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STAFF APPRAISAL REPORT

REPUBLIC OF SEYCHELLES

ENVIRONMENT AND TRANSPORT PROJECT

DECEMBER 2, 1992

Infrastructure Operations Division
South-Central and Indian Ocean Department
Africa Region

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CURRENCY EQUIVALENTS

Currency	:	Seychelles Rupee (SR)
Exchange Rate	:	$1.00 = SR 5.0
		$0.20 = SR 1

WEIGHTS AND MEASURES

Metric	US/UK
1 ha	2.47 acres
1 km	0.62 miles
1 mm	0.039 inch
1 km^2	0.386 square mile
1 kg	2.2 pounds
1 metric ton	2,205 pounds
1 m^3	1.307 cubic yards

ABBREVIATIONS AND ACRONYMS

CFTC	Commonwealth Fund for Technical Cooperation (UK)
CITES	Convention on International Trade in Endangered Species
CODEVAR	Artisan Development Cooperative
DCA	Directorate of Civil Aviation
DOE	Department of Environment
DOI	Department of Industry
EC	European Community
EEZ	Exclusive Economic Zone
EMPS	Environmental Management Plan of Seychelles
GEF	Global Environment Facility
GET	Global Environment Trust Fund
ICBP	International Council for Bird Preservation
IDC	Islands Development Company
IERR	Internal Economic Rate of Return
IMO	International Maritime Organization
IUCN	International Union for the Conservation of Nature
lcd	Liters per capita per day
LTD	Land Transport Division
MARPOL	International Convention for the Prevention of Marine Pollution from Ships
MEPER	Ministry of Environment, Economic Planning, and External Relations
MTOW	Maximum take-off weight
MTT	Ministry of Transport and Tourism
NDP	National Development Plan
ORSTOM	Organisation des recherches scientifiques et techniques d'Outre-mer (France)
PIP	Public Investment Program
PMSD	Ports and Marine Services Division, Ministry of Tourism and Transport
PUC	Public Utilities Corporation
RSNC	Royal Society for Nature Conservation
SFA	Seychelles Fishing Authority
SIF	Seychelles Island Foundation
SPPF	Seychelles People's Progressive Front
SPTC	Seychelles Public Transport Corporation
TRL	Transport Research Laborarory (UK)
TRRL	Transport and Road Research Laboratory
ULC	Union Lighterage Corporation, Ltd
UNDP	United Nations Development Program
UNDTCD	United Nations Department for Technical Cooperation and Development
UNEP	United Nations Environment Program

GOVERNMENT OF SEYCHELLES FISCAL YEAR

January 1 - December 31

SEYCHELLES

ENVIRONMENT AND TRANSPORT PROJECT

STAFF APPRAISAL REPORT

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This report is based on the findings of a Bank appraisal mission which visited Seychelles in July 1992, and which comprised Messrs. O. Grimes (economist and mission leader), A. Zohore (financial analyst), F. Cardy (environmental specialist), C.G. Lundin (ecologist), and L. Rasmusson (sanitary engineer). Messrs. B. Bostrom (transport economist) and M. Audigé (port engineer) helped to prepare the transport and marine pollution abatement components respectively. Ms. A Kiss (environmental officer) advised on the content and progress of the GEF program. Messrs. J. Post and R. Tillman were the peer reviewers for the project. Assistance with report production was provided by Mmes. C. Kok Shun, G. Chartier, N. Ford, and N. Wong. Messrs. M. Blanc and F. Aguirre-Sacasa are the managing Division Chief and Department Director respectively for the operation.

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SEYCHELLES

ENVIRONMENT AND TRANSPORT PROJECT

Loan and Project Summary

Borrower:	Republic of Seychelles
Beneficiaries:	Ministry of Environment, Economic Planning, and External Relations (MEPER); Seychelles Island Foundation (SIF); Land Transport Division (LTD); Public Utilities Corporation (PUC); Directorate of Civil Aviation (DCA); Ports and Marine Services Division (PMSD); Seychelles Fishing Authority (SFA)
Amount:	US$ 4.5 million Cofinancing from Global Environment Trust Fund grant of SDR (1.25 million) (US$1.8 million).
Terms:	Standard variable interest rate and maturity of 15 years, including a grace period of 5 years.
On-lending Terms:	Interest rate of 8 percent for 13 years, including 3 years of grace.
Co-Financing:	Global Environment Trust Fund (GET) Grant
Project Objectives:	The objectives are to: a. Assist with implementation of the Environmental Management Plan of Seychelles (EMPS); b. Support environmental programs in resource management, biodiversity conservation, and marine pollution control; and c. Improve the basis for sustained tourism growth by facilitating tourist access, while preserving or restoring environmentally sensitive areas.
Project Description:	The project consists of actions in three programs: resource management, biodiversity conservation and abatement of marine pollution, and transport. Resource Management • water supply on Praslin island

- water resources study and preparation of water management plans for outer islands
- preparation of management plans for marine resources
- organizational study of Division of Environment

Biodiversity Conservation and Marine Pollution Abatement

- restoration and preservation of the ecosystem of Aldabra atoll
- protection of endangered sea turtles
- study of waste reception facilities at the Port of Victoria

Transport

- road rehabilitation on Praslin island
- airport improvements on Praslin island
- action plan for road traffic safety

Benefits: The project would support the implementation of a comprehensive national environmental action plan in Seychelles. It would provide more dependable basic infrastructure on Praslin island, which will be a spur to realization of the potential of the island for nature tourism. The biodiversity and marine pollution programs would benefit the international community by addressing issues of global concern.

Risks: The main risk is that of delays in implementation due to the scarcity of trained staff. Short-term technical advisers to provide specialized inputs, careful monitoring, and training are designed to minimize this risk.

Project Cost: The total cost is estimated at US$7 million equivalent, with US$5 million (72 percent) in foreign exchange. Detailed cost estimates in December 1992 prices are shown in the following table:

PROJECT COST ESTIMATES

	Local Currency	Foreign Exchange	Total	Local Currency	Foreign Exchange	Total	% Foreign Exchange	% of Total
	SR'000			US$'000				
I. ENVIRONMENT								
A. Resource Management Program								
1. Praslin Water Supply, Phase II	530.3	193.5	723.8	106.1	38.7	144.8	27	2
2. Water Resources Study and Management Plans for Outer Islands	956.0	3,841.0	4,797.0	191.2	768.2	959.4	80	14
3. Marine Resources Management Plans	401.0	2,575.0	2,976.0	80.2	515.0	595.2	82	8
4. Organizational Study of Division of Environment	117.0	275.0	392.0	23.4	55.0	78.4	70	1
Sub-total	2,004.3	6,884.5	8,888.8	400.9	1,376.9	1,777.8	77	25
B. Biodiversity Conservation and Marine Pollution Abatement Program (GEF)								
1. Restoration and Preservation of Aldabra Ecosystem	397.0	2,576.0	2,973.0	79.4	515.2	594.6	87	8
2. Protection of Sea Turtles	3,029.0	2,284.0	5,313.0	605.8	456.8	1,062.6	43	15
3. Waste Reception Facilities (MARPOL) Study	77.0	688.0	765.0	15.4	137.6	153.0	90	3
Sub-total	3,503.0	5,548.0	9,051.0	700.6	1,109.6	1,810.2	61	26
II. TRANSPORT								
A. Praslin Road Improvement Program	2,938.3	7,037.7	9,976.0	587.7	1,407.5	1,995.2	71	28
B. Praslin Airport Improvements	253.0	1,183.3	1,436.3	50.6	236.7	287.3	82	4
C. Road Traffic Safety Program	422.0	1,792.0	2,214.0	84.4	358.4	442.8	81	7
Sub-total	3,613.3	10,013.0	13,626.3	722.7	2,002.6	2,725.3	73	39
TOTAL BASE COST	9,120.6	22,445.5	31,566.1	1,824.2	4,489.1	6,313.3	71	90
Physical Contingencies	469.7	1,463.4	1,933.1	93.9	292.7	386.6	76	6
Price Contingencies	392.7	1,136.5	1,529.2	78.5	227.3	305.8	74	4
TOTAL PROJECT COST	**9,983.0**	**25,045.4**	**35,028.4**	**1,996.6**	**5,009.1**	**7,005.7**	72	100

Financing Plan
(US$ million)

	Local	Foreign	Total
IBRD Loan	0.7	3.8	4.5
GET Grant	0.6	1.2	1.8
Government	0.7	-	0.7
TOTAL	2.0	5.0	7.0

Estimated Disbursements
(US$ million)

	FY93	FY94	FY95	FY96	FY97	Total
Annual						
IBRD Loan	0.8	1.9	1.1	0.5	0.2	4.5
GET Grant	0.3	0.7	0.6	0.2	-	1.8
Government	0.1	0.2	0.2	0.1	0.1	0.7
Total	1.2	2.8	1.9	0.8	0.3	7.0
Cumulative						
IBRD Loan	0.8	2.7	3.8	4.3	4.5	4.5
GET Grant	0.3	1.0	1.6	1.8	1.8	1.8
Government	0.1	0.3	0.5	0.6	0.7	0.7
Total	1.2	4.0	5.9	6.7	7.0	7.0

Economic Rate of Return: About 22 percent for 38 percent of project costs.

Staff Appraisal Report: Seychelles, Environment and Transport Project (Report No. 11259-SEY)

Maps: IBRD Nos. 23521, 23522, and 23524.

I. COUNTRY AND SECTOR SETTING

A. TOURISM, ENVIRONMENT, AND THE ECONOMY

1.1 Seychelles, a group of 115 granite and coral islands in the western Indian Ocean, well illustrates both the potential and the vulnerability of small island economies. The natural beauty and narrow resource base has led to a heavy emphasis on tourism and fisheries, without much additional scope for diversification of production and export. Its geographic isolation, combined with the distances between islands (the most remote is 1,200 km from the main island of Mahé), make transport critically important to an economy whose zone of influence extends over nearly 1.4 million sq km of ocean. The population of 70,000 is growing at 1 percent per year. Nearly 90 percent of the population lives on Mahé, and an additional 10 percent live on Praslin and La Digue, two neighboring islands of growing importance as tourist destinations and sources of local growth.

1.2 Throughout the 1980s, the public administration was by and large effective at coping with swings caused by downturns in tourist arrivals and other external events, using imported and domestic savings efficiently, and carrying out generally prudent fiscal policies. Wage restraints and price controls on essential consumer goods kept the annual rate of inflation from 1986-91 at about 2 percent. As tourism arrivals were rising steadily, to a peak of 104,000 in 1990, real GDP grew at about 5.4 percent during 1986-1990. However, the after-effects on tourism of the Gulf war are still being felt, as well as the global economic slowdown, and the number of arrivals in 1992 is not likely to match the 1990 figure. The government is monitoring these developments closely, and it is determined to take the necessary corrective measures to contain any fiscal or balance of payments slippages. It has also embarked on the preparation of a three-year public investment program, with the objective of improving the management of public investments and preserving the country's external creditworthiness.

1.3 The positive economic performance, resulting in a per capita GNP of US$5,160 in 1991, has made it possible to improve social and living standards. Life expectancy of 70 years, infant mortality of 17.1 per thousand, and a literacy rate of nearly 100 percent compare favorably with the indicators of many higher-income countries. A consensus however is emerging that, even though an interventionist approach in social sectors has yielded visible benefits, its application elsewhere in the economy has discouraged investment, distorted labor incentives, and led to the government taking on tasks that could have been better left to private initiative.

1.4 The extent to which the private sector can claim a greater stake in development will depend heavily on the outcome of political liberalization. The transition to multi-party democracy, announced in December 1991 and scheduled to lead to presidential and legislative elections by early 1993, has been accompanied by the relaxation of price and import controls and by measures to promote private investment. The ruling Seychelles People's Progressive Front (SPPF) party obtained a 58% majority in elections held in July 1992 to name the commissioners who will draft a new constitution. The opposition party, under a former president of the country who spent 15 years in exile prior to his return in 1992, did not seriously contest its 33% of the July 1992 vote, and appears to be settling into a role of loyal opposition. Continued political stability is essential if the country is to achieve its stated goals of sustainable development with preservation of its pristine but vulnerable environment.

B. ENVIRONMENTAL PRESERVATION: STRATEGIES AND PRACTICE

Strategies

1.5 As a series of small island ecosystems, Seychelles has long been conscious of the need to manage its resource endowment on a sustainable basis. The two main sources of growth, tourism and exploitation of marine resources, both depend for their well-being on a healthy environment. The government strategic objective of sustainable development therefore calls for public and private investment to be fully consistent with the environmental objectives of:

(a) protection of unique or endangered species and ecosystems;

(b) development of health and environmental quality standards for air, water, noise, and marine pollution, effective disposal of solid wastes and sewage, and worker health and safety;

(c) sustainable use of renewable resources and efficient use of non-renewable resources and ecosystems;

(d) mandating of environmental impact analysis for major development projects;

(e) improvements in public information and training programs on the linkages between environment and development; and

(f) expansion of participation in regional and international organizations dealing with the environment.

1.6 To achieve these goals, environmental and resource management issues have been integrated into the current development plan (National Development Plan, NDP 1990-94). The projects and portions of projects in the NDP focused on the environment were expanded and brought together during 1990-91 in a National Environmental Action Plan called the Environmental Management Plan for Seychelles (EMPS). The EMPS thus became a more detailed and operational extension of the NDP.

1.7 The EMPS, consisting of 52 projects in 10 programs, has advanced to the implementation stage. In February 1991 it was presented to donors at a meeting co-sponsored by the United Nations Development Program (UNDP), the United Nations Environment Program (UNEP), and the Bank. Donor commitments to EMPS programs include the European Community (EC) (coastal zone management), UNDP (information, training, and monitoring), French aid (FAC) (environmental assessment guidelines), the Commonwealth Fund for Technical Cooperation (CFTC) (offshore oil drilling control program), the African Development Bank (AfDB) (waste management), and the Netherlands (coastal zone management, biodiversity, and institutional support) (see also para. 2.15). EMPS projects are being carried out by a wide range of public and private groups. A detailed description of the EMPS and implementation issues associated with it is contained in Annex 1.

