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South Pacific Bureau  
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## South Pacific Regional Environment Programme

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**FIJI**

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Noumea, New Caledonia

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COUNTRY REPORT

## COUNTRY REPORT FOR FIJI

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SOUTH PACIFIC REGIONAL ENVIRONMENT PROGRAMMECOUNTRY REPORT FOR FIJI - AUGUST 1980

## PREFACE TO THE COUNTRY REPORT

It is necessary to preface the Country Report with a few comments on Fiji's physical and social context in order to assist in understanding the country's natural and man-made environmental problems.

- Location The main archipelago lies between 15° South and 22° South in latitude and 174° East and 177° West longitude, comprising a total land area of 18,333 square kilometres.
- Land Area The two main islands (Viti Levu and Vanua Levu) together account for 87% of the total land area. Eight smaller islands make up a further 7.5%, or 1,378 square kilometres. The remaining land, only 1006 square kilometres, is scattered amongst a further 322 very small islands, excluding numerous atolls and reefs. There are 14 provinces and Rotuma Island.
- Climate Tropical with high humidity and temperatures may rise to 35°C but modified by South East trades from May to November.
- Physical Features The islands of Fiji (except Kadavu and the Koro Sea Islands) rise from two submerged platforms and consist almost entirely of volcanic and plutonic rocks of various ages which have been subjected to degeneration and soil formation under typical tropical conditions of intense weathering.
- The rugged interior of the main islands confines extensive agricultural production and urban development to a fertile but vulnerable coastal fringe of flatter land. Competing land uses present environmental problems of increasing magnitude when combined with erodable soils and a growing population.

(ii)

Population Approximately 100 of Fiji's 332 islands are permanently inhabited. The total population for Fiji at present (August 1980) is close to 638,000; the average annual growth rate having slowed from 2.14% between the 1956 and 1976 Censuses to 1.74% since the last Census, the ethnic breakdown of the population being 44.5% Fijian, 50.1% Indian and 5.4% other races (1978).

Urban growth is uneven, emphasising the pull of the capital Suva in South Eastern Viti Levu where 69% of all urban growth for the decade ending 1976 occurred. If this growth continues, the Suva subregion will contain over one quarter of Fiji's total population by the turn of the century.

Economy Primarily agrarian with sugar as the principal crop. Other sources of revenue include copra, gold, forestry and commercial fishing, although tourism is now the second largest revenue earner.

SOUTH PACIFIC REGIONAL ENVIRONMENT PROGRAMME

COUNTRY REPORT FOR FIJI  
AUGUST 1980

PART A. ENVIRONMENTAL POLICY AND IMPLEMENTATION

POLICY

1. The government of Fiji's economic and social policies are stated in the Development Plan Document covering a five year period. The seventh such plan (DP7) covers the period 1976 to 1980, whilst the eighth 5-year plan (1981-85) is in preparation and will be published before the end of 1980.

2. DP7 devotes Chapter 9 to environmental matters and states "... during the plan period Government's fundamental goal will be to exploit Fiji's natural resources wisely, in a manner which is consistent with the maintenance of a healthy environment and with the generation of benefits for all the people, today and in the future."

Eleven objectives were directed towards the achievement of this goal and their performance will be discussed in later paragraphs.

3. Development Plan 8 (1981-85) is to be presented in two volumes. Volume 1 will look at the main economic aspects of the economy plus sectoral policies and programmes aggregated at the national level. Volume 2 will contain the regional plans, where the programmes, projects and implications of the sectoral chapters are drawn out at the regional level.

4. It is expected that close liaison between economic and physical planning will be required at the regional planning level.

5. During DP8 Government will emphasise resource based development in the economically productive sectors of Agriculture, Fisheries, Forestry industry and processing.

6. Processing, located in the producing regions wherever viable, will be situated in rural centres. These centres will become the focal point of regional development efforts.

7. As far as mining is concerned, the need to plan the exploratory mining, construction, processing and waste disposal phases with due regard to ecological factors so as to minimise environmental degradation or destruction will prevail during the DP8 plan period.

8. The emphasis on rural development and the need for a measure of regional self-sufficiency is aimed at redressing the growing imbalance of population around the capital, Suva, in South-eastern Viti Levu.

9. At the same time the effects of rapid urbanisation, particularly squatting, are being met by a low cost housing programme and a regional approach to physical planning.

10. Priority will be given to creating and maintaining effective transportation links between smaller islands and major centres of attraction, by sea as well as air, to encourage self-sufficiency without isolation.

11. If the natural and human resource potential of each region is to be realised, then a series of resource based surveys will need to be undertaken.

12. Government priorities in the above areas stem from a need to balance out the unequal distribution of resources in the widely scattered centres of social and economic activity of the Fiji Islands.

## LEGISLATION

13. Several ministries exert control over environmental aspects of existing legislation. The following list refers to Chapters of the Laws of Fiji:

14. Ministry of Health

Chapter 91 Public Health Act (28/4/37) - enables the Central Board of Health to deal with environmental health matters including sanitation, potable water and drainage.

15. Ministry of Urban Development, Housing & Social Welfare

Chapter 109 Town Planning Act (1/8/46) - provides for the preparation of Town Planning Schemes including "... the conservation of the natural beauties of the area including lakes, and other inland waters, banks of rivers, foreshores of harbours and other parts of the sea, hill slopes and summits and valleys. The general provisions of this legislation also provides for a building set back of 30 metres above highwater mark, part of which is useable by the public for shoreline access. The Crown controls land below highwater mark. (Cap 113).

