste

With the increasing population, waste disposal is an increasing problem and well recognised as such. CICS concern has focussed mainly on solid waste management, from garbage dump to public rubbish containers to public littering and, in an attempt to reduce the volume of rubbish, intends to mount a recycling campaign for aluminium cans. It is also looking at possible recycling of other waste products.

The Cook Islands Chamber of Commerce has established an Environmental Sub-Committee which has adopted waste management as its first target. This will be an on-going and hands-on project. The Environmental Sub-Committee's current objectives are to:

- sponsor sorting of rubbish by categories;
- provide active support to an aluminium can recycling company;
- establish a bottle dump on a bottle refund basis;
- promote beautification of business premises; and
- provide a direct point of contact between Government and the private sector on environmental issues.

The Chamber of Commerce Environmental Sub-Committee is actively supporting the CICS and is itself requesting the conduct of an EIA on a proposed tourist infrastructure project.

3.2.8 Energy

On Rarotonga, a major electricity upgrade has commenced with French assistance, which includes a cross-island transmission line. This is a major development and the CICS has pressed successfully to ensure environmental protection measures are observed. An earlier proposal for a wood-fired steam generation on Rarotonga was abandoned because of the excessive demands the firewood plantations would make on available land to ensure a continuous supply of fuel. The CIG retains an interest though in establishing small steam-powered generators on islands such as Atiu and Mangaia.

Alternative energy

Mitiaro had a number of houses equipped with solar photovoltaic cell systems but failures of expensive low voltage fluorescent lights made the approach unpopular. The CIG has attempted again to introduce solar power systems and a pilot project is underway on Pukapuka. The government proposes to extend solar power systems to the remainder of the Northern Group, subject to the favourable results of the Pukapuka trial.

Solar power is, however, perceived as inconvenient because it entails regular maintenance of 12 and 24 volt batteries; if the batteries fail, many consumers say they cannot afford replacements. This perception may be nullified with user experience and as improved technology is introduced.

3.2.9 Outer Island Development Plans

MOPED is coordinating the preparation of development plans for the Outer Islands, focussing first on the Northern Group. A draft plan has been completed for Manihiki. The preparation of these plans should be undertaken in conjunction with the development of environmental management strategies for the same islands.

The CICS were fully aware of the MOPED project but CICS' direct involvement was not sought, and the draft Manihiki report produced without consultation with the CICS. The RETA Task Force has indicated that the preparation of further development plans will directly involve the CICS, with the activities of the RETA and the Outer Island Development Plans Projects closely integrated.

3.2.10 Tourist Master Plan

A Tourist Master Plan is currently being developed for the Cook Islands. This would appear to be a comprehensive plan which sees tourism as the major earner of foreign exchange and attempts to set the broad spectrum of development within this top priority area.

Environmental protection is seen as central to the future of the tourist industry.

3.2.11 Rarotonga town plan

There is no urban development plan for the Rarotonga. A town plan was prepared in 1973 for the Avarua and Avatiu central business area, but it was never accepted by Government. A Town Planning Code was designed but never adopted. Such planning is an urgent need for the Survey and Public Works functions of government for orderly and efficient development.

3.3 Education, Public Awareness and Public Participation

3.3.1 Education and public awareness

The CIG aims to make the public more aware of environmental issues, and to impress on the public the need for personal and community involvement in resolving such problems or in preventing their occurrence.

The CICS has put considerable effort into promoting environmental messages through the passive media of posters, brochures, nature trail handbooks for Atiu and Rarotonga, and through support of a NZ-funded 50 minute TV documentary on the work of the CICS. More such activity is needed and is planned. There has been little focus as yet on active educational processes. The first need usually referred to in the literature is for the preparation of environmental curricula and teaching materials which are relevant to Cook Islands.

Little reference is seen to perhaps the most important avenue; that is the use of agricultural and forestry 'extension' staff to play an active environmental role in their normal one-to-one contact with their clients. These are the officers who, having gained the confidence of the island communities and farmers with whom they are dealing, will be most influential in altering environmental perceptions and environmentally damaging land-use practices. Thus, a concerted training effort on environmental principles, etc., should be directed to the staff of the Ministry of Agriculture.