Policies and Institutions

1.8 Efforts to protect vulnerable areas and species began over 200 years ago in 1778, only eight years after the islands were first settled. The French commandant of that era tried to limit the taking of crocodiles, giant tortoises, and other species. These efforts did not succeed: sea cows, the Seychelles race of giant tortoises (as opposed to the Aldabra variety), and several birds, as well as the crocodiles, have all disappeared. Over the years since that time, many reefs have been mined for coral to use in construction, islands have been cratered as guano was extracted, and mangrove forests drained. Introduced plants outcompeted much of the native vegetation, which was also destroyed by fire, absent from the islands as long as they were uninhabited.

1.9 Real conservation can be said to have begun in the late 1960s, with the creation of the National Parks and Nature Conservancy Commission (later the Seychelles National Environment Commission) and the conferring of full responsibility for the management and preservation of Cousin island to the International Council for Bird Preservation (ICBP). Regulations issued in 1971 under the National Parks and Nature Conservancy Act provided the basis for the network of national parks and preserves which now amounts to 42% of the land area of the country and about 27,000 ha of surrounding seas and reefs. Other specific legislation protects land birds, sea birds and their eggs, marine turtles, shells, marine mammals, at least 25 species of trees, and giant tortoises. Following the Cousin island example, Aride island has been managed since 1973 by the Royal Society for Nature Conservation (RSNC). Seychelles has also played a major role in international conservation, especially in securing approval from the International Whaling Commission for an Indian Ocean Sanctuary for whales, and in launching the proposal for what is now the UNDP Convention for the Protection, Management, and Development of the Marine and Coastal Environment of the Eastern Africa Region.

1.10 Seychelles Island Foundation (SIF). In 1979 SIF, a charitable trust, was established to manage and conduct scientific research on Aldabra, the world's largest coral atoll and a largely undisturbed environment for terrestrial and marine life. SIF is formally in the Office of the President, but its operations are strongly influenced by the Ministry of Environment, Economic Planning, and External Relations (MEPER). The Foundation is administered by a Board of Trustees which includes representatives from the government and from sponsoring international organizations including the Smithsonian Institution (USA), the Royal Society (UK), the International Union for the Conservation of Nature (IUCN), and ORSTOM (France). The Board meets annually in Mahé, while a local executive group of the Board meets once a month to handle current matters. In addition to Aldabra, SIF since 1989 has been entrusted with management of the Vallée de Mai national park on Praslin island. Both Aldabra and the Vallée de Mai have been designated as World Heritage Sites.

1.11 As the responsibilities of SIF expand, its management will require strengthening. In particular, a more permanent leadership structure is needed for handling of funds, administration, support to scientific personnel, and the monitoring of field activities.

1.12 Seychelles Fishing Authority (SFA). SFA , under the supervision of the Ministry of Agriculture and Fisheries, is responsible for management, policy, and research on fisheries management issues. Its program includes studies on fishing practices and the establishment of quotas to maintain sustainable yields for tuna, sea turtles, lobsters, and artisanal fisheries. SFA handles licensing of tuna fishing by foreign fleets and assists with monitoring and enforcement of existing regulations. Despite an SFA ban, however, sea turtles continue to be caught for their

value in consumption or in the market. The management of marine resources has moreover been hampered by poor planning and lack of knowledge of the numbers and location of marine species such as lobsters (whose stocks are apparently rising again after a near complete depletion).

1.13 Ports and Marine Services Division (PMSD). Operations at the Port of Victoria are the responsibility of PMSD, a division of the Ministry of Tourism and Transport. The port benefited from support under the IBRD-assisted Transport Project (Ln. 2492-SEY), approved in 1986, and generally operates effectively. PMSD has been instrumental in establishing a contingency plan for possible oil spills from passing tankers. Lacking waste reception facilities at the port itself, however, PMSD has found it difficult to contain the pollution of port and surrounding waters with bilge waste, oily wastes, and garbage from the fishing and commercial fleets as well as cruise ships. Actions to reduce this type of ship-generated pollution of the sea are essential for preservation of the marine environment.

1.14 Public Utilities Corporation (PUC). PUC, the product of a merger in 1986 of the Seychelles Electricity Corporation and the Seychelles Water Authority, provides water, electricity, sewerage services, solid waste disposal, and production of bottled water. It is a public enterprise, 100 percent owned by the government, and is supervised by MEPER for water and sewerage and by the Department of Energy for electricity. Water connections managed by PUC total about 12,500 on Mahé, Praslin, and La Digue. A Finance and Administration division serves both the water and electricity divisions.

1.15 Seychelles has very low capacity for retention of groundwater. PUC must therefore exploit surface water sources and install extensive distribution networks to serve the scattered localities of Mahé, Praslin, and La Digue. Growing scarcities of water are evident on both Mahé and Praslin. Whereas Mahé has storage capacity from two reservoirs, Praslin relies on run-of-the-stream sources whose flows decline drastically during dry months. Since 1991 PUC has been carrying out a four-part improvement program designed to address its most critical organizational and financial needs. This program has thus far mainly affected Mahé operations, but PUC plans to introduce parts of it to Praslin/La Digue at a time when reliable yields can simultaneously be increased.

1.16 Division of Environment, MEPER. Although the mandate of each of the above agencies has been generally well understood, inadequate communication and the absence of clear lines of responsibility have often hampered collaboration among agencies responsible for protection of the environment. In response to these concerns, a Department of Environment (DOE) was established in the Office of the President in June 1989. DOE has been the main instrument for the attainment of national environmental objectives. DOE and its three sections (Forestry, Conservation and National Parks, and Environmental Assessment and Inspection) were integrated in May 1992 as the Environment Division within MEPER. This should strengthen the coordination between environment and development planning. It should also give the Environment Division added authority in securing budgets for environment, and in requiring environmental impact assessments for all major development projects. The Environment Division plays a major role in the Environment Steering Committee, a multi-agency advisory body chaired by the Minister of MEPER. Budgetary allocations in 1990 and 1991 were adequate to finance the operational budget of DOE, but care will need to be taken that future budgetary provisions fully meet the increased demands of implementation of the EMPS (see also para. 1.7 and Annex 1). It is also uncertain whether the organizational structure of the Environment Division will allow it to discharge its responsibilities effectively.

C. THE TRANSPORT SECTOR

1.17 Seychelles as an island nation has long recognized the importance of effective transport links, both with trading partners and between islands. The deep-water port at Victoria, the capital, processed 545,000 tons of freight imports and exports in 1989, including 223,000 tons of fish transshipment. An active inter-island cargo trade is handled by more than 50 schooners, a government cargo vessel, and hundreds of small boats. Air Seychelles, the national carrier also responsible for ground handling and air cargo management, has 7 aircraft including a B-767 in its fleet and serves the main islands of Mahé and Praslin as well as 8 outer islands. About 6,000 vehicles, most located on Mahé, use a network of 240 km of main roads, of which 200 km are paved, and an extensive network of secondary roads and tracks. Since the 1980s planned transport investments have accounted for 35-40 percent of public investment. The main objectives for the sector are to (i) improve and maintain the road network and promote road safety; (ii) upgrade airfields on Praslin, Mahé, and outlying islands and improve access to foreign tourist markets; and (iii) improve the ability of port and marine authorities to transport cargo between islands, control pollution, and respond to emergencies.

Roads and Road Safety

1.18 Under the 1985-89 National Development Plan (NDP), a program to rehabilitate the main roads of Mahé was carried out, with assistance from the Bank (Ln. 2492-SEY). With the completion of this program in 1991, periodic and routine maintenance, costing about SR 4.5 million (US$ 900,000) annually, can be carried out on the main road network of Mahé without recourse to external aid. Some resources in this program were also devoted to roads on Praslin. There is a need, however, to upgrade other segments of the main road network on Praslin so as to achieve a similar result.

1.19 The number of registered vehicles has increased by 55 percent over the past 15 years, but there has been an even greater increase in the number of road accidents. The steep terrain, rainstorms, and congestion in built-areas are all causes of the high accident rate. The relatively modest standards adopted for main roads, most of which are narrow with no shoulders or pedestrian walkways, is another important factor. The main cause of accidents, however, is negligent driving, especially drunk driving. Traffic management measures to reduce congestion are being combined with a road safety campaign begun in May 1992 to improve awareness of safety concerns and reduce negligent driving.

1.20 Land Transport Division (LTD). The overall responsibility for land transport lies with the Land Transport Division (LTD) of the Ministry of Tourism and Transport. LTD successfully carried out the road rehabilitation program of the late 1980s (see para. 1.18), and chairs the newly-created Road Traffic Safety Commission. Before 1983 roads were maintained by force account labor brigades and by a construction parastatal. Since that time, LTD has opted for encouragement of private contractors in road maintenance.

1.21 Seychelles Public Transport Corporation (SPTC). The public bus company SPTC, established in 1977, links small and isolated rural communities on Mahé and Praslin with employment centers. A high percentage both of the working population and of students uses public transport. Fares are low, with the result that SPTC depends on government for its capital

expenditure as well as about half of its operating budget. Its maintenance and repair facilities function effectively, however, and the bus fleet is generally in good working order.

Marine Transport

1.22 The Ports and Marine Services Division (PMSD) (see also para. 1.13) is responsible for the operation and maintenance of the Port of Victoria, as well as for all other Seychelles ports and harbors, navigation aids, licensing of vessels, and pilotage. Stevedoring and dry cargo handling is the responsibility of a parastatal, the Union Lighterage Company (ULC). Import volume in 1989 totalled 313,000 tons, while exports amounted to 9,000 tons. Imports increased by one-third during the late 1980s, and tonnage of fish transshipment has also shown significant growth, from 130,000 tons in 1985 to 223,000 tons in 1989. Currently, PMSD is engaged in several projects designed to upgrade equipment and buildings at the commercial and fishing ports, identify appropriate facilities for reception of marine wastes, and extend and realign the jetty at Baie Ste. Anne, the main transshipment point of Praslin. The Port of Victoria is a commercially viable entity whose operations, especially for containerized cargo and petroleum products, were improved under the Bank-assisted Transport Project (Ln. 2492-SEY).

Aviation

1.23 Tourism as the major source of foreign exchange earnings became a tangible prospect in 1971, with completion of the international airport at Pointe Larue, on Mahé. Since virtually all tourists wish to visit at least one other island, Praslin is served by a runway, surfaced in June 1988, capable of accommodating 20-passenger aircraft. During 1985-89, airfields were constructed on the outer islands of Alphonse, Coetivy, Desroches, Farquhar, and Marie-Louise. More recently, an airstrip was completed on Assomption island, making the formerly remote nature preserve of Aldabra much more accessible to visitors.

1.24 The Directorate of Civil Aviation (DCA) is responsible for the country's civil air transportation system, as both provider of airport services and regulatory body. DCA is trying to come to grips with the growth of air traffic on both Mahé and Praslin, which is straining the existing facilities. Expansion and upgrading of the international airport is currently under consideration. For Praslin, whose airport operations now average about 1,000 landings and takeoffs per month, upgrading of the runway and enlargement of the small parking area are required in order to meet the needs of current arriving passengers and to accommodate growth. DCA is well managed from the technical point of view. There is however a need to improve the financial information available to the management of DCA in order to properly account for and allocate revenues and expenditures as they relate to individual airports.

1.25 Air Seychelles, the national carrier, increased revenues by 57 percent in 1990. The sharp increase stemmed largely from the acquisition through leasing of a B-767 aircraft in August 1989 to cater for the European and Far East markets. The airline's European routes are roughly breaking even, although the Singapore route is so far a heavy loser. Domestic operations and airport services are making a profit. In addition to the B-767, 2 BN2 Islanders and 4 DH-6 Twin Otters comprise the Air Seychelles fleet. There are at present no aircraft in the 30-35 passenger range, such as the DASH-8 or F-27. This places a limit on development of the outer islands, most of which are beyond the range of the Twin Otters, and to some extent of Praslin, where the runway cannot now accommodate heavier aircraft. Traffic rights have been granted to 5 foreign airlines, and commercial agreements have been recently concluded or are in progress with

seasonal carriers providing service on contract with tour operators. Operating losses of Air Seychelles amounted to SR 66.2 million (US$ 13.2 million) in 1989. In 1990, these losses had declined to SR 4.4 million, and the provisional 1991 results for the first time show an operating profit (of SR 24.1 million, or US$4.8 million). The financial performance of Air Seychelles from 1989 to 1991 is given in Annex 13.

1.26 DCA has launched two master planning exercises, one for the international airport and the other for the outer islands. The contract for the international airport master plan was awarded in May 1992, and the study should take about 9 months to complete. The first phase of works is expected to consist of the rearrangement and extension of the existing passenger terminal building, construction of an office building, and related road and utilities works. This study would include traffic forecasts up to the year 2015 for both the Seychelles (Mahé) and Praslin airports. Although focused primarily on Mahé, the master plan is therefore also expected to provide advice on the long-term development of air service to Praslin. The second master plan, supported by the Government of India, will establish the long-term airfield, navigation, and equipment requirements of 6 outer islands in relation to planned tourism development: Alphonse, Assomption, Coetivy, Desroches, Farquhar, and Platte.