16. Ministry of Fijian Affairs and Rural Development

Chapter 115 Native Land Trust Act (7/5/40) - established a Board (N.L.T.B.) that, as part of administering land on behalf of Fijians can proclaim Native Reserves over any part of native land.

17. Ministry of Agriculture and Fisheries

Chapter 120 Land Conservation and Improvement Act (10/7/53) was established "to make provision for the conservation and improvement of the land and water resources of Fiji".

Chapter 135 Fisheries Act (1/1/42) - controls fishing methods and requires that a register of Native Customary Fishing Rights be kept.



18. Ministry of Lands and Mineral Resources  
 Chapter 125 Mining Act (16/12/66) requires amongst other things the holder of a mining tenement to restore the surface of the land disturbed by mining operations. The Petroleum (Exploration and Exploitation) Act 1978 Section 62 requires companies to carry out environmentally safe work practices. Also, applications for production licenses are to be accompanied by an environmental impact statement of the proposed production programme and possible safeguards.

19. Ministry of Forests

Chapter 128 Forests Act (1/10/53) -

The " Minister " , with N.L.T.B.'s consent (see chapter 115) may ... "declare any land, not being reserved forest or alienated land, to be a protected forest."

20. Other Acts that could be updated or expanded to assist environmental management include:-

Chapter 113	-	Crown Lands
Chapter 118	-	Subdivision of Land Act
Chapter 121	-	Rivers and Streams Act
Chapter 122	-	Drainage Act
Chapter 124	-	Land Development Act
Chapters 126 and 127	-	Oil and Quarries Acts
Chapter 147	-	Birds and Game Protection Act

There also exists the Pesticides Act 1971

21. Ministry of Works and Communications - is responsible for the National Trust for Fiji, a statutory body formed in 1970 and which will administer the National Parks and Reserves Bill now being drafted. This Bill provides for the "preservation and protection of the natural environment including unspoilt landscape, reefs and waters, indigenous flora and fauna including native organisms, habitats and ecological systems, features of scenic historic or archaeological interest or any other scientific interest.

A Wildlife Island Reserve for the protection of the habitat of the Fiji Crested Iguana has already been established (August 1980) under the control and management of the local Mataqali (land owning unit).

The proposed Bill will also make suitable provision for the use of specified parks and by the public for enjoyment, recreation and education purposes.

22. A new Town Planning Act and accompanying regulations is in preparation for a final draft by the end of 1981. Such legislation will recognise the need to:-

- (a) Make environmental analysis an integral part of the planning system
- (b) Ensure that environmental impacts of particular development proposals are adequately assessed before decisions are made

Regional, subregional and local plans would operate within a framework of environmental guidelines. The need for expertise to develop such guidelines will be discussed in later paragraphs.

23. Native lands legislation (Chapter 114) ensures that such land is cultivated, allotted and dealt with by native Fijians ... according to their native customs and subject to any regulations made by the Fijian Affairs Board. (See also para. 10 above). Research into native customs discussed later.

24. Fiji is party to the following Conventions of relevance to Fijian and Pacific regional issues:-

Date of Instrument	Treaty No.	Title and Remarks on Ratification
27 February 1956	76	International Plant Protection Convention, Plant Protection Agreement for the South-East Asia and Pacific Region - Adherence 4 December 1970.
5 August 1963	112	The Treaty banning Nuclear Weapon tests in the atmosphere, outer space and under water - succession dispatched 14 July 1972.
1 July 1968	115	Treaty on the non-proliferation of Nuclear Weapons - succession dispatched 14 July 1972.
10 April 1972	239	Convention on the prohibition of the development, production and stockpiling of bacteriological (biological) and toxic weapons and on their destruction;

(CONTD)

Date of Instrument	Treaty No.	Title and Remarks on Ratification
		ratification on 1 October 1973 and entered into force 26 March 1975
12 June 1976	513	Convention on the Conservation of Nature in the South Pacific - <u>FOR REFERENCE ONLY</u>
10 July 1979	524	South Pacific Forum Fisheries Agency Convention - signed 10 July 1979

Note - Fiji is a member of the International Tsunami Warning System Coordination Group.

25. To summarise the legislative aspects of this report -

The opportunities for effective control over environmental problems exist within the legislation but a cohesive policy for action is needed.

Forthcoming legislation (para 22) during the DP8 period (1981-85) will assist such cohesion. A key provision in the proposed legislation will be for environmental impact studies to be prepared for all development projects, including governmental projects; as well as opportunities for the public to be better informed, express their opinions and affect decisions impinging on their natural environment.

## PLANNING

26. Environmental factors are considered in economic planning as discussed in paragraph 2 above.
27. Surveys conducted in 1965 by I.T. Twyford and A.C.S. Wright called "The Soil Resources of the Fiji Islands" are now being supplemented by a series of land capability maps being prepared by the Ministry of Agriculture.
28. The Directorate of Town and Country Planning undertakes land use surveys on a continuous basis for the preparation of statutory town plans and advisory sub-regional planning schemes, particularly along the southern coast of Viti Levu where road upgrading has created local and tourist development pressures in recent years.
29. The Native Land Trust Board (See para. 16) in the past two years has undertaken 8 land use surveys of substantial areas of native land on the two main islands. In the absence of a specific environmental policy within NLTB, input from other government agencies is sought for environmental assessment.
30. Regional planning surveys, based on the 14 provinces of Fiji have been prepared as part of the preparation of Development Plan 8 (See paras. 3 and 4).
31. Although general environmental data is being used by Government, there remains a need for a land inventory for the country followed by land capability assessment for physical development, constraints analysis and research into effective performance standards for the environment and resource development.
32. Environmental impact assessments can be requested of the project developer by the relevant Ministry.
33. The Director of the Department of Mineral Resources within the Ministry of Lands can invoke specific requirements for environmental impact statements as described in para. 18 and monitor same.