3.3.2 Public participation

CIG is quite conscious of the need for public participation and community involvement in government. And the Conservation Act, 1986-87 specifies (Part I, clause 8(b)) that of the four members of the Conservation Council, other than the Director of Conservation, one shall be appointed from the private sector.

The appointments on the Council were changed this year to give greater representation to village opinion. This step is intended to promote broader public participation in environmental administration.

But, as currently constituted, the Conservation Council is essentially a special Council on environment issues for Rarotonga with no direct representation from other islands. All islands, excluding Rarotonga, have their own Island Council which is the local level of government.

If the Conservation Council is to be seen as a national body, then it needs some form of representation of the Outer Islands as well, and also wider representation of the community, including private sector and community organisations.

The resulting unavoidable increase in the size of the Council need not present administrative or executive problems if an executive group is elected within Council, with the delegated power to make and implement decisions within the framework of policy agreed to by Council; the executive would also need to take immediate action in the case of an emergency without the necessity of calling a full meeting of Council.

There is currently an Outer Islands Telecommunications program underway to install satellite earth stations and small-scale digital telephone exchanges and subscriber connection equipment on Mauke, Atiu, Manihiki, Penrhyn and Pukapuka islands. When this is completed, consideration could be given to the greater use of conference phones and facsimile machines to facilitate Council Meetings without the need for travel by members from those islands to Rarotonga.

4. PLANNING FOR SUSTAINABLE DEVELOPMENT

4.1 Prioritising Sustainability Issues

4.1.1 Foreshore/coastal development

As a nation of small islands, protection of the coastal zone is the highest national priority. And the main thrust of the RETA will be to develop EMS for this zone; island conservation plans and coastal zone management programs will be one and the same thing.

Mining of the foreshore for sand and aggregate for construction purposes remains of great concern to the CIG, despite controlling legislation and despite the great importance of maintaining attractive beaches for tourism promotion.

4.1.2 Protected area development

Despite the limited success in the implementation of recommendations made over the years for the establishment of further marine protected areas and terrestrial protected areas, this remains an area of high priority in order to safeguard a number of important ecosystems and endemic species.

4.1.3 Tourism industry development

Tourism has replaced agriculture as the main earner of foreign exchange and is the foundation for the future economy of the nation. The Cook Islands Tourism Forum (Nov.1989) urged the CIG to promote local entrepreneurial tourism initiatives, and a number of organisations have recognised the economic potential of this sector. And a Tourism Master Plan for the country is currently being prepared.

Development aid can most usefully, and as a high priority, focus on the balanced development of the tourism industry, particularly of eco-tourism activity. This embraces tourism infrastructure development of hotels and facilities, roads and transportation, communications, etc., but in the context of protecting the natural and cultural environment of the Cook Islands.

For the tourist industry hinges on maintaining the ambience of the Cook Islands, the strong drawcard for the tourist in the first place. The Cook Islands people are a critical element in that appeal.

4.1.4 Human settlement development

Human settlement issues represent a further area of high priority for sustainable development, especially so for Rarotonga, and, to a lesser extent, for Aitutaki.

Urban planning within the context of an overall island land use plan is a vital need for rational development of urban housing and services. Planning must strive for the best use of the available land. With limited arable additional arable land, the nation cannot sustain the continued sprawl of urban house construction on to the better agricultural land, and the alienation of top farming land through subdivision for non-productive purposes. Neither should houses continue to be built on excessively steep slopes, with their attendant erosion, roading and other servicing problems.

4.1.5 Agricultural practices

A fifth area recognised by government as high priority is for the wider adoption of environmentally safe agricultural practices.

Such practices include cultivation practices which do not accelerate soil erosion, including the proper use of agricultural equipment; design and maintenance of agricultural roads; the use of agricultural chemicals, including fertiliser and biocides.