D. PREVIOUS BANK EXPERIENCE AND CURRENT STRATEGY

1.27 The Bank's country assistance strategy supports the focus of national priorities on tourism and diversification toward services, particularly in shipping, with careful management of Seychelles' main asset, its environment. Since joining the Bank in 1980, Seychelles has received one loan in 1986 for port improvements and road rehabilitation (Ln. 2492-SEY, US$6.2 million). Since 1988 the collaboration has covered a broader range of sectors and topics, including water supply, environment, housing, and macroeconomic planning. The present project focuses on resource management, biodiversity protection, and control of marine pollution in addition to land and air transport. The Bank has also assisted since 1990 with preparation of the Mahé Integrated Water Supply program, a large investment in new source development, treatment, and distribution of water throughout the island of Mahé. Its preparation includes an evaluation of the economic and financial impacts of the water supply program, in the context of a multi-year Public Investment Program (PIP). Bank assistance in the preparation of the PIP, the first one for the country, has been requested. A sector study of housing and land management, carried out in late 1991, has recommended several measures designed to improve the supply of affordable housing and the availability of land for housing construction. IFC in 1992 approved US$ 6.3 million in loan and syndications for the refurbishing of the Paradise Hotel on Praslin island. An earlier IFC project, now closed, was also in the tourism sector.

1.28 Implementation of the Transport Project was well managed, and the project was successfully completed in 1991. The design of the proposed project takes account of this experience through the provision of periodic inputs of technical specialists, rather than long-term advisers, and through sustained follow-up of the programs through their completion.

II. THE PROJECT

A. PROJECT ORIGIN AND CONCEPT

2.1 Support for environment programs under the proposed project was an outgrowth of Bank involvement in the preparation of the EMPS. During this period, as a Seychelles team of staff and consultants prepared the EMPS, the Bank's advice was sought on specific topics, such as protection of sea turtles and waste management. Together with other donors, the Bank analyzed the EMPS at the donors' meeting in February 1991 and indicated its priorities for support. Of the EMPS programs, actions to protect biodiversity and to limit the pollution of the international waters around Seychelles were identified as the most supportive of the goals of the Global Environment Facility (GEF).

2.2 While the environment actions supported by the GEF were identified chiefly for their global benefits, those to be financed by the proposed Bank loan are mainly characterized by strong linkages with development objectives and by internal consistency. The geographic focus on Praslin will enhance the mutual benefits from investments occurring simultaneously in several sectors. The priority given to water resources during preparation of the forthcoming Mahé Integrated Water Supply project is continued, both in the investments on Praslin and in the study of water resource management in the outer islands. The Praslin road improvement program extends the focus on road maintenance and rehabilitation begun under the Transport Project.

2.3 The intended beneficiaries participated in project design and preparation in several specific ways. Turtle shell artisans gave their views on the approach taken in the Hawksbill turtle management program to facilitate their re-absorption into the labor force in another occupation. The scientific and research community familiar with Aldabra has been closely involved with the proposals for restoration and preservation of Aldabra's ecosystem. Finally, the newly elected district representatives on Praslin discussed the road improvement program with their constituents and advised on priorities and content.

B. RATIONALE FOR BANK INVOLVEMENT

2.4 Consistent with the strategy of sustainable development, the Bank seeks to promote the types of growth that will improve, rather than detract from, the chances of realizing environmental preservation in deeds as well as words. The encouragement of nature tourism on Praslin, with appropriate supporting infrastructure, meets this criterion and constitutes one of the chief reasons for Bank support of this project. Another reason is the priority attached to moving National Environmental Action Plans through to the implementation stage. As EMPS implementation issues crop up over the decade of the 1990s, the Bank experience that will be brought to bear is not only in environment (which is already considerable), but also in capacity building, management with scarce resources, and organization.

2.5 To maximize its policy impact, the Bank is also continuing its involvement with key sectors of the economy. Transport improvements on Praslin, combined with those already achieved on Mahé, are expected to place LTD on a firm footing, capable of ensuring the preservation of the investments made. Participation in water resource actions on Praslin and on

the outer islands puts into practice the assistance with policy implementation in the water sector that began two years ago with preparation of the Mahé Integrated Water Supply program.

C. PROJECT OBJECTIVES AND DESCRIPTION

2.6 The proposed project is designed to improve the basis for sustained tourism growth, while preserving or restoring environmentally sensitive areas. Tourist access on Praslin would be facilitated through rehabilitation of the main road network, airport improvements, and enhancement of reliable water supplies. For environment the project would support EMPS programs in resource management, biodiversity conservation, and marine pollution control, the latter two through a program financed by the Global Environment Trust Fund (GET). Under both the project and the Global Environment Facility (GEF) program, the Bank would continue to assist with implementation of the EMPS as a whole. Indicators of progress toward attainment of project objectives have been agreed with government (see also para. 3.32).

2.7 The project consists of two parts. The first part is an environment program, comprising 57 percent of project base costs, focusing on resource management, protection of biodiversity, and abatement of marine pollution. The second part is a transport program, representing 43 percent of base costs, which consists of road rehabilitation, airport improvements, and road safety. Road safety measures apply largely to Mahé. For most other elements, however, the focus is on Praslin and the outer islands, where the need to ensure that environmental preservation accompanies growth is especially acute.

2.8 In the context of the proposed project, the actions to reduce marine pollution and several measures to protect biodiversity make up the GET-financed program. The GET-financed biodiversity measures include the restoration and preservation of the ecosystem of Aldabra island, and the protection of endangered sea turtles. For marine pollution reduction the GET would finance the design and justification of waste reception facilities at the Port of Victoria.

2.9 The specific actions proposed are outlined below. Further details on their implementation can be found in Annexes 3, 4, 5, and 6.

I. ENVIRONMENT

A. Resource Management Program

Praslin Water Supply, Phase II

To improve dry weather flows and the overall reliability of water provision while avoiding more costly additions to capacity, two additional intakes would be constructed at existing water installations at the Fond B'Offay and Nouvelle Découverte rivers on Praslin island. Actions would include the supply of 4 pumps, construction of 2 pumphouses, and laying of 900 m of ductile iron pipes. Further details on the proposed works are included in Annex 6.

Water Resources Study and Management Plans for Outer Islands

Development of the coralline outer islands is severely constrained by a lack of fresh water, and the exploitation of aquifers is limited by the threat of salt water intrusion. Although data on water resources have been collected for several years, they have not been analyzed with a view to formulating proper water management guidelines and policy. Management plans would be prepared for 7 outer islands: Alphonse, Assomption, Astove, Coetivy, Desroches, Farquhar, and Providence. The management plans would be prepared in four steps. First, existing water supply systems would be surveyed and data collected through installation of wells, meteorological monitoring stations, and drilling surveys. Second, additional hydrological data would be collected on the inner, granitic islands for benchmark comparisons. The third step would consist of the preparation of long-term water resource management plans for the main catchment islands. Finally, a long-term data maintenance program would be established for continuous monitoring of surface and underground water resources.

Marine Resources Management Plans

Although data are collected on some marine species, there are serious gaps in the knowledge required to establish sustainable levels of exploitation with confidence. On the basis of more systematic data collection, plans would be prepared and carried out for the management of marine fisheries resources, especially tuna, reef fishes, demersal fishes, and lobsters. The management measures to be formulated would be specific as to size of catches, types of fishing gear, closed seasons, and similar topics. Advice would be given in the drafting of fisheries regulations. Posters, leaflets, and other educational materials would also be prepared, mainly for enforcement staff.

Organizational Study of Division of Environment (MEPER)

In carrying out its mandate, DOE, now the Division of Environment in MEPER, has been adversely affected by the lack of trained personnel and equipment, limited environmental expertise at senior management levels, and the absence of clear lines of responsibility among the various ministries. A review of the organizational setup of the Division of Environment would be undertaken to help overcome these problems as rapidly as possible. The study would aim to propose an improved structure for the Division, assess coordination and monitoring requirements for environmental programs, and prepare staffing and training proposals.

B. Biodiversity Conservation and Marine Pollution Abatement Program

Restoration and Preservation of Aldabra Ecosystem

This program consists of four parts: (i) rehabilitation of the scientific research facility on Picard island, Aldabra; (ii) provision of personnel to strengthen SIF research and conservation management; (iii) control of feral goats on islands of the

atoll; and (iv) preparation of a long-term management plan for Aldabra. Formerly several days away from Mahé by boat, Aldabra is now much more accessible due to completion of an airstrip on Assomption island, 3 hours away by sea. This program would address critical issues such as the number and frequency of visits by non-scientists, area designation for conservation purposes, supervision of visitors while on the island, liaison with other reserves and national parks in Seychelles, and the prospects for ecotourism programs. A more detailed description of this program can be found in Annex 3.

Protection of Sea Turtles

The two species of marine turtles in Seychelles, the Green (*Chelonia mydas*) and Hawksbill (*Eretmochelys imbricata*), are both on the endangered list. This program is designed to implement a comprehensive set of actions to restrict or prohibit marine turtle exploitation. The Green turtle protection program would define the sustainable level of exploitation for the species in order to accommodate domestic consumption. The Hawksbill turtle protection program would include a feasibility study of Hawksbill turtle ranching, a turtle trade compensation study, retraining and compensation for artisans presently working turtle shells, and educational materials to Seychellois and tourists on the consequences of trade in and purchase of turtle products. A fuller description of this program is contained in Annex 4.

Abatement of Marine Pollution

This component consists of a study to design and evaluate the waste reception and disposal facilities at the Port of Victoria that are needed to comply with the requirements of the International Convention for the Prevention of Pollution from Ships (MARPOL Convention). Actual construction of the facilities would take place in a subsequent phase, beyond the proposed project. Further details on this activity are included in Annex 5.

II. TRANSPORT

A. Praslin Road Improvement Program

On Praslin island, three earth roads totalling 13.3 km would be improved to paved standard. The existing alignment will generally be maintained, with minor changes largely to avoid disturbance to vegetation. Drains and culverts will be installed, and edgewalls and seawalls repaired or constructed. Off-street bus lay-bys will be provided along the SPTC bus service routes, and passing bays will be constructed in the narrow sections. More details on this program are provided in Annex 6.

B. Praslin Airport Improvements

The present 1,200 x 26 m runway on Praslin is in need of periodic maintenance. In addition, parking space for aircraft has become very restricted with the growth of the Air Seychelles fleet. These problems are aggravated when general aviation or military aircraft fly to Praslin. Under the project, the runway would be resurfaced to continue to serve the type of aircraft now using it. Two 400-m2 extensions to the parking apron would also be cleared and paved. A fuller discussion of these improvements can be found in Annex 6.

C. Road Traffic Safety Program

Negligent driving is the cause of over 90 percent of the accidents on Seychelles roads. Phase 1 of this program consists of a diagnostic and evaluation study that will analyze the current situation, evaluate the economic and social costs of road accidents, and propose an Action Plan to improve traffic safety. In Phase 2, also supported by the project, road signs and markings would be introduced, crash barriers installed, and street lighting improved. A 3-km footpath would be constructed along the Cascade road, where pedestrians are especially vulnerable to vehicular traffic. More details on the road traffic safety measures to be introduced are found in Annex 12.

D. COST ESTIMATES

2.10 The total cost of the project is estimated at SR 35,028.4 million (US$7.006 million). The foreign exchange component of SR 25,045.4 million (US$5.009 million) represents 72 percent of total project cost. Goods and services procured under the project would not be subject to import duties or local taxation. Base costs are expressed in December 1992 prices. Base costs are derived from preliminary and detailed designs for the physical components, and consultants' feasibility studies and appraisal mission estimates for the other elements. For the GEF program, the remuneration of local and expatriate technical and managerial personnel was estimated on the basis of current base pay and benefits in each case. Costs for consultant and advisory services were estimated on the basis of recent provision of these services in Seychelles, and include international and local travel, living allowances, and overheads. Project costs are summarized in Table 2.1. Annex 7 provides detailed cost estimates, by year and by sub-program, for each activity.

2.11 Physical contingencies for civil works have been estimated at 10 percent for Praslin road and water supply improvements, and 15 percent for Praslin airport improvements, construction of footpaths under the Road Traffic Safety Program, and rehabilitation of the Aldabra research facility. For equipment, materials, and training, physical contingencies of 10 percent have been established. No physical contingencies have been attributed to consulting services. Price contingencies for foreign costs are based on recent estimates of international inflation of 3.7 percent for 1993 and beyond. Price escalation for the local portion of total project cost is estimated at 3 percent for 1993 and 4 percent for 1994 and onward. These forecasts are consistent with past experience, in which the rate of actual domestic price increase was 2 percent in 1989, 4 percent in 1990, and 2 percent in 1991. They do however assume that

inflationary pressures in the future will be reflected in price movements, due to economic liberalization, somewhat more has been the case in the recent past. Price escalation amounts to 4 percent of base costs plus physical contingencies.

E. FINANCING PLAN

2.12 The proposed project would be supported by the Government and by a grant from the Global Environment Trust Fund (GET), in addition to the Bank. The foreign exchange costs of US$5 million would be met by the Bank loan (US$3.8 million, or 76 percent of foreign costs) and the GET grant (US$1.2 million, 24 percent of foreign costs). The Bank loan would also finance 35 percent of local costs (US$ 0.7 million), with an additional 30 percent of local costs supported by the GET grant (US$ 0.6 million) and the remaining 35 percent from the government. Local cost financing represents a modest portion of the Bank loan (about 16 percent), and will ensure that foreign and local suppliers can compete on equal terms for supply contracts for items available locally. The critical importance of environment in natural development strategies, and the considerable extent to which the project contributes to this key development objective, provides additional justification for local cost financing. Financing of recurrent costs such as salaries is the responsibility of government and the GET, and is not included in the Bank loan.

2.13 The loan would be at the Bank's variable interest rate and is repayable in 15 years including a grace period of 5 years, with level repayments of principal. GET funds would be made available to implementing agencies as grants. Of the Bank loan, US$ 170,000 would be onlent by the government to PUC at an interest rate of 8 percent for 13 years including three years of grace. The foreign exchange risk would be borne by the government. Signature of a Subsidiary Loan Agreement between the government and PUC concerning the Praslin Water Supply Phase II works would be a condition of loan effectiveness.