34. The Director of Town and Country Planning can include specific environmental requirements within the terms of approval of an outline planning or subdivisional application but there is an acute lack of trained staff to see if the conditions are being complied with or to monitor the effect of such conditions in operation.

#### ADMINISTRATION

35. Under the co-ordinating role of the Central Planning Office, authorities responsible for implementing environmental policies include the Directorate of Town and Country Planning, Central Board of Health, Department of Mineral Resources, the Ministry of Commerce and Industry and the Ministry of Agriculture. Other governmental agencies deal with specific development projects having environmental implications and include Ministry of Works, Ministry of Tourism and Transport, and Ministry of Forests.

36. The Interdepartmental Committee on Pollution Report 1976 "Pollution and the Environment in Fiji" recommended that "appropriate arrangements for the implementation and monitoring of environmental policies, including the establishment of any new institutions, departments or legislation for this purpose, be made".

37. There is sufficient expertise for comprehensive physical planning but its effectiveness could be augmented by revised legislation (para. 22). The establishment of a small environmental unit to independently develop performance standards, monitoring and evaluation techniques and assist in more sensitive planning has been suggested.

38. Meanwhile, the possibility of an environmental management committee to exert greater co-ordination between governmental departments concerned with environmental matters is under consideration.

39. There exists a governmental mapping committee to assess the departmental mapping requirements. Present map coverage for Fiji is at 1:50,000 with town areas being mapped at 1:2,500. A national map coverage at 1:10,000 with peri-urban development areas at 1:5,000 would greatly assist planning and environmental management.

## PART B. ASSESSMENT

## MAJOR ENVIRONMENTAL PROBLEMS

40.       Development Projects
- Monasavu hydro-electric scheme
  - . Namosi Copper Mining
  - . Oil drilling
  - . Queens Road realignment/extension
  - . large scale agricultural schemes including pine logging
  - . possible establishment of pulp paper mill for pine logs
  - . deafforestation of natural rain forest
  - . soil erosion and siltation of waterways
  - . flooding, particularly in Navua and Rewa river systems
41.       Urban Areas
- . untreated sewage disposal
  - . toxic outfall from industrial areas
  - . oil storage tank leakage
  - . noise and air pollution associated with transport
  - . human ecological problems including stress, loss of social values, unemployment, boredom and crime
42.       Rural Areas
- . deafforestation for large agricultural schemes e.g. Seaqaqa sugar cane scheme
  - . widespread use of pesticides (not monitored)
  - . extensive use of fertilisers causing excessive algal blooms and water weed growth in rivers
  - . land slips, due to agricultural practices adding to water siltation and flooding risks
  - . salination of ground water through over-usage
43.       Coastal Waters
- . oil pollution, especially in Suva and Lautoka
  - . sand dredging affecting turtle grass beds and fauna
  - . overfishing of some resources e.g. turtles

- insensitive placement of groynes, jetties or reef blasting interfering with water flow and sand deposition characteristics
- depletion of mangrove areas through urban growth and drainage schemes
- depletion of coral communities through tourist resort sewage outfalls and, to some extent, over-collection of live organisms

44. External Pressures

- no known pressures - possibly some responsible for removal of local forest for plantation of Pinus sp. with loss of fauna and flora
- risk of unauthorised flora/fauna collection from overseas operators

RESEARCH AND MONITORING

- 45. the Central Board of Health maintains regular surveillance of safe drinking water.
- 46. Agricultural Ministry controls import of undesirable agricultural products/animals with disease risks.
- 47. Ministry of Lands and Mineral Resources maintains meteorological observations, geological and seismic observations.
- 48. the Director of Mines has broad powers to restrict or terminate prospecting and mining activities if unreasonable disturbance of land is caused; and to use funds deposited by a prospector to make reparations in addition to owner compensation.
- 49. Air quality controls by the Ministry of Tourism and Transport is currently being researched, particularly in relation to public transport and heavy lorry pollution.
- 50. Although the University of the South Pacific (U.S.P.) does not undertake any regular surveillance of environmental conditions, other than independent research projects, some consultancies are accepted. However, these consultancy surveys by the Institute of Natural

Resources and the Institute of Marine Resources tend to be too bried through lack of funds from firms and lack of insistence by Government on the need for such survey work.

51. Projects of high priority for further research include -
  - rainforest fauna and flora, particularly localised and endangered species.
  - mangroves and associated fauna.
  - coral reefs, turtles, seabird colonies, fish and shellfish resources.
  
52. Monitoring of tsunamis, earthquakes and cyclones is undertaken by the Ministry of Lands Metereological Office.
  
53. There is a need for a larger amount and more consistent monitoring of environmental effects of development. A lack of trained field officers overburdens personnel with other responsibilities within the Ministries of Health, Urban Development, Lands and Native Land Trust Board.



PART C. MANAGEMENT

STATE OF RESOURCES

SOILS

54. i. 870,000 acres suited to permanent agriculture without improvement.
- 450,000 acres suited to permanent agriculture after minor improvements.
- 1,408,000 acres suited to permanent agriculture after major improvements.
- 1,693,000 acres largely unsuited to agriculture.
- ii. A land use section of the Ministry of Agriculture provides an extension service to farmers for optimum land utilisation.
- iii. Soil erosion continues to present problems. Deforestation, grassland burning and the extensive removal of vegetation during construction projects has caused substantial soil loss, particularly in steep areas during extreme conditions of heavy rainfall.
- iv. Land capability maps at 1:50,000 scale are being prepared by the Ministry of Agriculture to assist in monitoring effects of conservation measures.