4.2 Constraints to the Sustainable Use of Resources and Environment

4.2.1 Lack of effective EIA process

There is no legal requirement for a process of investigation of the likely environmental consequences of a major development proposal, nor even any mechanism stipulated by law for the conduct of screening, and preliminary investigation of proponents submissions. This will be addressed in the review of the Conservation Act.

4.2.2 Legislative challenge

The Conservation Act 1986-87 is sound legislation but it has a number of deficiencies which markedly limit its application. Further review of the legislation is needed and amendments prepared which address important omissions.

One major concern is that of the legal precedence of the Conservation Act. Other Acts contain environmental provisions. For example, the application of the Marine Resources Act can have significant environmental consequences; both it and the Conservation Act bind the Crown, but there has been no determination in the event of an marine environmental dispute that the Conservation Act as the umbrella environmental legislation takes precedence.

Another major concern is for the lack of requirement for environmental impact assessment in the Conservation Act.

The discussion below highlights other areas of concern.

Environmental Planning

The CICS has drafted conservation plans for Aitutaki and Mauke in consultation with each Island Council. And, under the RETA, management strategies and prioritised management plans will be prepared for the entire country. The need is to amend the Conservation Act to assist implementation of such plans.

The concept of 'coastal zone' needs reconsideration in the Cook Islands context. Any land disturbance on a small island such as Rarotonga has the potential to affect the coastal fringe. A coastal zone management plan, an environmental management plan and a conservation management plan are essentially the same thing for the Cook Islands.

Protected Areas

The establishment and subsequent management of protected areas needs the full co-operation of the customary landowners. The Conservation Act 1986-87 requires amendment to specify procedures and safeguards for leasing customary land for public purposes, such as a national park or reserve.

The management of the reserved area would need to be in the landowners hands, perhaps in the form of a Management Committee, for reservation to be acceptable, with the acceptance of some representation from the CICS on the Committee.

The CICS has had a major amendment of Part IV -National Parks and Reserves- of the Conservation Act drawn up to that effect. This amendment would permit the establishment of a national park or reserve by proclamation, or by way of a shared management regime under a Conservation Lease and its early introduction would be a welcome development for planned conservation action.

Marine Reserves

The planned amendment referred to above applies only to "native land". Further amendment is needed to permit the establishment of Marine Reserves which can provide for control of the over-harvest of shell-fish or crustacea on the reefs and reef flats in specified areas. The control of endangered marine species also requires attention, e.g. turtles.

Beach mining

While mining of the beach for sand and aggregate is prohibited by law, the CICS has had great difficulty in enforcing the provisions. This is particularly difficult when the offence is committed by Government machinery, despite the Conservation Act 1986-87 binding the Crown. The penalties are unrealistically small in the Act for the significance of the offence; with much of the future economic well-being of the country tied to tourist appeal and the beaches being part of that appeal.

While no alternative sources of sand exist for use in cement and mortar, the court may continue to adopt a lenient view towards breaches of the Act. This makes the need for establishing an economically viable, alternative source of sand all the more urgent, and a project is already planned to that end. When this is done, however, there will be no mitigating circumstances and one would expect the law to be applied with full rigour.

Wildlife protection

While there is a provision in the Conservation Act for regulations to protect wildlife, for example by prohibiting the shooting of pigeons and doves, there are no regulations. The current application of the Act is quite weak in this regard.

Littering

Streets which are littered with rubbish do not help promote tourism. The effect of the Act in controlling littering is almost nullified by the extremely small fine which can be imposed on offenders. The fine should be increased substantially, and applied to all, including tourists.

4.2.3 Capacity for environmental monitoring

The need for monitoring systems and regular programs with trained staff is a matter which concerns the CICS, the Agriculture Department and the Public Health Department.

None has the capacity currently to police the registration, storage, sale, safe use and disposal of agricultural chemicals nor to monitor the impact on soil, water, and food of the use of agricultural chemicals, including fertilisers and biocides, and veterinary drugs.

To boost this capacity would require a concerted effort to upgrade laboratory analytical capacity, including the training of field staff for taking soil, plant and food samples, and of specialised laboratory technicians. Detecting a problem is one thing; there must also be the capacity to trace back instances of chemical residues exceeding safe maximum residue limits and to take corrective action.