Table 2.1

SEYCHELLES

ENVIRONMENT AND TRANSPORT PROJECT

PROJECT COST ESTIMATES

	Local Currency	Foreign Exchange	Total	Local Currency	Foreign Exchange	Total	% Foreign Exchange	% of Total
	SR'000			US$'000				
I. ENVIRONMENT								
A. Resource Management Program								
1. Praslin Water Supply, Phase II	530.3	193.5	723.8	106.1	38.7	144.8	27	2
2. Water Resources Study and Management Plans for Outer Islands	956.0	3,841.0	4,797.0	191.2	768.2	959.4	80	14
3. Marine Resources Management Plans	401.0	2,575.0	2,976.0	80.2	515.0	595.2	82	8
4. Organizational Study of Division of Environment	117.0	275.0	392.0	23.4	55.0	78.4	70	1
Sub-total	2,004.3	6,884.5	8,888.8	400.9	1,376.9	1,777.8	77	25
B. Biodiversity Conservation and Marine Pollution Abatement Program (GEF)								
1. Restoration and Preservation of Aldabra Ecosystem	397.0	2,576.0	2,973.0	79.4	515.2	594.6	87	8
2. Protection of Sea Turtles	3,029.0	2,284.0	5,313.0	605.8	456.8	1,062.6	43	15
3. Waste Reception Facilities (MARPOL) Study	77.0	688.0	765.0	15.4	137.6	153.0	90	3
Sub-total	3,503.0	5,548.0	9,051.0	700.6	1,109.6	1,810.2	61	26
II. TRANSPORT								
A. Praslin Road Improvement Program	2,938.3	7,037.7	9,976.0	587.7	1,407.5	1,995.2	71	28
B. Praslin Airport Improvements	253.0	1,183.3	1,436.3	50.6	236.7	287.3	82	4
C. Road Traffic Safety Program	422.0	1,792.0	2,214.0	84.4	358.4	442.8	81	7
Sub-total	3,613.3	10,013.0	13,626.3	722.7	2,002.6	2,725.3	73	39
TOTAL BASE COST	9,120.6	22,445.5	31,566.1	1,824.2	4,489.1	6,313.3	71	90
Physical Contingencies	469.7	1,463.4	1,933.1	93.9	292.7	386.6	76	6
Price Contingencies	392.7	1,136.5	1,529.2	78.5	227.3	305.8	74	4
TOTAL PROJECT COST	**9,983.0**	**25,045.4**	**35,028.4**	**1,996.6**	**5,009.1**	**7,005.7**	72	100

The summary financing plan for the project is shown in Table 2.2 below:

Table 2.2

Summary Financing Plan

Cofinancier	Contribution US$ million
World Bank	4.5
GET	1.8
Government	0.7
Total	7.0

2.14 For the technical advisers financed under the project and the GEF program, about 60 percent of expenditures are concerned with capacity building and institutional development. Notable examples include the scientific and managerial personnel for Aldabra, the organizational study of the Division of Environment, preparation of turtle management plans, training for LTD staff in materials testing, and the marine resources management plans. The remaining 40 percent of expenditures have to do with project preparation and implementation support. The study of waste reception facilities and the water management study of the outer islands illustrate this type of support.

2.15 The environment program supported by each of the above cofinanciers is part of a larger program of implementation of the Seychelles national environmental action plan, the EMPS. Major contributions and pledges to the EMPS have been made by several other donors, including AfDB (US$8 million), CCCE (Caisse Centrale, France) (US$12 million), Commonwealth Development Corporation (CDC, UK) (US$1.2 million), the European Community (EC) (US$1.8 million), and the Commonwealth Fund for Technical Cooperation (CFTC, UK) (US$1.4 million). In July 1992 the Netherlands government pledged support for a Trust Fund for management of coastal ecosystems, protection of biodiversity, and institutional support within the EMPS. It is expected that the Bank will be asked to administer this Trust Fund. The financing and implementation of EMPS programs as a whole are described in detail in Annex 1.

III. IMPLEMENTATION

A. THE EMPS AND ITS IMPLEMENTATION

3.1 Along with praise for the EMPS as an exposition of sound environmental policy, concerns have been expressed about the country's ability to mobilize the staff, resources, enforcement, and public involvement that is necessary for the EMPS to succeed on the ground. Commitments from donors have been received for part or all of 20 projects in the EMPS, and 11 projects are currently underway. Pledges have been made for another 19 projects. Since the EMPS is being implemented by several ministries, public enterprises, and NGOs, the coordination and monitoring of these activities is of critical importance.

3.2 The measures supported by the Bank loan and the GET grant are parts of a broader whole, the EMPS. It would have been unwise to set up a project implementation unit, that would have reflected an artificial distinction between Bank-supported EMPS programs and the others. The emphasis is therefore on coordination of implementation of the EMPS as a whole, and is focused especially on the central role of the Environment Division of MEPER.

3.3 Several steps would be taken to strengthen the coordination and management role of the Environment Division. MEPER would appoint a National Coordinator that would supervise the progress of EMPS execution, provide advice to participating groups, exchange information, and directly manage some EMPS projects. Additional details on establishment of the National Coordinator position and a description of duties are contained in Annex 2. The appointment is expected to be made before the end of 1992, and would be a condition of effectiveness of the Bank loan as well as of the GET grant. Moreover, the principle of dispersed management of the EMPS has been adopted, whereby MEPER will delegate management of most EMPS projects to SIF, PMSD, and other groups whose specialized expertise can be brought to bear. Comprehensive staffing and training plans, a third element of the implementation plan, are expected from the Organizational Study of the Division of Environment, to be financed under the project. Because of labor scarcities, training will always need to be supplemented by specialized foreign expertise, as it is in the proposed project. Finally, environmental legislation will be strengthened where needed, especially in making it mandatory to carry out environmental impact assessments for all major investment projects.

B. PROJECT IMPLEMENTATION ARRANGEMENTS

3.4 Within the above framework, a number of agencies and ministries would have specific responsibilities for the program, as outlined below. The Implementation Schedule for the project is given in Annex 15.

Resource Management Program

3.5 The Praslin/La Digue district office of PUC will carry out the Praslin Water Supply Phase II program. Its experience and the availability of staff familiar with Praslin conditions make it most economical for PUC to undertake engineering works and supervision itself. The

Bank would conclude a Project Agreement with PUC for the proposed works. All source works, reticulation systems, and other water assets are still owned by the government. Prior to December 31, 1993, the government would transfer to PUC, on a loan and/or equity basis, all water assets it now owns. Both of the existing intakes at Fond B'Offay and Nouvelle Découverte, as well as those proposed at the same locations, lie at the inner boundary of the Vallée de Mai National Park. As a condition of disbursement for the Praslin water component, an assessment of the possible impacts of the proposed works on the national park would be undertaken by the Division of Environment, MEPER. The results of this assessment would be fully taken into account in the design and implementation of the works.

3.6 The water resources study and management plans for the outer islands would be managed by the Environment Division, MEPER in collaboration with PUC and with the Islands Development Company (IDC), a public enterprise responsible for development of the outer islands. The enhanced data base generated from the management plans would be stored and maintained by MEPER.

3.7 SFA would manage the preparation of marine resources management plans. In the process, SFA would coordinate with the technological support services division of the Office of the President, which reviews marine biotechnology issues as well as ways of using marine resources for commercial purposes. As a condition of disbursement of funds for the marine resources management plans, MEPER and SFA would sign a Memorandum of Understanding which would outline the responsibilities of each in preparation of the management plans.

3.8 The Organizational Study of the Division of Environment will be carried out by a group of local and foreign consultants under the supervision of the Director-General of Environment. The study will be closely monitored by the Environment Steering Committee (see para. 1.16).

Biodiversity Conservation and Marine Pollution Abatement Program

3.9 SIF would manage all facets of the Aldabra program. To define roles and responsiblities, a Memorandum of Understanding will be concluded between the government and SIF for implementation of the program. Signature of the Memorandum of Understanding is a condition of disbursement of the GET grant. SIF would be responsible for recruitment of the scientific and managerial personnel, and of consultants for the goat control program. It is expected that the managerial and scientific personnel recruited will be major contributors to the long-term management plan.

3.10 At present, the management of SIF is weak. It lacks permanent staff, and requires strengthening in its handling of funds, administration, support to scientific personnel and overseeing of field activities. As a condition of disbursement of the GET grant, SIF would appoint a full-time Executive Director to manage its day to day operations including the Aldabra program. The SIF Board of Directors at its meeting of August 1992 took the decision to provide financial support for such a position. The Executive Director would assign high priority to improvements in financial administration. The National Coordinator in MEPER would contribute in this respect by exercising supervision to ensure that the accounts are properly managed and that decisions of the Board of Trustees are implemented.

3.11 The turtle protection program will be managed by the Conservation and National Parks Section of the Environment Division, MEPER. SFA, with long experience trying to manage sea turtle stocks, will make specialized inputs during implementation. SFA will also be called upon to enforce the Green turtle quota regulations that are likely to form part of the management plan. For the Hawksbill program, and as a condition of disbursement of the GET grant, a Memorandum of Understanding would be concluded between MEPER and the Department of Industry (DOI) in the Office of the President in collaboration with CODEVAR, an artisan development company. This agreement will outline the responsibilities of DOI/CODEVAR for undertaking the turtle trade compensation study and the re-training and compensation of artisans. Legislation would furthermore be put into effect prior to December 31, 1993 to ban domestic trade in turtle shell products.

3.12 PMSD, in collaboration with the Harbour Master's Office, would be in charge of the waste reception facilities study. PMSD effectively managed the port improvements financed under the earlier Bank-assisted Transport Project (para. 1.27). It is presently consulting with local and foreign experts, including the International Maritime Organization (IMO), on the organization and staffing of the study.

Transport Program

3.13 LTD will carry out the road rehabilitation program on Praslin and the road safety measures. Under the supervision of DCA, LTD will also handle contracting for the improvements at the Praslin airport in order to facilitate contract management of these relatively small works involving the same equipment and procedures as the road program. LTD was responsible for the earlier paving of the airport runway. During the same period it had a good track record in implementation of the road rehabilitation portion of the Bank-assisted Transport project. In road safety LTD is playing the leading role. The Director-General of LTD chairs the Road Traffic Safety Commission, and has been instrumental in launching the current traffic safety campaign.

3.14 LTD is however under completely new management since the Transport project was completed. Its engineering capacity remains fairly strong, but for financial, economic, and environmental assistance it requires outside consultant help. Although no long-term technical assistance is required, provision has been made for short-term support in training and other specialized topics. LTD usually fields a full-time engineer on Praslin to manage road maintenance, but the position is now vacant. As a condition of disbursement for the Praslin road improvement component, LTD would fill this vacancy with a full-time road rehabilitation specialist who would take charge of the program.

C. PROCUREMENT

3.15 Contracts for an aggregate value of US$2.5 million equivalent for Praslin road and airport rehabilitation would be awarded on the basis of international competitive bidding in accordance with Bank guidelines. Several lots would be packaged for international competitive bidding in order to increase competition. Rebates for combinations of lots would be considered, and contracts would be awarded for one or more lots depending on the most advantageous combination. Because the works are not overly complex, prequalification would not be required.

Review of bid documents prior to contract award would be required for civil works contracts greater than US$100,000 and for equipment contracts greater than US$50,000. With regard to procurement of goods, for purposes of evaluation and comparison of bids, under international competitive bidding, a preference of 15 percent or the value of the applicable customs duties, whichever is lower, would be allowed for equipment, materials, and supplies produced in Seychelles.

3.16 Contracts for road safety and traffic management measures (US$200,000 maximum) will be awarded on the basis of local competitive bidding procedures acceptable to the Bank. LCB procedures include local advertising plus notification of embassies, since foreign firms are not excluded from bidding or from being paid in foreign exchange. The small scale of these works, which are not likely to attract foreign firms, justifies the use of LCB. Laying of pipes and other civil works of the Praslin Water Supply Phase II component (US$0.1 million) would be executed through direct labor (force account) by PUC, which has the capacity to carry out such works efficiently and economically by this method. PUC would also carry out all engineering works and supervision. For this component, the 4 pumps are proposed to be procured from the same source as existing pumps to facilitate operation and maintenance and the keeping of spare parts. Works supervision for road and airport improvements would be carried out by LTD, which has the necessary experience to undertake these tasks effectively.

3.17 Consultants for training, technical assistance, and studies would be selected in accordance with Bank guidelines. Incremental operating expenses for the project consist mainly of staff salaries, and would be financed entirely by the government and the GET grant. Bank procurement guidelines would also apply to expenditures financed under the GET grant. The format used for the preparation of bidding documents under international competitive bidding will be that described in the World Bank publications Procurement of Goods (March 1986) and Procurement of Works (Smaller Contracts) (March 1992).

3.18 Procurement arrangements are summarized in Table 3.1 below.

Table 3.1: PROCUREMENT ARRANGEMENTS
(US$ MILLION)

	ICB	LCB	Other [a]	Not Applicable [b]	Total Cost	Percentage of Total
Civil Works	2.5 (2.1)	0.1 (0.0)	0.1 (0.1)		2.7 (2.2)	39%
Equipment, Materials, and Supplies	0.6 (0.6)	0.2 (0.2)	0.2 (0.0)		1.0 (0.8)	14%
Training			0.2 (0.1)		0.2 (0.1)	3%
Technical Assistance [c]			0.8 (0.7)		0.8 (0.7)	11%
Consulting Services [d]			1.5 (0.6)		1.5 (0.6)	21%
Operating Expenses				0.2 (0.0)	0.2 (0.0)	3%
Artisan Compensation and Re-installation				0.6 (0.1)	0.6 (0.1)	9%
TOTAL	3.1 (2.7)	0.3 (0.2)	2.8 (1.5)	0.8 (0.1)	7.0 (4.5)	100%

Note: Figures in parentheses indicate amounts to be financed under Bank loan.