WATER

55. i. Normal rainfall, av. 100" p.a. in south and east of main islands, is augmented by irrigation and ground water.
- ii. Ground water requires careful management to conserve supplies and protect its quality. Mineral Resources Department is engaged on a programme of ground water testing for new supplies.
- iii. Water catchment areas are protected (see para. 17).
- iv. The Monsavu Hydro-Electric Scheme is designed to meet fifty-eight percent of the electric power needs of Viti Levu Island (three-quarters of Fiji's

population) by 1982 with 40 megawatts being put on line upon initial project completion in 1981 and another 40 megawatts later. A 132 K.V. transmission line from Eastern to Western Viti Levu is being constructed. The scheme as a whole presents a challenge to effective environmental management over the next decade.

## CROPS

56. i. 200,000 hectares of the country's 1.8 million ha. are under cultivation 12% of the land is reasonably flat and suitable for mechanised farming. An additional 20% can be used for planting crops cultivated by hand. Swamp land accounts for about 4%, the remainder being forest and grassland.
- ii. Sugar is the major export. An average of 46,000 hectares of cane being harvested annually. 4 mills producing some 400,000 tons of raw sugar each year. Pollution of water from these mills is closely monitored.
- iii. 25,000 tonnes of copra produced annually - 9% coming from Vanua Levu, Taveuni and the Lau region. 220,000 acres planted with coconuts but over mature trees and severe hurricanes have lowered production significantly over recent years.
- iv. Diversification, inter-cropping with coconuts being studied as well as finding alternative uses for coconut products such as Charcoal and building materials being sought.
- v. Citrus, ginger and fruit production growing as is local canning of fruit juices.
- vi. Production of rice is about 20,000 tonnes annually. Rice schemes being assisted by the United Nations Food and Agriculture Organisation, its Development Programme and Australia in order to increase production to meet local demand.
- vii. The Seaqqa Development Scheme on Vanua Levu involved drainage of the largest concentration of swamps on the island for growing sugar cane and rice.

- viii. The Raviravi reclamation scheme converted 320 hectares of a 360 hectare mangrove area near Ba, Viti Levu, to arable land for crop production.
- ix. Other large tracts of mangrove swamps has been reclaimed for industry, housing, resorts, marine culture, roads, refuse disposal and agriculture but a running total of the amount reclaimed is not available.
- x. Self sufficiency is an aim promoted by a national campaign, Feed Fiji First, that encourages education in small scale intensive garden production.
- xi. All chemicals used in agriculture require approval under Pesticides Act (see paragraph 20) Mill mud, from sugar refining process, used as soil improver as is decomposed Bagasse. Bagasse can also be recycled to fire boilers in sugar mills.

## ANIMAL HUSBANDRY

- 57. i. 70% pork locally produced, 80% poultry local. Beef production approaching self sufficiency.
- ii. Dairy and beef cattle farming are increasingly assisted by subsidies and advisory services of the Agriculture Department.
- iii. Commercial pig farming is mainly confined to South-eastern Viti Levu where there is a supply of pig feed from the dairy and butcher trade.
- iv. A large livestock project on Viti Levu (Uluisaivou) will eventually sub-divide 24,000 hectares (100 square miles) of bushland into 113 farms.

## FORESTS

- 58. i. Natural forest covers just under half the total land area of the country (830,000 hectares).

- ii. 35% or 290,000 hectares is currently under concession licence for harvesting, the greater proportion of which is on Vanua Levu.
- iii. About 150 cutting licences are issued annually but these are mostly renewals. During the 1973 to 1977 period the average annual cut was 4,040 hectares of which 65% took place on Viti Levu and 35% on Vanua Levu.
- iv. Timber production and saw milling, based on timber concessions granted on native communally-owned lands totalled over 1.3 million <sup>m<sup>3</sup></sup> sawn timber and 1.1 million <sup>m<sup>3</sup></sup> of veneer in 1978. This more than met domestic demand and resulted in exports of over 7000 <sup>m<sup>3</sup></sup> of sawn timber in 1978.
- v. Since the most accessible areas are harvested first almost all the commercially valuable rainforest has been removed. New road schemes have opened up hardwood reserves in Central Viti Levu and Vanua Levu and there protected forests at higher elevations are threatened by encroachment.
- vi. Re-forestation Schemes:-  

The Forestry Department has leased or otherwise occupied 23,000 hectares of mainly cut over native communally owned land for re-forestation and has planted 13,000 hectares with exotic species. (Planting rate of 800 hectares per year, or some 30% of the forest area being cut).
- vii. The Fiji Pine Commission has a re-forestation programme on 54,000 hectares of leased talasiga, or degraded grass lands, of which 25,000 hectares have been planted (Planting rate 3000 ha per annum).
- viii. It is proposed to integrate hardwoods with pine species but the environmental costs and benefits of full scale pine production and associated pulp mills and new settlements have yet to be evaluated.
- ix. Although there are written safeguards in logging concessions, erosion from logged areas has been extensive due to insufficient policing. There is a need to effectively implement Fiji's soil conservation law (paragraphs 17 and 19).
- x. An Alternative Energy Committee has been looking at ways in using waste from timber (e.g. charcoal and wood fired power).