Because of the considerable cost in recurrent expenditure in such monitoring activity, careful consideration would be required of what analyses can realistically be undertaken within Cook Islands, and what might be more practically handled by, for example, DSIR at their Mt Albert Laboratory in Auckland, NZ.

4.2.4 Lack of resource pricing policy

The CICS considers there is little real appreciation of the true worth to the community of the nation's natural resources. Cook Islands is no different from other countries where people are inclined to take their natural assets

for granted, and even regard resources as inexhaustible.

One method of public education of resource value is to attempt to place a real price on all natural resources and charge people appropriately for their utilisation of the resources, even scaling charges beyond full cost-recovery according to resource scarcity. The cost recovery approach is commonly referred to as the 'user pays principle', and has proved salutary elsewhere in promoting resource conservation.

The other fundamental principle is referred to as the 'polluter pays principle'. As implied, the individual or company who is identified as the polluter pays for the action taken to counter the problem. It is also applied to the situation where a level of pollution is tolerated, or unavoidable, in order to foster development, but the polluter is required to take specified positive action to enhance the environment elsewhere to compensate the community for the damage caused in the development process.

4.2.5 Public education and participation

There is as yet in the Cook Islands a limited perception of environmental issues by the public generally. Indeed it is fair to say that some, both in government and in private industry, regard matters environmental as incidental to the development process rather than intimately bound up with it. And the Conservation Service is seen as an organisation whose intent is to block development in the name of environmental preservation, or merely as a group of litter inspectors and the like, with but a minor place in the overall scheme of government.

Nothing could be further from the truth, the CICS having a very positive and pragmatic approach to environmental planning and management. But these perceptions does exist and need to be changed.

That these perceptions are already changing, is evidenced by the much higher profile now given by the public to the CICS, and the Government's recent formation of the Task Force on Environment and Development. Much yet remains to be done though in bringing environmental issues before the public and encouraging full debate at all society levels.

4.3 Opportunities for Sustainable Development

4.3.1 Urban planning for Rarotonga and Aitutaki

The main business centre on Rarotonga is found in the Avarua and Avatiu area. Business activity is however scattered around the perimeter of Rarotonga in a generally unplanned way, and intermingled with urban housing or agricultural activity.

The provision of electricity, sewage, rubbish collection and other communal services is made that much more difficult, less amenable to efficient use of resources and more costly. The application of proper town planning principles for the central business district would seem to be the first task, but this can not be sensibly undertaken in the absence of comprehensive land use planning and zoning for Rarotonga as a whole.

Urban planning for Aitutaki is basic to the efficient expansion of the tourist trade, and many of the problems which now confront Rarotonga can yet be avoided or reduced.

4.3.2 Sustainable agricultural production

The main environmental problem of the agricultural sector is erosion. This is fully recognised within Cook Islands, but erosion control action merits increased budgetary emphasis.

Erosion control will require the application of a combination of actions from conservation engineering works to reforestation, but the fundamental need is greater attention to the factors which produced the erosion in the first place.

If landowners intend to continue cropping their land intensively and still pass on a valuable resource to their children as an inheritance, there will need to be a change in perceptions of what practices are environmentally acceptable and what are not.

Increased training on appropriate mechanised cultivation practices will be required and, perhaps most importantly, reduced use of fire as a land preparation/cleaning tool to bare the soil.

With New Zealand assistance, the CIG is addressing this erosion problem, with the initial emphasis on reforestation to rehabilitate damaged areas, rather than on training for erosion prevention. The New Zealand-funded reforestation program is confined to the islands of Rarotonga, Mangaia and Atiu. While erosion is not as evident on Mauke, the potential there for erosion suggests the need for reforestation action; tree planting has commenced, but, within the constraint of available labour, the rate should be increased now, not some years hence when the problem may be much larger.

A role for agroforestry

The other perceived opportunity is to strengthen or reintroduce traditional land use practices which were founded on the maintenance of ground cover and the replacement of organic matter for the soil surface horizon.