[a] International shopping, direct purchase, force account, and hiring of consultants
[b] Includes incremental operating costs and salaries and revenue compensation to artisans (GET)
[c] Long-term advisers for studies
[d] Other consulting services for studies

3.19 Procurement procedures in Seychelles reflect general guidelines for the achievement of fair competition. The specific steps adopted in contract awards are usually those of the external donor concerned. Two of the implementing agencies of this project (LTD and PMSD) were also involved in the previous one, and no major procurement problems were observed in either case. There is consequently no need to apply remedial measures. However, other implementing agencies, notably SIF and SFA, have no experience with Bank-financed procurement. MEPER, and especially the National Coordinator's office, would therefore support the process of hiring of consultants. Specific responsibilities would be spelled out in the Memoranda of Understanding to be concluded with each agency. For this task and also for the

studies MEPER will manage directly, MEPER has gained sufficient experience from its management of the consultant selection process for the Organizational Study of the Division of Environment, and earlier from preparation of the Mahé Integrated Water Supply program.

D. DISBURSEMENTS

3.20 Table 3.2 below gives the amounts allocated in the Bank loan to each disbursement category:

Table 3.2: DISBURSEMENT ARRANGEMENTS

Disbursement Category	Bank Loan Allocated, in US$ million	% of Expenditure to be Financed
Civil Works	2.1	100% of foreign expenditures and 75% of local expenditures
Equipment, Materials, and Supplies	0.7	100% of foreign expenditures and 75% of local expenditures
Training	0.1	100% of foreign expenditures and 50% of local expenditures
Technical Assistance	0.6	100% of foreign expenditures and 50% of local expenditures
Consulting Services	0.6	100% of foreign expenditures and 50% of local expenditures
Artisan Compensation and Re-installation	0.1	100% of foreign expenditures and 50% of local expenditures
Unallocated	0.3	
TOTAL	**4.5**	

3.21 The schedule of estimated disbursements is given in Annex 14. This schedule is not based on a standard profile for the sectors or region, but has been designed to fit the specific circumstances of the Bank-assisted and the GEF program.

3.22 To ensure prompt availability of funds for the program, a Special Account (revolving fund) would be established in US dollars in a commercial bank in Seychelles. The initial deposit into the Special Account would be US$300,000. All expenditures under US$50,000 would be met from the Special Account. For expenditures above this threshold, the

direct payment or Special Commitment procedure may be used. Replenishment requests would be submitted monthly, and all expenditures would be fully documented except (i) expenditures under contracts of less than US$20,000; (ii) local training; and (iii) expenditures under the artisan compensation and re-installation component which would be made on the basis of statements of expenditure. MEPER would forward withdrawal requests to the Ministry of Finance for review and approval prior to dispatch to the Bank.

3.23 In the Transport Project (Ln. 2492-SEY), the only disbursement issue requiring attention was late requests for replenishment of the Special Account. Otherwise no special problems were encountered. Accounting capabilities within MEPER have been strengthened since the earlier project, and this, combined with close monitoring, should improve the timeliness of requests for replenishment of the Special Account.

E. ACCOUNTING, FINANCIAL REPORTING, AND AUDITING

3.24 Separate project accounts would be established in the implementing ministries and agencies for project activities. MEPER would keep consolidated records and accounts of all project activities, including those undertaken by all implementing ministries and agencies.

3.25 Government accounts are audited annually by the office of the Director of Audit. The financial records of PUC and SIF are audited yearly by independent auditors. Despite staffing constraints, the quality of government audits is satisfactory. However, expenditures of government ministries related to the project, having been incorporated into the consolidated accounts by MEPER, will be subject to annual audit by an independent auditor whose experience and qualifications are acceptable to the Bank. As is already the practice, the financial records of PUC would be examined yearly by independent auditors satisfactory to the Bank. These audits will show separate accounts for the Praslin/La Digue water district. The financial records of SIF, for actions related both to the GEF program and to its other activities, would be subject to independent audit in a similar manner.

3.26 Although there is no official source of auditing standards in Seychelles, procedures in effect in the UK are generally followed. The auditor's report must attest to whether the financial statements are considered to present a "true and fair view" of the company's activities. There are four audit firms in Seychelles, two of which are fully satisfactory by these standards. One of the major international firms is represented in Seychelles, and some accounting firms in neighboring countries have Seychelles clients.

F. TRAINING

3.27 Seychellois responsible for environmental preservation are generally well trained, but lack sufficient resources to carry out and enforce what they already know how to do. Training of additional staff is hampered by labor scarcities and by the high opportunity cost of recruiting someone from elsewhere in the economy. Consequently, appropriate training generally takes the form of on the job learning of counterparts collaborating with expatriates, and short-term intensive courses locally or abroad to fill specific knowledge gaps.

3.28 Both types of training will be pursued under the project. The most important examples of counterpart training are the water resources management plans for the outer islands, the Aldabra restoration program, and the National Coordinator's office, for which the government has pledged to provide counterparts and in which a productive collaboration is expected. Examples of short-term technical training include a work attachment abroad for the chief engineer responsible for Praslin roads, overseas training in water resources management for Seychellois staff, and training in materials testing for LTD. The re-training of artisans to pursue other occupations also falls into this category.

3.29 In addition to formal training, the project emphasizes the dissemination of posters, leaflets, videos, and other educational materials designed to heighten awareness of environmental issues. Illustrations include educational and background information for fishermen on protection of marine resources, and campaigns for visiting tourists on the consequences of purchasing Hawksbill turtle shell items.

G. SUPERVISION

3.30 The Bank would devote some 79 weeks of supervision to the progress of the Bank loan and the GEF program through FY97. During the first three years, supervision will focus mainly on progress toward achieving specific objectives, such as works and study completion, and on monitoring of the performance of implementing agencies. In the final two years the emphasis will shift more fully toward evaluation of results and especially follow-up to implement the action plans prepared. It should also be recalled that collaboration with NGOs and other donors will result in a far more comprehensive picture of overall progress of environmental actions than any single agency, including the Bank, could produce on its own. The Bank plans to continue a policy of open, two-way exchange of information with all agencies with active environmental programs in Seychelles.

3.31 Staffing requirements, and the proposed timing and frequency of supervision, are included in Annex 15. This schedule was prepared in collaboration with implementing agencies, and is meant to coincide as much as possible with critical junctures in Seychelles, such as annual meetings of the SIF Board of Trustees, meetings of the Environment Steering Committee, and discussion periods between the completion of a management plan and the start of its implementation. A project launch workshop, at which implementation arrangements and documentation will be finalized, will be held in early 1993.

H. MONITORING AND EVALUATION

3.32 MEPER would prepare reports each quarter describing the progress of each program element from the physical, financial, and socio-economic standpoint. These reports would review the performance of implementing agencies, monitor the key indicators of progress in fulfillment of program goals, and identify any major problems with their recommended solutions. The Closing Date of the loan is June 30, 1997. A Project Completion Report would be prepared and sent to the Bank within six months after the close of disbursements. Progress reporting requirements, and a description of the key indicators to be monitored, are included in Annex 16.

3.33 Mid-Term Review. Prior to December 31, 1994, a mid-term review focusing on EMPS implementation as a whole will be carried out. The review will be carried out jointly by the Bank and the government. Resources for Bank participation have been included in the supervision schedule, as well as in the Bank's economic and sector work program for FY95. The main objective of this exchange of views would be to evaluate the success at mid-term of project elements and reach agreement on any remedial actions or modifications to project design. Among other topics, the review will cover: (a) the overall managerial efficiency and performance of SIF; (b) progress in sea turtle mangaement plans in relation to the outcome of stock assessment, the Hawksbill turtle ranching study, and the turtle trade compensation study; (c) review of the financial performance of the PUC Praslin/La Digue office with regard to adequacy of water tariffs, revenue and expenditure, and timetable for meeting the target rate of return on net fixed assets; and (d) the impact on the Praslin economy and environment of basic infrastructure investments in water supply, road rehabilitation, and airport improvements. For purposes of the mid-term review, the government would prepare a report on the progress of implementation, with emphasis on the above-mentioned issues, by October 31, 1994.

IV. FINANCIAL ANALYSIS

A. BUDGET AND EXPENDITURES FOR ENVIRONMENT

4.1 In Seychelles, the main responsibility for environmental preservation is vested in a line ministry. Financial issues consequently focus on the ability of this ministry to command, from the budgetary process, the financial resources required to discharge its tasks adequately. For the transport sector the critical issues similarly concern the mechanisms by which funds are forthcoming for operation, maintenance, and renewal in addition to recurrent expenditures, the efficiency with which funds are spent, and the sustainability of resources for maintenance. For water supply, furnished by the public enterprise PUC, the usual pricing, cost recovery, and financing issues apply, but are affected in this case by the smallness of the Praslin/La Digue operation in relation to total water connections in the country. For airport services cost recovery is also a policy issue, particularly the relation between aircraft landing fees and the operations and maintenance expenditures of the airport facility.

Division of Environment

4.2 Since the creation of the Department of Environment in June 1989, budget allocations from the Ministry of Finance have increased steadily. The approved fiscal 1992 operating budget is 78 percent of the amount that the now-Division of Environment requested, and is close to double the budget approved for fiscal 1990. The 1991 budget originally approved was low, but was increased at the mid-year budget review in August 1991 in conjunction with the startup of implementation of the EMPS. A further increase is expected in 1993. If the allocation of financial resources continues at the pace of the last three years, there should be no major financial constraint on the application of environmental policy. Assurances were obtained at negotiations that budgetary allocations at least equal in real terms to the approved 1992 operating budget will be maintained through fiscal year 1996 for the Division of Environment of MEPER. A summary of operating expenditures requested and approved for 1990-92 is given in Table 4.1 below. MEPER units typically spend all of the amounts approved in the budget.

Table 4.1 DIVISION OF ENVIRONMENT

BUDGETS REQUESTED AND APPROVED, 1990-92
(SR'000)

	1990		1991		1992	
	Requested	Approved	Requested	Approved	Requested	Approved
Salaries	5,244	5,129	6,828	5,137	8,486	6,724
Other Charges	2,246	1,424	1,965	1,520	3,482	2,478
Minor Capital Outlays	1,115	363	2,385	818	3,412	2,803
TOTAL	8,605	6,916	11,178	7,475	15,380	12,005

Source: Division of Environment

4.3 The budget allocation system for environment is consistent with the concept of nature tourism, whereby tourist expenditures to experience a natural environment contribute to foreign exchange earnings and are later redistributed according to national priorities. In the future there should be more prospects for an ecotourism approach, in which tourist expenditures in a natural area or on a species are kept and used directly for preservation of that area or species. Currently, fees from visitors to Cousin island are sufficient to meet operating and maintenance costs of conservation measures, including salaries of the six resident specialists. Bird island, a privately owned sand cay and a refuge for migrating waterfowl, also meets its operating expenses from overnight visitors. Under the long-term management plan, it is likely that any future non-scientist visitors to Aldabra would be charged at least the full operating costs of the expanded facilities.

SIF

4.4 SIF is a charitable trust with its own financial resources. Its current assets amount to nearly SR 2 million (US$ 400,000), including SR 1.4 million in Seychelles government bonds. Annual income is about SR1.5 million, most of it coming from admissions fees at the Vallée de Mai national park. The Smithsonian Institution (US) and the Royal Society (UK) each contribute US$10,000 equivalent per year. Total expenditures now average about SR 1.1 million, about half of which is salaries. Income has exceeded expenses by some SR 400,000 over the past two years, which has so far been used to build up liquidity. However, current expenses do not include any rehabilitation of existing facilities or acquisition of new equipment. Indicators of the financial status of SIF are included in Table 4.2 below.

Table 4.2 SEYCHELLES ISLAND FOUNDATION

FINANCIAL SUMMARY
(SR'000)

	1989	1990	1991
Balance Sheet			
Current Assets	1,045	1,491	1,937
Current Liabilities	93	106	84
Accumulated Capital, 31 December	1,287	1,688	2,128
Profit and Loss			
Income		1,544	1,571
Total Direct Expenses		1,143	1,130
Surplus		401	441
Fixed Assets, 31 December			
Workers' Cottages		-	235
Boats and Engines		-	15
Other Equipment		-	25
Net Book Value		303	275

Source: SIF Financial Statements

4.5 SIF's most urgent priority is to better utilize the resources it has, rather than strengthen its financial base. To this end, the Executive Director to be appointed will be responsible for introducing improved financial management methods including cost accounting. Oversight on financial record-keeping will be exercised by the National Coordinator, in collaboration with the accounting section of MEPER which has several years of experience dealing with project finances, to ensure that the accounts are properly managed.

B. PUC (PRASLIN/LA DIGUE) FINANCIAL PERFORMANCE AND PROSPECTS

4.6 PUC's financial performance since 1987 has on the whole been good. In 1989 and 1990 PUC declared dividends of about US$1 million (77 percent of combined net income from water and electricity) and US$0.9 million (98 percent of combined net income) respectively, in spite of a working ratio of about 80 percent. Water and sewerage accounted for more than 90 percent of total net income. The government, rather than PUC, owns the great bulk of water assets, and therefore it is the government that has ensured payment of debt service on loans previously contracted. In return, the government has required PUC to make dividend payments, which have in effect substituted for debt servicing on water assets. PUC operations currently result in a rate of return on net fixed assets of 2.2 percent.