## MANGROVES

59. i. Estimates of the area occupied by mangrove swamps vary due to interpretation of landward limits from 19,000 to 50,000 hectares (or 1.1 to 2.8 percent of the total land area).
- ii. Urbanisation and land drainage schemes threaten depletion of this resource valued for its local village timber supply and protection for fish spawning as well as habitat for crabs, prawns, oysters and shrimps.
- iii. The value of mangroves has been built into government policy (DP7, Chapter 9) but monitoring and research on mangrove habitat is lacking (See paragraphs 50 and 51).
- iv. It is generally accepted that where mangroves are destroyed both inshore and offshore fisheries will decline. This poses a problem for the Fisheries Division since it must furnish information for use in hearings on Fishing Rights Recompense. A research study at Savusavu Bay (Vanua Lvu) placed a value of 10 cents annually per m<sup>2</sup> on the biological productivity of mangroves.
- v. Licences for small scale commercial exploitation of mangroves are issued by Conservator of Forests who also controls cutting operations. In 1977 - official total removed some 4705 cu. metres for firewood and poles of an estimated 4,750,000 cu. metres of mangrove.
- vi. Prior to 1975 all mangrove areas outside city and town boundaries were declared forest reserves (See paragraph 10) but in 1975 these areas were dereserved to enable indigenous Fijians to exercise their traditional rights to use the area. This does not present any problem provided not over commercialised.
- vii. Since 1974 final decisions on foreshore lease applications to the Ministry of Lands and Mineral Resources to exploit mangroves have been made by Cabinet.
- viii. In 1976 the MANA project was initiated to gain a comprehensive picture of mangrove food resources, uses and values to provide guidelines for economic development for DP8.

## REEFS AND LAGOONS (See also Coastal Zone Planning Paragraphs)

60. i. The coastline and coastal waters of the Fiji Islands are characterised by the presence of fringing reefs, barrier reefs, lagoons with patch reefs and sandy or muddy shores.
- ii. These areas are threatened by:-
- (a) Mining of coral sand - leases granted by Director of Mineral Development for only short periods at a time to assist in natural rehabilitation of sea grasses etc.
  - (b) Oil pollution - Act No. 3 1974 Harbour Act (Chapter 160) enables heavy penalties to be imposed for the pollution of harbour and coastal waters.
  - (c) Tourist development - sewage discharge controlled under the Public Health Act, Cap.91.
  - (d) Overfishing - although coastal areas bordering densely populated urban areas are close to optimum yields of fin fish, rural coastal areas are relatively underexploited. Commercial and subsistence fishermen harvest around 7,300 tonnes of fish and non-fish products annually; 3,200 tonnes obtained by 500 commercial fishermen using simple netting techniques, 4,100 tonnes obtained by the labour intensive fish drive methods of subsistence fishermen.

## FISHERIES

61. i. Tuna fishing using the 'pole and line' method has been successfully started by government with Japanese assistance. Yielded over 6,000 tonnes of tuna processed into tinned fish, fish meal and oil in 1978.
- ii. There is a need for a fishery resource survey on a regional basis to assess potential (See paragraph 51).
- iii. Fish farming is in an experimental stage but there exists potential for inland water bodies to be developed as fisheries.

- iv. In coastal villages and outer islands fishing is mainly for subsistence but changing through marketing outlets provided by the National Marketing Authority and Fish Carrier Service of Fisheries Division of the Ministry of Agriculture and Fisheries. There is a need for small refrigeration units in appropriate locations.
- v. The Fisheries Division is concerned that turtles in Fiji waters are being depleted, despite regulations against taking turtle eggs or killing below a minimum size or during a 4-month nesting season. Enforcement is the main problem. An education programme has been initiated but is of necessity a long term approach.
- vi. Depletion of shell fish in localised areas and possible over collection of aquarium fish are growing problems.
- vii. During 1978, 180 tonnes of Trochus shells were commercially collected and sold as were 20 tonnes of Mother-of-Pearl, 24,000 live fish for aquariums, 15 tonnes of Beche-de-mer and 56 tonnes of shark fins.
- viii. The Fisheries Division has set up a research programme for the tridacnid (Giant Clam) because of over harvesting. More work needs to be done on other species including non-fish species (soft corals and sponges etc) but there is not the expertise to regulate control despite their potential importance to marine ecology.

#### CONSERVATION, PARKS AND RESERVES

62. i. Fiji has no national parks and comparatively few developed opportunities for outdoor recreation. Of the 14 recreation and amenity areas within Fiji, ten are located on Viti Levu and mainly administered by the Department of Forestry.
- ii. In January 1980, the National Trust for Fiji (Paragraph 21) in co-operation with the International Union for the Conservation of Nature and Natural Resources (I.U.C.N.) and the World Wildlife Fund (W.W.F.) submitted to Government a plan for a National Parks and Reserves system for Fiji. The report arose from a concern over the loss of tropical rainforest mangroves and coastal areas and associated flora and fauna, as well as a need to provide further outlets for recreational pursuits.

- iii. The I.U.C.N./National Trust Report recommends a wide ranging programme of action during the Development Plan 8 period and beyond to create reserves, particularly on Viti Levu where social and economic development poses the greatest threats of degradation and destruction of the country's heritage. It is on the main island of Viti Levu too where the need for more outdoor recreation provision is greatest.

#### ENDANGERED SPECIES

- 63. i. The National Trust through the National Parks and Reserves System already referred to, has as one of its aims "the preservation or protection of unique, rare or endangered species and examples of natural communities and significant ecological systems to help maintain Fiji's natural diversity and integrity and prevent their extinction..."
- ii. During DP8, through the Environmental Management Committee, agricultural development, timber harvesting, hydro-electric power schemes etc. will need to recognise, protect and monitor effects on identified terrestrial and marine flora and fauna.
- iii. Present legislation for the protection of endangered species is inadequate (Paragraph 20). A draft bill for a National Parks and Reserves Act has been embodied in the plan for National Parks and Reserves System. Also, a Wildlife Bill aimed at giving broad protection to existing and potentially undiscovered rare species is being considered by Government.