4.3.3 Material for construction

Construction grade sand and aggregate is vital for Cook Islands development. The beach was the main source of sand but the banning of beach mining will not be effective until alternative economic sources of material are developed.

There is a rock crushing plant on Rarotonga and this has been upgraded to provide high quality aggregate and some fines. But it can supply only a small portion of the material needed. Urgent attempts to locate a viable, alternative source of sand have to be made. The only prospect, apart from mining environmentally sensitive sand dune deposits, are the sand and gravel deposits in the ocean outfalls of passages in the fringing reef. A feasibility study, together with environmental impact assessment, is required of the economic and financial viability, of recapturing these deposits.

There is a further prospect, albeit also environmentally sensitive. And that is to reduce the need for concrete block manufacture for construction purposes by selective mining of makatea to provide coral limestone blocks. Such quarrying activity might of itself be visually and physically polluting, but to a much lesser degree than beach mining, and without the potential economic consequences for the tourism industry inherent in the loss of beach resource.

Makatea mining could be regarded as a case of the lesser of two evils. Certainly the technology exists for such block production using modern stone sawing techniques; and the 150 year old limestone block buildings on Mangaia testify to durability of that makatea material. The aesthetic problem of weathering and algal staining of the exposed surface can be countered with modern sealants used with concrete high-rise development. Obviously, a detailed technical, economic, financial and environmental feasibility study is the first step.

4.3.4 National parks and reserve development

There would seem to be a major opportunity through the necessary emphasis on tourism as the future mainstay of the Cook Islands economy for the protection of the remnant biological diversity through establishment of terrestrial and marine reserves. This eco-tourism or nature tourism is one of the keystones of the recently completed Tourism Master Plan for the Cook Islands.

The management of such reserves must of course remain with the people and the Island Councils, with the assistance of the CICS as required.

4.3.5 Energy

Steam generation could play a much larger role in Cook Islands than is the case today. The main renewable source of fuel is firewood and coconut shell/husks, for cooking and water heating.

The prospect of steam generation was considered three years ago but rejected on wood resource, maintenance and cost grounds. With recent new designs for both biomass combustion and auto-regulating steam engines, small scale electricity generation for small outer island communities is a real and relatively cheap prospect compared with diesel generation.

However, steam generation requires a continuous supply of large volumes of a high calorific firewood and reliable labour to harvest the wood, feed the firebox and maintain equipment. Neither is available. Unless the system is designed to use brackish water, there will also be the problem of an ample supply of suitable water on islands of the Northern Group.

The establishment of fuelwood plantations as part of the reforestation program for rehabilitating eroded areas on Mangaia and Atiu, and perhaps as wind-breaks around exposed garden areas, should receive closer attention. The Forestry Division has experience with the silviculture of eucalypt and acacia coppicing species and pros and cons of establishing short rotation (5-8 year) coppice-wood plantations of species suited to the acidic soils on those islands should be examined.

While there is some tentative use in Cook islands of wind, wave and solar power generation, there would seem to be far greater scope for the introduction of such alternative power systems, where proven economic.

Solar energy in combination with diesel generation is proving a viable option in remote areas overseas to supply electric power needs, with significant cost reductions over normal stand-alone diesel generators. On its own, solar energy is a proven way of providing solar lighting, water pumping, and hot water for small communities or individual households. In the USA, the cost of using photovoltaic systems is now said to be down to 20 cents per kilowatt hour, with rapid advances in the technology which promise further cost reductions.

While some of the photovoltaic lighting systems may be new to the Pacific region, and Cook Islands experience with photovoltaic lighting has not altogether been a happy one, windmills for water pumping, wind-powered D.C. electricity generation, and the roof-mounted, black-bag hot water production are well known, or in some cases, remembered.

Ethanol or methanol production from biomass is not a real option for Cook Islands, the literature indicating that the real cost to the community of fuel alcohol being considerably higher than that of imported diesel when the energy cost of producing the biomass in the first place is taken into account.