4.7 Water tariffs are established uniformly for the country, in accordance with the Public Utilities Act of 1985. PUC guidelines call for water charges to meet operation and maintenance costs. The latest tariff increase, of 50 percent in 1987, brought the charges to SR 6.43 (US$1.30) per m3. Water tariffs are high in relation to many other countries, but they need to be in view of the high capital cost of serving a relatively small and scattered population. At present, the cost of water per m^3 is approximately the same on Praslin as it is on Mahé. However, it will be important in the future for PUC to be able to impose different charges for water, so that tariffs correspond to the specific cost structure prevailing on each of the main islands. The concept and the possible timing of differential water tariffs were discussed at negotiations. It was concluded that tariffs in the future could be more closely linked to investments and cost structures from one area to another. Additional analysis will be undertaken of this question by PUC in collaboration with MEPER. It is expected that this analysis will be available prior to December 31, 1993, at the time of the first checkpoint of PUC's financial condition and of the adequacy of current water tariffs.

4.8 PUC manages a total of 12,500 water connections on Mahé, Praslin, and La Digue. Of this total, the Praslin/La Digue water district office accounts for 1,400 connections with annual sales of US$460,000. There are 26 employees on Praslin/La Digue. A Finance and Administration division with 12 employees serves both the Water and Electricity divisions.

4.9 PUC has begun to carry out a four-part improvement program designed to address its most critical organizational and financial needs. First, ownership and management of all water assets is the primary means for PUC to become an autonomous agency capable of improving and expanding water and sewerage services. In 1991 a revaluation of assets was completed to this end. Second, PUC has initiated several cost reduction and demand management measures, including meter repair, leak detection, and reduction in unaccounted-for water. A Systems Manual which describes procedures for regular progress reporting and cost control was completed in early 1992. Third, the introduction of cost accounting and implementation of an improved

billing and collection system are among the improvements in financial management and planning now underway. Periodic tariff adjustments are the final element of this improvement program.

4.10 Thus far, these measures have mostly affected operations on Mahé. For the Praslin/La Digue water office, the current financial performance is inadequate. The working ratio in 1991 and 1992 was about 98 percent, and on current trends is projected to reach 100 percent by 1993. Overstaffing in support services has resulted in high labor costs, averaging 40 percent of sales. Lack of proper control of transportation charges and equipment inventory results in an additional cost representing about 32 percent of sales. If interest and depreciation were accounted for, the result of operations would be a deficit. Unaccounted-for water including treatment works losses now stands at 20 percent of production. Although a low proportion by the standards of most developing countries, it is possible and desirable to reduce this figure further.

4.11 An improvement program to be supported under the project, focusing on asset management and on reduction in operating costs, has consequently been identified for the Praslin/La Digue district water office. The transfer to PUC of all water assets, not just those of Praslin/La Digue, would be a major step toward autonomous management of water resources and improved financial viability. Assurances were obtained at negotiations that by the end of 1993 government would effect the transfer to PUC of all water assets it presently owns. Measures to reduce operating costs would center on reductions in staff costs and in expenditures on transport and equipment, projected to be 30 percent lower by 1995, compared with 1993 figures. Assurances were furthermore obtained at negotiations that, by means of these and such other measures as PUC decides to take, (i) its working ratio is not higher than 85 percent by the end of 1994 and 70 percent by the end of 1995; (ii) receivables on Praslin/La Digue water operations do not exceed 60 days of sales for domestic, commercial, and government accounts by the end of 1993; and (iii) the Praslin/La Digue water operations yield by 1995 a return on net fixed assets in operation of at least 2 percent. This return is achievable through increased water sales that the project will make possible, combined with the above cost reductions, even accounting for the inclusion of debt service. Annual forecasts will permit close monitoring of progress, and other measures including tariff increases would be taken to achieve these results if cost reductions alone are not sufficient. The first annual review, at the end of 1993, will focus particularly on whether a tariff increase is needed to complement the cost reduction measures. Through these means a small surplus on net income would be realized by 1995, and would grow in subsequent years. Finally, it was agreed at negotiations that the proportion of unaccounted-for water would be reduced to 18 percent of production for Praslin/La Digue operations by the end of 1993, and at least maintained at that level thereafter.

C. ROAD SECTOR FINANCING AND ROAD USER CHARGES

4.12 With the improvement of the road network, forecasts of annual expenditures by LTD call for road maintenance expenditures to remain at an average of SR 4.9 million until at least 1995. As indicated in Annex 18, budget allocations from the Ministry of Finance have been adequate to cover the costs of road maintenance as well as the administrative costs of LTD. Direct income from road users, such as vehicle and license fees, do not cover the cost of road maintenance. However, when considered together with duties on fuel, which are paid into the Treasury and not into an earmarked fund, total revenues exceed the cost of road maintenance.

Capital investments for new infrastructure are financed directly from the capital budget. Taxes on all petroleum products are SR 5.96 per liter. The demand for petroleum products for the domestic market will likely amount to more than 51,400 metric tons in 1992, compared with 36,000 in 1987.

4.13 It is reasonable to expect, based on past budget performance, that with continued careful management and priority to the road network the annual government outlays to LTD for road maintenance and administration will be adequate. Assurances were obtained at negotiations that budgetary allocations at least equal in real terms to the approved 1992 budget would be made to LTD with regard to its operating budget and allocations for road maintenance.

D. PRICING AND FINANCING OF PRASLIN AIRPORT SERVICES

4.14 Revenues from the Praslin aerodrome services mainly consist of charges levied for the landing of an aircraft and miscellaneous income from the rental of space in the terminal facility. The current landing fees were determined by regulation issued in 1988 by the Minister responsible for civil aviation. The charge for the landing of an aircraft on Praslin is now set at SR 15 for each 1,000 kg of permissible weight specified for the aircraft (the charge for aircraft 2,000 kg or less and for helicopters is one-half of the specified charge). There is a surcharge of 40 percent for night operations.

4.15 As indicated in Annex 18, revenues from airport services do not cover the costs of maintenance of the airstrip and other functions related to its operation. In 1991, total revenues represented only 50 percent of the cost of operation and maintenance of the airfield. DCA has carefully managed the facilities, and the scope for cost reduction is limited since 71 percent of costs are devoted to salaries of essential personnel and necessary allowances. There is consequently a need to raising landing fees, not only to meet the cost of expanded operations but to reduce the current discrepancy between fees and costs. Assurances were obtained at negotiations that as a condition of disbursements for the airport improvements component, landing fees at the Praslin airport would be raised to SR 30 per 1,000 kg of permissible weight. The resulting revenues would meet 100 percent of operating costs of the airport, with the improved facilities. This increase would be incorporated into the round trip ticket price, currently SR 340, and is expected to have no effect on passenger visits to Praslin.

V. PROJECT JUSTIFICATION AND RISKS

A. PROJECT BENEFITS

5.1 Preparation of the EMPS in conjunction with the NDP 1990-94 represents in itself a major step toward incorporation of environmental practice into development decision-making. The next step is to determine the impacts of the EMPS programs, including the Bank loan and the GEF measures, on the country's ability to manage its natural resources efficiently. Ideally, the impacts will be quantified as costs and benefits and one or more valuation techniques will be applied to them. This approach could feasibly be attempted toward the end of the EMPS implementation period. For the project and the GEF program, the foundation for eventual quantification of costs and benefits would be laid by collection and maintenance of data, careful monitoring of impacts, and the systematic use of environmental impact assessments for major investments.

5.2 The GEF program would primarily benefit the international community by addressing issues of global concern. GEF support of endangered sea turtles represents the pilot phase demonstration of how to meet the challenges of preservation of endemic biodiversity in isolated island communities. This program would provide alternative forms of livelihood and compensation for the foregone benefits of turtle harvesting to local populations. The Aldabra program, rather than seeking only to arrest degradation, aims at restoration and preservation of the ecosystem. With regard to marine pollution, only Seychelles among nations of the western Indian Ocean has signed the MARPOL Convention. Support for port waste reception and disposal symbolizes the willingness of the international donor community to support the implementation of measures that it has been advocating for the developing countries. The demonstration benefit for other nations of the cost-effectiveness of reception facilities for pollution that is partly generated outside the national boundaries is therefore expected to be significant.

5.3 More dependable basic infrastructure on Praslin will be a spur to realization of the potential of the island for nature tourism in a semi-remote setting. The proposed road improvements would ensure that almost all main roads are paved. Benefits will accrue in particular to the local population and the tourism industry. The direct beneficiaries will mainly be private operators of taxis and other vehicles for hire, and the public bus company SPTC, as well as visitors enjoying easier access to departure points for hiking, water sports, and other nature-based activities.

B. INTERNAL ECONOMIC RATE OF RETURN

5.4 A quantitative economic analysis was not undertaken for the environment program, which consists mostly of management plans and studies. However, internal economic rates of return (IERRs) were calculated for water supply and airport improvements and for the road program. These activities represent 38 percent of project costs.

5.5 Even though improved access will facilitate development, and of tourism in particular, the estimates of internal economic rate of return (IERR) for the road rehabilitation program take as a measure of benefits only the reductions in vehicle operating and road

maintenance costs. On the basis of forecasts of traffic growth (see Annex 6), the internal economic rate of return for the Anse Boudin road is 27 percent, for Anse Consolation 15 percent, and for Anse Kerlan 13 percent. The weighted average IERR for the road program is 17 percent. Sensitivity tests were carried out concerning a reduction of benefits and increase in costs. If benefits were to be 10 percent lower than forecast, the IERRs would range from 11 to 24 percent. The most sensitive cost item is the cost and installation of asphalt premix. If this cost were to increase by 20 percent, a large amount based on past experience, the IERRs would decrease to 24 percent, 13 percent, and 11 percent for the Anse Boudin, Anse Consolation, and Anse Kerlan roads respectively or to 15 percent for all roads.

5.6 With the increases in hotel capacity being experienced on Praslin, it is critical that the airport runway and other facilities be properly maintained. The relatively light asphalt pavement will need periodic overlays to remain in service for the present Twin Otter aircraft. Although well suited to the route, this aircraft is no longer produced and in the future would need replacement, most likely by a somewhat larger and heavier aircraft. Meanwhile, the periodic maintenance on the runway supported under the project will allow flights with the present aircraft to continue, and will avoid much more costly reconstruction of the runway later on. Expansion of the parking apron will permit more flexibility in flight scheduling in order to meet the demand for trips to Praslin during the morning peak and return to Mahé in the late afternoon. If only one flight at half-capacity is added to the 25-30 now operating per day, the IERR for the Praslin airport improvements is estimated to be 43 percent.

5.7 The Praslin water supply improvements will result in additional sales through the 1990s, especially during dry periods, from water which would not otherwise be available. As is well known, sales provide only an approximate measure of economic benefits. Using this measure, however, the IERR of Praslin water supply improvements is estimated at 47 percent. This is considered to be a minimum estimate of benefits, since the separate health-related benefits of reliable water supplies have not been calculated. The weighted average IERR for all project elements for which a quantitative analysis was undertaken is 22 percent.

C. ENVIRONMENTAL ASPECTS

5.8 For the transport program, works will consist of paving and resurfacing of existing alignments rather than new construction. The proposed road improvements will virtually eliminate dust problems but will increase traffic noise. Elimination of the dust problem will mainly benefit road users on Anse Consolation, while at Anse Boudin both road users and residents with adjacent houses will benefit. Effects on residents would be controlled by retaining the present alignments which, especially on the Anse Boudin and Anse Consolation roads, will be an automatic restraint on speed. LTD has incorporated into its design the main conclusions of the environmental impact assessment concerning minimum cutting of trees, removal of rocks, landscaping, and repair of seawalls without interfering with the natural coastline. For Anse Consolation especially, the disposal of excess soil in a manner that does not lead to environmental damage is likely to involve transporting the materials some distance away. More generally, the proposed improvements are expected to reduce surface erosion, and reshaping and landscaping of embankments would increase the positive effect.

5.9 At the Nouvelle Découverte river, the proposed site for the new intake is located upstream from another intake presently being constructed for an agricultural scheme. Based on

an analysis carried out by PUC, the proposed extraction of water on Praslin for domestic and hotel consumption would not affect the water requirements under the agricultural scheme. The proposed works will have little or no adverse environmental impact.

5.10 The GEF program is expected to have significant positive effects on the environment, and the adverse impacts are expected to be minimal. Studies and management planning comprise the bulk of this program. Civil works at the Aldabra research station will consist of rehabilitation of existing facilities rather than expansion. Overall environmental effects will be monitored by the Environmental Assessment and Pollution Control section of MEPER.

D. IMPACT ON POVERTY GROUPS

5.11 Although not intended to address poverty issues directly, the project would significantly benefit low-income populations in at least two respects. Poor families have been affected more than others when marine resources such as octopus and lobsters become scarce. Depletion of stocks forced a ban on the taking of lobsters in 1986, which was not able to be rescinded until 1991. Preparation of management plans for marine resources would identify the sustainable yield of such resources, and consequently help prevent scarcities through over-exploitation. Second, poor families on Praslin tend to take public transportation or walk. The road upgrading program will improve their living conditions by reducing the time and inconvenience of travel.

E. RISKS AND SAFEGUARDS

5.12 The main risk facing the project is that of delays in implementation due to the scarcity of trained staff. This risk would be minimized through the use of short-term technical advisers to provide specialized inputs, careful monitoring, and training. LTD, for example, has adequate engineering capacity, but uses advisers to good advantage to perform environmental and economic analyses. The Organizational Study of the Division of Environment would indicate the ways in which short-term expertise and training programs can speed the integration of environment with economic planning staff and their collaboration with other participating groups.

5.13 Among implementing agencies, SIF would need to strengthen its management capability to the greatest degree. The risk of inadequate management of SIF programs would be mitigated by the appointment of an Executive Director of SIF, and by the hiring with GEF funds of two scientists with managerial experience over the span of two years. The hiring of two people allows a permanent presence of one SIF representative on Aldabra, as the two scientists would alternate between Aldabra and Mahé.