#### LOCAL ENERGY SOURCES

- 64. i. The electrification programme from hydro-electric power has already been mentioned (Paragraph 55 ).
- ii. Power is also being developed through biogas plants and wind systems, but in the experimental stage at present.
- iii. Sea wave energy is also being actively pursued by the Ministry of Lands and Mineral Resources as a possible future option for local energy.
- iv. Geothermal energy is another possible avenue of exploration being followed.



## MINERALS

65. i. Gold mining has been carried on for a long time by a private company but reserves appear to be low.
- ii. Exploration for copper has proceeded since 1967 and assessments of deposits on Viti Levu are being made together with social and environmental impacts of extracting the ore.
- iii. There is a programme for offshore mineral exploration including prospecting for oil and some drilling occurred in 1980 under the Mineral Resources Department with assistance from C.C.O.P./S.O.P.A.C.

## HUMAN RESOURCES

66. i. Fiji is a multi-cultural society; ethnically the population is broadly 44% Native Fijian and 50% Indian, the remainder being of European Chinese and Pacific Island origin.
- ii. The estimated population for Fiji as at August 1980 of 638,000 is considered likely to exceed 1 million people by year 2000 despite a slowing down of the rate of increase of population in the 1970's through a vigorous birth control campaign. At present the urban population exceeds 37% of the total population.
- iii. Water quality is generally good, urban areas having treated water and monitored by Central Board of Health offices.
- iv. Human health is satisfactory, malnutrition occurring through ignorance of balanced diets rather than unavailability of fresh fruit and protein. The Feed Fiji First Campaign attempts to spread knowledge of diet to all sectors of the community.
- v. Steady urbanisation, particularly in the Suva region has generated a squatter problem who may comprise up to 15% of the total urban population. Whilst there is little evidence of poor health or disease such unplanned settlements represent a waste of human potential as well as a strain on existing services and utilities.

- vi. Public Housing complies with local and central government standards but overcrowding exists and there is a need for research on alternative types of urban accommodation using available local materials affordable by low income families.

live

- vii. With a fertility rate of 30.3/births per 1000 population and mortality rate of 5.8 deaths per 1000 (1976), the average annual growth of population has fallen to 1.6%. Although 60% of the population is aged over 15 years old, unemployment is relatively low, but there remains considerable disguised unemployment or under-employment in the subsistence sector of the economy.

#### INFRASTRUCTURE

- 67. i. Government continues to have as a major policy aim the improvement of transport throughout the island group.
- ii. Fiji has two major ports and one smaller one plus thirteen wharfs and jetties to load sugar and timber as well as for inter-island passengers.
- iii. There is one international airport and a smaller one to serve the island group and the South Pacific region. These are supplemented by thirteen government airstrips, eight private ones and one scheduled and one charter seaplane service.
- iv. Public roads are most extensive on the two largest islands but for the most part are not tarsealed. Ten other islands have public roads.
- v. Private roads are used mainly to move timber, copra and sugar cane. The larger cane areas also have narrow gauge railways to assist harvesting.
- vi. There is a commitment to regional water supply schemes to serve the main urban areas as well as a programme of rural water supply schemes to match the increasing demand from a growing population. A major impounding scheme to supply the drier western side of Viti Levu with water storage capacity for the next thirty years has been started.
- vii. The environmental impact of such schemes, their benefits and costs in the long term development of the country's resources have yet to be fully assessed.

#### MAJOR DEVELOPMENT TRENDS

68. The major trend in population and settlement pattern terms in the past decade has been the increasingly fast rate of growth of the nation's capital, Suva, and the urban corridor from Nausori to Suva.

69. Urban migration particularly from the eastern islands has been identified as one of the most pressing problems facing the country and is being tackled by a comprehensive regional planning approach in DP8.

70. Over the 1970-80 decade the country's economy grew at a generally sustained rate, generated initially by tourism and later by sugar.

71. Industrial development has emphasised the import-substitutive activities but over the next plan period emphasis on an export-oriented industry based on primary products is likely.

72. Agriculture is becoming increasingly self-sufficient. Timber and forest products from indigenous and exotic timber species having just begun. (Paragraph 58).

73. Fisheries has considerable potential to expand markets particularly as deeper fishing in local waters is developed. Training facilities for fishing technology will increase in the coming plan period. Aqua-culture however appears to have only limited potential at present.

#### MANAGEMENT APPROACHES (See also Paragraphs 45-53)

74. Twelve percent of Fiji's land is reasonably flat but much of this is as a narrow strip of coast land where competing agricultural, industrial, tourist and residential requirements can quickly disrupt the fragile coastal ecology.

75. DP7 policy clearly identifies the importance of protecting coastal features such as mangroves. The same document recognises the deleterious effects of toxic waste disposal on public health and marine life. Controls over older industrial activities have not always proved effective and the need for relevant performance standards and skilled monitoring staff is required, particularly if future port development projects and oil storage schemes are permitted.