Most communities are now equipped with diesel generators are simply not going to abandon them for some alternative energy prospect. It would be quite wasteful of existing capital investment for such a course to be suggested, and the generators will serve out their useful life.

But one practical option for electricity generation at this point in time would be to supplement the diesel generation with solar generated electricity, reducing the rate of diesel consumption. This would be an attractive opportunity for development assistance from donor organisations for the conduct of field trials.

And for the distant future, Cook Islands could look to renewable biomass as fuel for steam powered electricity generation in the Outer Islands, and as a provider of employment. The continued technical assistance of aid agencies for the purchase of the additional capital equipment and for training should be sought.

4.3.6 Water monitoring

There is a need to institute a program of regular monitoring of the quality of both underground water and marine water of the lagoons. Quality monitoring would include the regular collection of water samples for laboratory

analyses for organic and inorganic chemical contamination, for bacterial pollution from faeces, and, in the case of groundwater, for salt content.

Regular sampling should be undertaken but analysis will be too expensive if all samples are sent to New Zealand. But for the full spectrum of analyses to be undertaken in Cook Islands, or even routine basic analyses significant strengthening of the analytical capability of laboratories of the Public Health Department may be required.

4.3.7 Waste disposal

There is a clear need to commission comprehensive studies for the Cook Islands on solid waste disposal and sewage.

Solid waste

The main immediate opportunity for reducing the solid waste disposal problem is reduce the volume of rubbish, especially of the non bio-degradable component.

Effort to promote recycling of aluminium cans and glass bottles needs to be stepped up. But experience elsewhere suggests that commercial recycling exercises will only be profitable if can or bottle collection is subsidised by government.

An alternative approach is to minimise collection costs by imposing a large deposit on the container at point of sale. eg of 10-20 cents. Another approach is to require, by law, that beer and soft drinks be packaged in bio--degradable containers (i.e. steel cans), or in recyclable containers, i.e. glass bottles. With glass beverage bottles however, their sale should be permitted only on islands where recycling is practical. That is, only on Rarotonga.

Government packaging policy should also discourage plastic containers, bags or wrapping, opting instead for renewable products of cardboard and paper. Separated organic waste should be composted, not burnt, to provide essential humus to help sustain horticultural production. Proper garbage dumps should be designated in those Outer Islands which have not already done so, with Island Councils providing two drums to each household, one designated for organic and the other non-organic waste. And regular garbage collection be undertaken by truck or by tractor and trailer.

Sewage

Sewage disposal is a problem in Cook Is. as elsewhere in the Pacific. With the growing tourist industry, there is an urgent need, on Rarotonga at least, to design and install a sewage collection and treatment system.

The major hotels have their own treatment systems but these are not always satisfactory. Past plans for the construction of such a system for the main business and tourist areas of Rarotonga needs to be revived and extended to the whole of the island.

4.4Supporting Measures

4.4.1Institutional and administrative measures

Organisation and staffing of the CICS

Government arrangements for environmental administration could well serve as a model for other South Pacific countries. Environment is administered by the Cook Islands Conservation Service which is a corporation outside of the Public Service structure and therefore seen more as an honest broker in development/environment issues.

The CICS is under the control of a board, the Conservation Council, which comprises community, government

and private sector representation. The current concern is for the lack of direct representation on the Conservation Council of representatives of the Outer Council. It is suggested that all Chief Administration Officers of the Island Councils be made ex-officio members of Council, until such time that amendment of the Conservation Act makes it more acceptable to the Outer Islands, and more formal representation becomes necessary.

The staffing problems of the CICS are those of lack of balanced spread of professional skills, and insufficient numbers needed for carrying out the responsibilities with which it is charged under the Conservation Act. All agencies who have assisted the CICS in recent years have stressed this need in their reports. And the RETA will also be making a close study of the need for and extent of institutional strengthening requirements for the Service.

But immediate action is required outside of the RETA context to engage two additional professional staff, particularly that of a Deputy to the CICS Director, who is professionally trained and well experienced in day-to-day administration of a small organisation. Without such immediate support, it simply will not be possible for the CICS Director to address the strategic planning, management and administrative roles required of his position. The second need is for environmental resource manager, preferably one with resource economics training.