VI. AGREEMENTS REACHED AND RECOMMENDATION

6.1 At negotiations, assurances were obtained that:

a. By December 31, 1993, legislation will have been approved banning the trade in endangered sea turtles and turtle products (para. 3.11);

b. MEPER will keep adequate records and accounts of project activities, including those undertaken by all implementing ministries and agencies, and will have the accounts for each fiscal year audited by independent auditors acceptable to the Bank (para. 3.25);

c. The records and accounts of SIF and PUC covering all activities for each fiscal year will be audited by independent auditors acceptable to the Bank (para. 3.25);

d. Budgetary allocations at least equal in real terms to the approved 1992 operating budget will be maintained through fiscal year 1996 for the Division of Environment, MEPER with regard to its total expenditure and for LTD with regard to its operating budget and allocations for road maintenance (paras. 4.2, 4.13);

e. DCA would ensure that periodic adjustments are made in charges for landing of aircraft at Praslin airport so that the revenues of the airport are at least equal to its operating costs (para 4.15);

f. By December 31, 1993, government will have effected the transfer to PUC of all water assets presently owned by government (para. 3.5, 4.11);

g. PUC would ensure that, for its Praslin/La Digue water operations, (i) its working ratio is not higher than 85 percent by the end of 1994 and 70 percent by the end of 1995; (ii) unaccounted-for water is reduced to 18 percent by the end of 1993 and maintained thereafter; and (iii) receivables do not exceed 60 days of sales for domestic, commercial, and government accounts by the end of 1993 (para. 4.11);

h. PUC would ensure that its Praslin/La Digue water operations yield a return on net fixed assets in operation of at least 2 percent by 1995. It will submit annual financial forecasts such that this objective is met, and will take all other measures including tariff increases to achieve this result (para. 4.11); and

i. A Mid-Term Review focusing on EMPS implementation as a whole would be carried out prior to December 31, 1994. Among other topics, the review would cover: (a) the overall managerial efficiency and performance of SIF; (b) progress in sea turtle management plans in relation to the outcome of stock assessment, the Hawksbill turtle ranching study, and the turtle trade compensation study; (c) review of the

financial performance of the PUC Praslin/La Digue office with regard to adequacy of water tariffs, revenue and expenditure, and timetable for meeting the target rate of return on net fixed assets; and (d) the impact on the Praslin economy and environment of basic infrastructure investments in water supply, road rehabilitation, and airport improvements. For purposes of the Mid-Term Review, the government would prepare a report on the progress of implementation, with emphasis on the above-mentioned issues, by one month prior to the Mid-Term Review at the latest. (para 3.33).

6.2 The following are **conditions of loan effectiveness:**

a. Appointment in MEPER of a National Coordinator for implementation of the EMPS (para 3.3);

b. Signature of a Subsidiary Loan Agreement between the government and PUC for implementation of the Praslin Water Supply, Phase II program (para. 2.13); and

6.3 The following **conditions of disbursement** of funds against related expenditure would also apply:

For the Resource Management Program (Marine Resources Management Plans):

- Signature of a Memorandum of Understanding between MEPER and SFA for supervision of the Marine Resources Management Plans (para. 3.7).

For the Resource Management Program (Praslin Water Supply, Phase II):

- Completion of an assessment of the possible impacts of proposed works on the Vallée de Mai National Park (para. 3.5).

For the Transport Program (Praslin Road Improvement Program):

- Appointment in LTD of a full-time representative on Praslin island for management of the Praslin road rehabilitation program (Para. 3.14).

For the Transport Program (Praslin Airport Improvements):

- Increase in charges for landing of aircraft at Praslin airport to SR 30 per 1,000 kg of permissible weight or part thereof (para. 4.15).

6.4 With the assurances and conditions indicated above, the project is suitable for a Bank loan of US$4.5 million to the Government of Seychelles.

ANNEXES

ENVIRONMENT MANAGEMENT PLAN OF SEYCHELLES:

PROGRESS ON IMPLEMENTATION

A. BACKGROUND

The Government of Seychelles has committed itself for several decades to achieving a balance between development and environmental preservation. There is a strong awareness that the foundations of the nation's economy, fishing and tourism, depend to a large extent on the achievement of a sustainable development program.

When the Government was preparing the National Development Plan for 1990-94 it decided to prepare a complementary but distinct Environmental Management Plan for the Seychelles (EMPS) to cover the period to 2000. The completed EMPS was reviewed in depth at a Technical Seminar, revised and then presented at a Donors' Meeting sponsored by the Bank, UNDP and UNEP held at the Bank's Paris Office in February 1991. Pledges totalling US$40 million were secured from bilateral donors, NGOs and multilateral agencies.

Environmental management in the Seychelles was the responsibility until 1992 of the Department of the Environment in the Office of the President. In May 1992, DOE was merged with the Ministry of Planning and External Relations to become the Ministry of Environment, Economic Planning and External Relations (MEPER). This gives the environment a central position in national economic planning.

The unique ecosystems and endemic species of Seychelles attract significant world interest and are an important global resource. There are, for instance, said to be 150,000 giant tortoises on Aldabra compared with only 10,000 on the more widely known Galapagos Islands. Seven National Parks have been established along with three special reserves, including two World Heritage Sites and these include 43% of the total land area of the country and 23,000 hectares of surrounding reefs and lagoons. National Parks are areas set aside for the propagation, protection and preservation of wildlife or objects of unusual interest and they include 5 marine national parks. Two of these areas, Aldabra Atoll and Vallee de Mai on Praslin are protected under international law as unique natural sites of world importance. Three islands - Aride, Cousin and Aldabra are special nature reserves where flora and fauna are protected under Seychelles law.

The Environmental Management Plan (EMPS)

The EMPS consists of two volumes: a main report containing the Plan and a second volume containing the Investment Program with project profiles. The Plan volume is divided into four parts. Part 1 comprises a general introduction which reviews past policies and performance, summarizes the Government's development strategy (detailed in the National Development Plan, NDP 1990-94) and presents the five main goals for sustainable development:

- To protect the health and quality of life for all Seychellois

- To ensure that future economic development proceeds on an equitable and sustainable basis
- To preserve natural heritage and biological diversity
- To improve our decision making, laws and institutional framework for sustainable development
- To increase public information and understanding of the essential linkages between environment and development

Part II of the Plan presents the environmental issues and priorities for action under 7 main headings: human health and environment; natural resources; natural heritage and biological diversity; decision making, laws and institutions; information, education and training; international cooperation and management plans for key policy areas.

Part III of Volume 1 contains the details of the management plans (programmes) and the projects they include, as follows:

- Environmental guidelines and assessment (5 projects)
- Pollution Monitoring and control (7 projects)
- Land Management (3 projects)
- Water management (6 projects)
- Energy policies and conservation (2 projects)
- National Parks and wildlife conservation (9 projects)
- Forest Management (3 projects)
- Coastal environment management (4 projects)
- Marine resources management (4 projects)
- Environmental law and enforcement (1 project)
- Environmental information, education and training (4 projects)

A complete listing of all projects in the EMPS with a ranking by priority assigned by the Government was incorporated into the Plan and is reproduced as Appendix 1 of this Annex.

Part IV of the Plan covers the implementation of the Plan and deals specifically with the institutional, manpower and financial implications.

Volume 2 is a document of some 160 pages containing briefs for the 52 projects for which funding was sought. Of the 59 projects included in the EMPS, financing had already been obtained for 7 projects and these were therefore excluded from the EMPS investment program in Volume 2. All projects in the EMPS are included in the NDP 1990-94 except for project A5 on climate warming and sea level rise.

The general opinion of the outside experts who attended the Technical Seminar was that the EMPS represents a solid achievement. Reviewers found that the EMPS had done a good job of identifying inconsistencies, overlaps and gaps in the government's planning and management of

the environment. The EMPS was found to have a high degree of internal consistency, and it was felt that the planned investment program was realistic and could be financed without a significant increase in the Government's debt burden.

The principal concerns that arose had to do with the Government's ability to implement the Plan in particular with regard to staffing, operations, evaluation, enforcement and public involvement. At the donors' Conference some raised concerns about the recurrent costs of financing projects and the institutional capacity of the implementing agencies. The Government confirmed that it had estimated the recurrent costs of projects in the EMPS wherever possible. These would normally be borne by the Government as their contribution to the project costs. They also confirmed their commitment to cost recovery as evidenced by their request for an IBRD project incorporating improved cost recovery mechanisms in the water and sanitation sectors.

During the Donors' Meeting, the donors generally did not pledge specific amounts for the financing of the EMPS but rather indicated interest in specific projects or sub-sectoral programs in the EMPS. Based on these indications, a total of US$40 million, about 75% of the total investment program, was pledged, although only $6 million was actually committed. Thirty-two projects received support and about one third of the pledged amount represented grant or concessional financing. Following the meeting, the Government undertook a series of follow-up contacts with key donors to confirm the pledges and discuss financing terms.

B. PRESENT STATUS

Progress To Date

In the eighteen months since the Donors' Meeting some progress has been made but there is much more to be done. Meetings have been held with donors to attract additional funding, some firm commitments have been obtained for specific projects, staff have been added to the Department of the Environment (DOE), the Department itself has been incorporated into the new Ministry of Environment, Economic Planning and External Relations, and changes in the political culture of the country as it moves towards political pluralism open the way to a larger role for the public in environmental decision making.

Appendix 2, prepared by MEPER, shows the status of each project, the availability of financing, the sources of financing, and the state of implementation. As can be seen from this appendix, there are now commitments covering all or part of 20 projects out of the 51 proposed to the donors, and 11 projects are currently underway. Pledges have been made for another 19 projects, although no firm agreements have yet been signed. Most of the remaining projects are being considered for financing although no prior commitment has been made. Two projects have so far elicited little interest (A4, annual sustainable development audits and B3, centralized vehicle testing facilities) and are expected to be dropped. Total commitments now amount to some SR 136.62 million (US$ 27.3 million). Of this amount, about SR 24 million (US$ 4.8 million) has actually been secured.

Appendix 3 is an updated version of the Implementation Schedule for the EMPS investment program prepared by MEPER in July 1992. It reflects the status described above.

Since the EMPS is being implemented through a number of differently financed projects, the coordination and monitoring of these activities is an important issue. A mechanism has been established for coordinating the implementation of the EMPS through the Environment Steering Committee, which meets monthly under the chairmanship of the Minister of MEPER. The monitoring has already been commenced by MEPER but it will become a more onerous task in time and its continuance needs to be assured despite staff changes. Planning for the implementation of the EMPS needs to go further by identifying the key constraints such as staffing that will have to be met in a timely fashion to maintain progress.

MEPER has established a computerized data bank to keep track of the implementation of the EMPS projects and those of the National Development Plan (NDP). This is updated regularly after the monthly meeting of the Environment Steering Committee. A full printout of the progress on all the projects in the EMPS Investment Program is prepared quarterly.

Present Implementation Capacity

Although the Government has been very active in searching for funds, there has been understandable concern among the donors about the actual implementation capacity that can be mobilized to carry out the EMPS. In a country of some 70,000 people it is possible to have an unusually clear picture of who is actually available to do what specific job. The Government has completed a Manpower Study (National Manpower Plan of the Seychelles, 1990 - 1994) and is now in the final stages of completing a Human Resources Development Plan for 1992-96. This is expected to be published in September 1992 and should provide the context within which a human resources plan for implementation of the EMPS can be developed.

Some advances have been made in staffing the higher-level positions in the Department of the Environment. Most environment specialists now function as a Division in MEPER, as shown in Annex 3. There is now a Director in place for each of the units and additional staff will be sought for 1993 (2 for the Conservation Section, 6 for the Environmental Assessment and Pollution Control (EA & PC) Section; and 16, including 12 field workers, for the Forestry Section). A request for 2 additional Inspectors is also being submitted for the EA&PC Section.

In the entire Environment Division there are only about a dozen graduate positions, and several of these have heavy administrative loads to carry as Directors or Assistant Directors. Of the senior professionals actually in place, three are Seychellois and the rest are expatriates. There are few likely candidates available locally for professional positions in the Environment Division, if any, although with the recent liberalization policies there is a possibility that some might return to the country. Some polytechnic graduates are available but their level of education is barely that of the English "A Level" high school graduation. In general, for the foreseeable future, additional professional staff can be found at the senior levels only through further use of imported expatriates. This lack of Seychellois is even more critical at a time when those that are in Government may be tempted to enter the private sector.

The consolidation of the Environment Department as a Division into the new MEPER is a significant and important step which offers great potential for innovative approaches to the integration of environment in national economic planning. It has also, unfortunately, meant a down-grading of the formal responsibility levels of staff, which during the transition has been damaging

to their morale. Already the NDP contains all but one of the EMPS project proposals and these are receiving much of the attention among the 500 or so that are included in the NDP. This opportunity to develop new synergies for effective and sustainable development of the Seychelles environment within MEPER is rare and challenging.

Projects Proposed for GEF and Bank Support

Among the EMPS projects are four that are being proposed for support by the Global Environment Facility under the title of Biodiversity Protection and Abatement of Marine Pollution. These projects are:

- G6 Rehabilitation of Aldabra World Heritage Site
- G7 Eradication of Feral Goats from Aldabra Atoll
- J1 Protection of Endangered Sea-turtles.
- B6 Implementation of International Convention for the Prevention of Pollution from Ships

Actions to be undertaken under these projects are described more fully in Annexes 4, 5 and 6 below.

EMPS projects that are included in the Environment and Transport Project are:

- E5 Praslin Water Supply - Phase II
- E6 Assessment of Water Resources and Preparation of Water Management Plans
- J3 Preparation of Marine Resources Management Plans

The proposed works for Praslin Water Supply lie within the Praslin National Park. Although no significant environmental impact is expected, it is impossible to do works without some impact and so the value of the word "significant" acquires much importance. Because of this, a formal environmental assessment will be done to confirm that the minimal works proposed, mostly on the site of existing facilities, will not significantly affect the Park. The assessment should also confirm that there are no lower cost alternatives to the proposed pumping scheme.