76. Coral sand dredging is being undertaken under licence. A statement on environmental impacts is required before the issue of a foreshore lease - recent studies by the Institute of Natural Resources on the environmental consequences and management of coral sand dredging in the Suva area suggests that rehabilitation procedures to dredged areas could prove successful.
77. To ensure public access to the foreshore a 30 metre reserve extending from the main highwater mark is operative in development planning approvals. (See Paragraph 15).
78. Town Planning and Subdivision legislation operates general land use controls to define limits of conflicting uses, require re-planting and restoration, control interference to sea quality and currents. Central Board of Health controls dumping of waste of septic tank design and location. There is no concerted planning of the coastal zone as such. (See subsequent paragraphs re land use plans etc.).
79. Contingency planning for an oil spill before oil drilling is commenced is embodied in the Petroleum (Exploration and Exploitation) Act 1978.
80. Government is most interested in keeping up to date with oil spillage.
81. To cope with major disasters such as tropical cyclones, flood, earthquake, tidal wave and drought, Government has instituted the Disasters and Emergencies Services Committee (EMSEC). EMSEC is subordinate to Cabinet to co-ordinate and execute immediate safety and relief measures, and direct resources for relief measures.
82. There is also the Prime Minister's Hurricane Relief Committee (PMHRC) serviced by the Ministry of Fijian Affairs and Rural Development to provide long term reconstruction and rehabilitation of disaster victims and property.
83. The Fiji Government has no specific policy on island carrying capacities. However, Central Board of Health advocates tourist development schemes on small islands to be self-sufficient with water supply (minimum 35 gallons per person per day). Storage requirements for this supply together with building regulation controls on building height, size and location for light and privacy impose a measure of control on over-development of small islands.

84. Both the Man and Biosphere Programme 1977 for Fiji's eastern islands and United Nations/Fiji Regional Planning Project 1977 discuss the concept and importance of carrying capacity policies for small islands. The Directorate of Town and Country Planning is preparing policy recommendations for protecting small island ecosystems.

85. Zoning and subdivision standards are contained in a set of General Provisions used for the preparation of town plans and updating existing schemes - at present six town planning schemes have been approved for the country's major urban areas.

86. Subregional advisory plans have been prepared, particularly for the coastal region west of Suva where accessibility and consequent development pressure is greatest. (See also Paragraphs 22, 28 and 30 regarding regional planning).

87. Little rehabilitation of degraded areas has occurred although visual scars of natural disasters and large development projects are soon covered by tropical vegetation. Degraded grass lands have been systematically planted with pine as a profitable enterprise (See Paragraph 58).

## PART D. REQUIREMENTS FOR NATIONAL ACTION

## NEW ACTIONS

88. Development Plan 8 recognises the need to institute a regional basis for planning. Co-ordination within government is being examined to ensure consistent policy formulation on environmental matters. Whilst an independent Environmental Council may be premature, a co-ordinating committee and small unit of expertise on environmental matters may become a reality in the near future.

89. There remains a need to attempt a comprehensive inventory of marine and terrestrial resources. The recent National Parks and Reserves Plan (already referred to in Paragraph 62) has highlighted the need for more information on Fiji's natural resources.

90. The large scale of future projects for self-sufficiency such as later stages of the Hydro-Electric Scheme, mining, forest industries and agricultural schemes involving mechanisation, particularly if ethanol from sugar cane becomes feasible, makes environmental evaluation essential if full use of resources is to occur. At the same time, environmental legislation already referred to (Paragraphs 22, 25) coupled with an effective system of monitoring and enforcement in a way that does not stifle imaginative projects is required.

91. Preventive actions are required to be backed up with suitable enforceable legislation e.g. laboratory facilities should be able to identify toxic wastes and trace culprits which should then be liable to legal action, fining and rectifying problem.

92. Action is also needed to anticipate problems rather than rely on trying to rectify environmental degradation after it has occurred, particularly where effluent treatment and disposal of industrial waste is concerned. It would seem that a number of new projects are required to recommend various measures to correct existing problems eg. Soil erosion and flooding along Queen's road; leakage of toxic substances into Suva harbour/Walu Bay.

## EDUCATION

93. Primary Level

Although environmental education is not treated as a separate discipline the topic is introduced into elementary science, social studies; gardening and health lessons emphasise man's dependence on a healthy environment.

94. Secondary Level

- i. Basic Science, Biology, Physical Science and Chemistry cover environmental issues. Art and Craft courses emphasise the need for recycling materials.
- ii. The subject of the environment is treated in English and Urdu. Whereas the Science courses cater more deliberately for environmental needs Social Science and Economics also cover the topic.
- iii. As far as primary and secondary education is concerned, it is felt that more emphasis could be placed on preventative measures to avoid environmental problems and the individual's responsibility towards the environment.
- iv. There is a real lack of good environmental literature and visual teaching aids for both teachers and pupils.
- v. The present curriculum in this field is very limited with very little or no local bias. There is an urgent need for programmes of a local nature to be developed both for the general public and local schools. There should be a special panel to devise a suitable programme for schools which could be incorporated into the curricula. This should be backed up with audio-visual aids probably supplied by a special section of the Fiji Film Unit or similar overseas body through an aid programme.

## TERTIARY EDUCATION

95. i. At the Fijian Institute of Technology a two-year part-time course for town planning technicians touches on elementary environmental aspects related to physical planning.
- ii. At the University of the South Pacific the Institute of Natural Resources (INR) offers the following programme of ecological/environmental courses with a local emphasis on content.

NR 105 Biology course for diplomates.

A general introduction to tropical ecosystems and their functioning for teachers acquiring a Diploma.

Degree Courses

NR 131 - Now incorporates a section (4 weeks) on ecology for students majoring in any combination of science subjects for a BSc or BSc + CCED.

NR 201 - Soil Science : a full course involving the three disciplines - Biology, Physics and Chemistry.

NR 222 - Environmental Physics : a full course largely involved in the measurement of various environmental factors.

NR 231 - Population Biology : essentially and ecologically based course with a section on pest control and the exploitation of animal populations.