CICS facilities

The CICS has responsibility for environmental protection of the foreshore zone on Rarotonga. This includes the vetting of applications for constructing a house or other facility in the zone; such construction is discouraged. Yet, the CICS office building is itself on the immediate foreshore at its location behind the Agriculture headquarters at Tupapa.

This is not merely anomalous, but sets an improper standard. Funding for the construction of a new facility should be sought; an inland site has already been located which would be available.

Budgetary support

The CICS budget is very limited indeed and there is an acute lack of operational funds. For example, in 1990 the total expenditure of $136,000 represented a mere 0.22% of total Government expenditure. And of the total CICS expenditure, $113,700 was for recurrent costs, mostly salaries for staff.

This funding problem is not unique to Cook Islands, but the CIG is particularly constrained with its small tax base. If environmental action is to be taken and maintained then this can accomplished only with the continued support of donor organisations. And not merely monies for politically up-front type activities of national park establishment and the like which capture the public eye, but also of funding to support recurrent costs. Without recurrent cost funding, aid organisations are whistling in the wind.

4.4.2 Environmental Legislation

The Conservation Act 1986-87 provides the legal capability for good environmental management and development of protected areas and reserves. However, there are a number of shortcomings and these severely inhibit the accepted application of the Act. A number of amendments are needed, in particular to address the following (after McCormack, 1989):

- to broaden the definition of coastal zone;
- extend the foreshore zone definition beyond the current 50 metres, and to devise better definition for the islands with makatea rims;
- to enable protected areas to be established in co-operation with landowners on customary land;
- to extend the definition of environment to include harvest of marine life;

- to broaden membership of the Conservation Council to include a wider range of public and private sector representatives;

- to include EIA requirements;

- to extend the application of the Act to the entire nation.

While separate review of the Act is currently being undertaken by the FAO from the viewpoint of soil erosion controls, a much wider review is required. And if done and the amendments indicated above implemented, then Cook Islands will be in the unique position for the southern Pacific of having a single piece of legislation which will provide for adequate environmental control.

4.4.3 Environmental education and public awareness

While environmental education is not entirely neglected, the main focus of the educational effort by the CICS and of other government agencies needs re-examination. Perhaps the first need is to focus training on politicians and on the public service, particularly on those senior officers administering policy concerning use of natural resources.

Nor does there appear to be any deliberate, planned involvement of the main community organisations, the churches, in spreading the social message of good environmental management. The Religious Advisory Council, which represents all the major faiths and denominations, is an obvious channel for reaching the people. There would also seem to be merit in seeking to have an appreciation of issues on the social, biological and built environment included within the curricula of students at the Theological College.

It is also apparent that the people who could be most influential in conveying an environmental message to the farmer level, and in acting as catalysts for change in environmental perceptions, are the extension staff of the Department of Agriculture, but these are not being brought into the education debate.

And finally, in the delivery of training to private and public sectors, and in the conduct of various public awareness campaigns, the need is readily apparent for greater co-ordination between government agencies, but more particularly between foreign agencies who are, ever more commonly, demanding full consideration of environmental issues before funding is provided for development.

Apart from such one-off events as World Health Day or Environment Week, there is little evidence of such internal co-ordination within Cook Islands; nor with a recent instance of four international aid agencies all researching similar environmental aspects within a three weeks time span, does there appear to be little consultation on project implementation in that quarter either.

4.4.4 Multilateral and bilateral assistance

Mention has been made of the need for continued foreign aid for capital works related to the closely inter-linked tourism/environment development, and for at least some element of support for the recurrent costs of such capital investment.

Many bilateral aid agencies baulk at contributing towards recurrent costs, albeit such support is fundamental to a country such as the Cook Islands with a small population. One mechanism for providing funds for recurrent cost expenditure is through concessional loans from the international development banks, notably the Asian Development Bank and the World Bank.