NR 334 - Environmental Biology : a final year course dealing with tropical ecosystems, especially of oceanic islands. It considers the management of biological resources and each student does an ecological project.

NR 337 - Fisheries Biology : includes about 7 weeks covering fish population dynamics and exploitation of fish populations.

NR 335 - Marine Biology : a full course dealing with marine organisms and marine ecology.

The Institute of Marine Resources (IMR) are also responsible for running most of the courses for the Diploma in Tropical Fisheries, a two year programme.

SSED runs a number of geography courses with an environmental bias:-

SE 242 - Geography of Agriculture in the Tropical World.

SE 344 - Resources conservation and management.

Each course lasts for one semester i.e. 14 weeks comprising lectures, tutorials and practical work.

PERSONNEL

95. i. There are some trained manpower in Fiji, both expatriate and some local, but their availability is limited. USP is producing a few science graduates but the Government will need to increase its number of scholarships. These graduates would need a post-graduate programme (perhaps an MSc in applied ecology) to equip them for research. There is a need



for other programmes to train technical staff in environmental monitoring. Present science graduate teachers should be suitable in schools and where necessary as public information officers. Environmental planners may have to be overseas personnel preferably on aid.

- ii. Liaison between research personnel at INR/IMR and Government departments with environmental responsibilities should continue to be promoted, particularly in the area of public debate of environmental issues. The National Trust has endeavoured to raise the level of public awareness of such issues by occasional publications and press statements as well as organising an annual Environmental Day exhibition but the Trust lacks financial support to have a major impact.
- iii. Needs at the moment are for extra technical personnel, transportation both road and sea, four wheel drive vehicles, and a marine survey vessel, plus the funds to charter a seaplane for some surveys. Extra clerical or administrative staff may be required for preparing reports and supervising arrangements and logistics of the various surveys.
- iv. The surveys would incorporate various recommendations involving resource management and would be forwarded to the relevant government for action as well as being held by the regional information centre.
- v. Priorities in regional environmental programme include:-
  1. General survey of the fauna and flora in as many natural ecosystems (rainforest, mangrove, beachforest, coral reef, atolls; etc) as possible to obtain inventories of flora and fauna.
  2. To have a regional reference collection(s) for local researchers.
  3. To record and monitor all regional development projects to aid the surveys of similar projects in other areas.

## FACILITIES AND EQUIPMENT

97. Facilities in the form of laboratories and equipment are available in the University and there are personnel who could carry out analyses for pesticides, heavy metals, etc and perhaps they could run an instruction course for science graduates. Regionally, such facilities are almost non-existent and it is probably best for regional governments to subscribe to a central analytical laboratory in Fiji or to fund certain personnel at USP.

## OUTSIDE EXPERTISE

98. At the moment, INR has an analytical chemist, but this may not always be the case as it may be necessary to bring in such people. In fact, if a training programme is envisaged it will almost certainly require extra teaching personnel from overseas.

INFORMATION - Other than the references made in Parts A, B and C

99. i. Various reports, surveys are held by INR and IMR, but these are not publicly available. Private firms funding surveys may be reluctant to allow copies of such reports to be passed to a government body, so that the legislation may have to be tightened so that a copy has to be sent to the advisory body.
- ii. There should be a regional information centre housing maps, charts, aerial photos, surveys, etc carried out for reference and source for subsequent surveys. This could be housed at a regional organisation, or institution such as USP.

TRADITIONAL KNOWLEDGE OF RESOURCE MANAGEMENT

100. i. 83% of Fiji's land is under native communal ownership but land owning rights are complex and over the years Native Land Commission has established a record of land ownership boundaries for most of the country.
- ii. The Great Council of Chiefs, drawn from Fiji's 14 provinces, appointed a committee in 1978 to draft terms of reference for a study of fishing rights. At present all marine spaces from mean highwater mark to the outer edge of the associated reef are assigned to members of the indigenous Fijian race. Each mataqali, or native communal land owning unit, has been allotted space in proximity to their native land holdings by the Native Lands and Fisheries Commission. In addition to having the right to engage in fishing for themselves, they also have the first right to permit or refuse applications for commercial fishing by others.

- iii. The Fijian Dictionary Project is in preparation. Also in operation is the Fijian Cultural Project that seeks to record and codify Fijian Ceremonies and Dance.
- iv. The National Trust for Fiji, in 1979, published a conservation handbook for primary and secondary school teachers.
- v. The dispersed nature of relevant documents on traditional knowledge limits their value but perhaps eventually a centralised library of such information could be formed.

#### GENERAL SUMMARY

101. Whereas government policies towards environmental issues are clearly stated, the means of implementation have traditionally tended to be diffuse and considerable effort in the 1980's will be expended to update legislation and co-ordinate action over the many problems as listed in Part B Paragraphs 40 to 43.

It is recognised that planning cannot be divorced from environmental control. The planning process needs to be broadened by:-

- (a) making environmental analysis an integral part of the planning system;
- (b) assessing environmental impacts of projects before decisions are made;
- (c) ensure that regional, subregional and local plans operate within a framework of environmental policy guidelines.

Fiji's resources and their exploitation is at a level which is controllable. Population estimates of one million people or more by year 2000 make it important for resource management to proceed at the same pace as development. Whilst Fiji's natural systems are relatively healthy at present there is no guarantee in the long run that they will remain in balance unless the conservation aims of:-

- (i) maintenance of essential ecological processes;
- (ii) preservation of genetic diversity; and
- (iii) sustainable utilisation of ecosystems

are followed in a consistent and co-ordinated manner by the public and private sector of Fiji's society.

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