These Banks are constrained for a variety of reasons in the minimum size of loan they are prepared to offer. At the same time small countries such as the Cook Islands have a very limited absorptive capacity for a large loan package. An approach taken by the ADB to help overcome this problem is the 'multi-sector loan' embracing a number of sub-projects of sufficient combined value to constitute a single loan of acceptable size

for the Bank. The Cook Islands Government does not favour such multi-sector loans because of the internal difficulty they have found in their administration.

Consequently, a variant on the multi-sector loan program has been suggested. This would relate to a single sector, in this case the Environmental Sector, and an Environmental Sector Loan would comprise concessional loan funding for a number of environmental projects. Under the ADB approach, there is also a prospect of attaching to such a Loan, a number of Technical Assistance Grants. There would be a single executing agency for the loan.

While this addresses the larger environmental projects, there are also a number of small, low cost environmental projects in the Cook Islands, as elsewhere, which even when combined are far below the funding level which could be considered for a loan. Consequently a further assistance mechanism has been proposed in the form of a Environment Multi-Project Technical Assistance Program. Aid donors would be asked to fund a package of small environmental projects, with total program value perhaps not exceeding US$ 100,000.

5. PROCEDURAL MATTERS

The Government of the Cook Islands had moved to form a Task Force for Environment and Development to guide the implementation of the RETA and to provide broad coordination for environmental and developmental activity. The membership of the Task Force was approved by Cabinet on 27 May and its inaugural meeting held on 29 May to review the draft UNCED National Report.

The Task Force comprises 14 representatives from Government, the Council of the Conservation Service, and private industry, under the chairmanship of Tamarii Tutangata, Permanent Secretary of the Department of the Prime Minister. Permanent membership of the Task Force comprises:

Jake Numanga	Councillor, CICS
Tamanu Scott	Councillor, CICS
Motu Kora	Secretary, Koutu Nui
Tamarii Tutangata	Secretary, Prime Minister's Department
William Hosking	Secretary, Agriculture Department
Julian Dashwood	Secretary, Marine Resources Department
Richard Chapman	Acting Secretary, Ministry of Planning and Economic Development
Anthony Utanga	Secretary, Ministry of Internal Affairs
Tuingariki Short	Secretary, Education Department
Dr Roro Daniel	Director of Public Health
Oliver Peyroux	Chief Surveyor, Survey Department
Pamela Ingram	Secretary, Cook Islands General Licensing Authority
Joelene Bosanquet	Chairman of the Environmental Sub-Committee of the Chamber of Commerce
Teariki Rongo	Director, CICS, and RETA National Coordinator.

Work on the draft commenced in Rarotonga on 14 May. The draft is the result of a synthesis of readily available information derived from a number of published and unpublished sources, as well as verbal advice. Significant input was derived from a report prepared by Dr Bob Thistlethwaite in 1990 for the Asian Development Bank on Environment Sector Strategies and Programs for the Cook Islands.

The draft report was prepared by a Team comprising CICS Director Teariki Rongo and Bob Thistlethwaite, in close collaboration with Tai Manuela of MOPED. Members of the Task Force gave freely of their time to assist with the framing and development of the draft and this is gratefully acknowledged. A special acknowledgment is made of the enthusiastic support of CICS staff and also of staff of the Marine Resources Department who facilitated printing of the draft report.

The draft report was circulated to Task Force members on 27 May in advance of the planned meeting of the Task Force. Following that meeting on 29 May, the draft was revised by the drafting Team to incorporate input from MOPED and Marine Resources, as well as comment from the Task Force. The revised draft was then submitted by the Minister for Conservation to Cabinet for Government endorsement.

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Relevant Reports

1. Mangaia Integrated Development Plan(1990-1994)

This was prepared by the people of Mangaia assisted by the Cook Islands Government and the Integrated Atoll Development Project of UNDP, October 1989.

2. Integrated Atoll Development Plan for Mitiaro

3. Island Conservation Plans: prepared by the CICS for Aitutaki and Mauke.

4. Town Plan for the City of Avatiu. Commenced by the UN in 1988 but terminated before it was completed.

5. Rutaki Area Plan.

6. New Zealand Meteorological Service Miscellaneous Publication 177.