C. OUTSTANDING ISSUES

The main issues raised in the donors' reviews of the EMPS were related to the implementation capacity of the Government in view of its limited staff. Staffing, organization, legislation, enforcement and public support for environmental issues were highlighted as possible limitations on successful implementation of the EMPS. Some progress has been made on addressing these but much remains to be done.

Operational Capacity

Although MEPER is relatively well equipped and organized, the capacity to supervise and administer such a comprehensive program as the EMPS is severely limited by the scarcity of trained Seychellois. There is already a very heavy dependence on expatriate experts, not only as advisers but also in senior line management positions such as Director of Planning and Director of the Environmental Assessment and Inspection bureau. There appears to be no other means of increasing or even maintaining the high level technical staff at this point. There is very little possibility that visiting technical experts can be allocated a counterpart for full-time training or assistance. The availability of suitable local candidates for higher technical positions in the Division will not increase significantly in the foreseeable future, and the contracts of several key expatriates expire within the next year. This provides a severe constraint on the sustainability of operations throughout the technical services in the Government.

This leads to a significant consideration which is the appropriate role of the Environment Division. Since it is impossible for the Division as it exists to do all that needs to be done under the EMPS as well as to establish its role firmly in the Government, because of a lack of people, there may have to be some creative thinking about what tasks the Division and Ministry must undertake and those it could delegate to other organizations or to the private sector. Several examples in Seychelles of partnerships for environmental conservation can be drawn upon. Bird Island, for instance, has been managed privately since 1968 with considerable success in the controlled development of tourism and as a bird sanctuary. The Government has leased Aldabra atoll to the Seychelles Island Foundation (SIF), which is responsible for its supervision, operation and protection. SIF is supported by several institutions from Europe and the US, but has been having difficulty maintaining the research station in good condition.

The Organizational Study of the Environment Division, which is expected to begin in October 1992, would determine the most effective means of maintaining coordination and monitoring the progress of the EMPS as a whole. One of the most important elements of this study will be the preparation of a ten-year human resource development plan. The capacity of Environment Division staff is stretched with day-to-day demands, which leaves little time for EMPS implementation. The staffing plan will support not only the EMPS but also the ongoing (and rapidly increasing) additional responsibilities of the Environment Division. It should also cover the staff functions in the Ministry that are required for the overall monitoring of EMPS activities being carried on outside the Ministry, such as the functions of the National Coordinator recommended below and in Annex 2.

The Organizational Study would also identify those tasks which do not need to be carried out by the Ministry but which could be done by other agencies or by the private sector. It is important, however, that the needs of these other agencies involved in the implementation of the EMPS also be identified. It is unreasonable to expect substantial support from others unless they are allocated the necessary resources to do the additional tasks. The staffing plan would build on and would be an extension of the present Government-wide plan being prepared under the aegis of the Ministry of Administration and Manpower and due to be released in October 1992. The staffing plan would be reviewed every year in the Ministry and revised as necessary.

Legislation

In Seychelles, there is a wealth of legislation affecting the environment, much of it concerning area and species protection. Some 46% of the total land area has been designated as national parks, reserves, or special areas, and a further 228 km^2 of marine areas have been designated as marine national parks. Although the protection framework is largely in place, more detailed legislation is often lacking on the specific activities permitted and proscribed in the protected areas, on enforcement measures, and on sanctions that can be imposed. A comprehensive draft of a Conservation and National Parks Act was prepared by a consultant based on an external model, but this is being further improved in order to better reflect Seychelles conditions. At present, another consultant is drafting legislation to apply the regulation making environmental assessments mandatory for investment projects. The legislation will be reviewed by the Environment Division and subsequently by the Attorney General's office prior to enactment.

There is scope for some innovative approaches to environmental legislation. MEPER is now the main executive for conservation policy and responsible for the creation and management of all protected areas apart from Aldabra, Aride and Cousin islands. Aride and Cousin are owned and managed as Special Nature Reserves by the Royal Society for Nature Conservation (RSNC) and the International Council for Bird Preservation (ICBP) respectively. Bird Island has been owned and successfully managed privately as a bird sanctuary since 1969. The population of sooty-terns has significantly increased on Bird Island in the intervening years. Successful alternatives to control by Government regulation and staff have therefore been established.

Public Participation

The awareness of the importance of sustainable development to the Seychelles environment has been increasing rapidly at all levels. There is now a "green" public awareness group in the Seychelles called the Seychelles Environment Lobby. Until the recent liberalization, however, there was little opportunity for general public participation in decision-making at the project approval level. A process of active campaigning for political parties is now under way and this should lead to a wider involvement of citizens in development decisions.

The success of the EMPS in the long run will in fact depend on the degree of public support there is for it and its activities. Every opportunity should be taken to encourage the involvement of the public, in part because environmental measures that are designed in accordance with the wishes of the affected public will be supported by them and as a result the need for government enforcement will be lessened. Peer pressure is much more effective than Government inspection and control.

The importance of environmental education in this context cannot be overemphasized. A top priority of any developing environment agency should be the environmental education of the children. Once they are sensitized they will help ensure the long-term sustainability of environmental programs in both the public and private sectors.

D. CONCLUSIONS AND RECOMMENDATIONS

The EMPS is beginning to get underway. Thirteen projects are fully funded, another 4 projects have start-up funding, and 11 projects have actually started. The total number of proposals in the EMPS Investment Program was 51. Seven other projects in the Plan were already financed and not included in the Investment Program. There is much more to be done, however, and the Government has been working hard to have the donors' pledges turn into committed funds. The workload from environmental matters is increasing exponentially from a rather high platform created by the recent flurry of international activities and by the need to implement the EMPS and to prepare and enforce new improved legislation.

Organizational Study of Division of Environment

This study, originated by the former DOE, is a top priority of the Government, especially now that questions of interaction between environment specialists and economic planners can be handled within a single ministry (MEPER). A consulting firm to undertake the study has been selected, and the study is expected to begin in October 1992. A 5-10 year staffing plan for the Division and a training and recruitment program are among the outputs expected from this study. Early adoption of its recommendations would be critically important to the successful implementation of the EMPS.

Innovative Approaches to Management of the Environment

It is recommended that an innovative approach be taken to the management of the environment through the Organizational Study and through other actions of the Government. In a country with such limited human resources it is appropriate to maximize the utilization of available personnel, be they in the Government, in parastatals or in the private sector. At the same time as recognizing the need for Government to have a considerably expanded staff to deal with the increased volume of environmental work, it is also important to focus on the most appropriate and crucial role for the Government to play, while identifying alternative means for implementation of the less significant or more easily delegated activities that might be carried out by others under the supervision of the Government.

Establishment of a National Coordinator for Implementation of the EMPS

The scope and complexity of the EMPS is such that it has recently been taking a substantial portion of the time of a MEPER Senior Economist and an Assistant. The work load continues to grow as the EMPS gets underway, and it is therefore recommended that this need be established on an official footing by the appointment of a National Coordinator for the EMPS. The position would be filled for a year by an expatriate economist who would train a Seychellois assistant to take over after that year has elapsed. It is hoped that the present Senior Economist can stay to fill this role and that he will be able to complete the training of the staff that he now has assisting him. Funding required is estimated to be about US$90,000 for the expatriate including overheads and about SR 4,400 a month for the Assistant with an eventual salary of about SR 5,300 a month for the Seychellois National Coordinator. Terms of reference and justification for the National Coordinator are given in Annex 2 below.

PRIORITY RANKING FOR EMPS PROJECTS

(As shown in Figure III-1 of the EMPS Vol I).

Code 0 designates projects which are already under implementation or about to start.

Code 1 designates projects which bear a first priority, either because they aim at addressing an urgent environmental problem, such as Victoria sewage treatment works (project C1), or because their completion is a prerequisite for the implementation of other projects and programmes, as is the case for the coastal environment baseline study (project I1).

Code 2 designates projects which, although bearing an intrinsic priority, cannot be initiated before other priority 1 projects have been completed or are well under way, such as the coastal zone management plans (project I4).

Code 3 designates projects which, even though they address an important issued, do not bear a character of real urgency because their implementation can be phased or delayed without putting in jeopardy the rest of the Plan, as is the case with sewerage network extensions (project C2).

A double code (for example: 1/3) indicates the respective priorities of Phase 1 and 2 of the project.

As the activities are of such a different character, no priorities were assigned in the Environmental Information, Education and Training Programmes. These projects are nevertheless essential for success in implementing the EMPS-90.

NOTE: Only one of the "0" projects (C6) was included in the EMPS Investment Program and this Study of Volbert Sewerage has been completed.

Figure III-1 : Priority Ranking for EMPS Projects.

Priority Ranking	
	A. Environmental Guidelines and Assessment Programme
2	A.1 State of Environment Reports
1	A.2 Prepare and Apply Environmental Guidelines
1	A.3 Environmental Assessment Procedures
3	A.4 Conduct Annual Sustainable Development Audits
3	A.5 Impact Assessment of Climate Warming and Sea Level Rise
	B. Pollution Monitoring and Control Programme
1	B.1 Set Standards for Air And Water Quality, and Noise Pollution
1	B.2 Pollution monitoring, Control and Advisory Service
2	B.3 Improvement of Vehicle Tests and Testing Facilities
1	B.4 Control of Toxic or Potentially Hazardous Chemicals
1	B.5 Contingency Plan for Marine Pollution from Ships
1	B.6 Implementation of International Convention for the Prevention of Pollution from Ships
1	B.7 Control Programme for off-shore Oil Drilling
	C. Waste Management Programme
1	C.1 Greater Victoria Sewerage Project - Phase II
3	C.2 Greater Victoria Sewerage Project - Phase III
1/3	C.3 Beau Vallon Bay Sewerage Project
1	C.4 Roche Caiman Sewerage Project
2/3	C.5 Anse aux Pins - Anse Royale Sewerage Study
1	C.7 Treatment of Waste Oil
0	C.6 Anse Volbert Sewerage Project
1	C.8 Solid Waste Treatment Plant and Plan for Mahé
3	C.9 Dispose of sludge from Victoria Power Station
3	C.10 Study of Improved Sewage Disposal for Dispersed Homes and Small Villages
3	C.11 Feasibility Study for Regional Management of Hazardous Wastes
	D. Land Management Programme
0	D.1 "Plan d'Aménagement du Territoire"
1	D.2 Strengthening of Planning Act and Building Regulations
3	D.3 Soil Fertility Conservation and Improvement
	E. Water Management Programme
1	E.1 Mahé Integrated Water Supply Development Plan
1	E.2 Mahé Water Distribution
1	E.3 Rehabilitation and Upgrading of Le Niol Treatment Works
0	E.4 La Digue Water Supply
1	E.5 Praslin Water Supply - Phase II
3	E.6 Assess Water Resources and Prepare Water Management Plans

Environmental Management Plan for Seychelles

Priority Ranking

F. Energy Policy and Conservation Programme

1	F.1 Energy Conservation Programme
3	F.2 Feasibility Study on Introduction of Lead Free Gas

G. National Parks and Wildlife Conservation Programme

3/1	G.1 Wildlife Inventories and Protection of Endangered Species
3	G.2 Control the Import and Export of Plants and Animals
1	G.3 Control of Pesticides
1	G.4 Rehabilitation of Curieuse National Park
1	G.5 Improvement of National Marine Parks
1	G.6 Rehabilitation of Aldabra World Heritage Site
1	G.7 Eradication of Feral Goats from Aldabra Atoll
3	G.8 Upgrading the National Botanical Garden
1	G.9 National Parks and Wildlife Service
2	G.10 Conservation Strategy and National Parks Management Plans

H. Forests Management Programme

1	H.1 Preservation of Endemic Tree Species
1	H.2 Forest Fire Contingency Plan
1	H.3 Preparation and Implementation of National Forest Management Plan

I. Coastal Environment Management Programme

1	I.1 Coastal and Marine Environment Baseline Study
1	I.2 Beach Erosion Control
1	I.3 Alternatives to Reduce Sand Use in Construction
2	I.4 Review of Coastal Zone Management Plans

J. Marine Resources Management Programme

1	J.1 Protection of Endangered Sea Turtles
0	J.2 Strengthening of Fisheries Surveys and Assessments
3	J.3 Marine Resources Management Plans

K. Environmental Law and Enforcement Programme

1	K.1 Revision of Environmental Legislation

L. Environmental Information, Education and Training Programmes

L.1 Environmental Documentation Centre and Information System
L.2 Increase Public Information and Participation on Environment
L.3 Expand Environmental Education
L.4 Expand Environmental Training

Implementation and Financing Status

for EMPS Projects

PROJECT TITLE	TOTAL EST. PROJ.COST	STUDY COST	FUNDS SECURED	DONOR SECURED	FUNDS IDENTIFIED	DONOR IDENTIFIED	% SECURED	PROJECT STARTED
A.ENV.GUIDELINES/ASSESS.PROG.	SR 000'S							
A1.STATE OF ENVIRONMENT REPORTS	1230		135	FRANCE			11	*
A2.PREP/APPLY ENV.GUIDELINES	360		400	FRANCE			112	
A3.ENV.ASSESSMENT PROCEDURES	1520		1520	FRANCE			100	*
A4.ANNUAL SUS.DEV.AUDITS	260		0		0	NONE	0	
A5.IMPACT ASSESS.CLIMATE WARM.	645		0		645	GEF	0	
TOTAL A. PROGRAMME	4015		2055		645			
B.POLLUTION MONIT/CONTR.PROG								
B1.STANDARDS AIR/WATER/NOISE	230		230	UNDP			100	
B2.POLLUTION MONITORING/CONTROL	180		0		180	ADB	0	
B3.VEHICLE TESTING FACILITIES	1500		0		0	NONE	0	
B4.CONTROL TOXIC SUBSTANCES	410							
B5.CONT.PLAN MAR.POL(NAT.ACTION	1935		160	ICOD	1500	US	9	*
B6.INT.CON.MARPOL(PHASEI)	440		440	GEF			100	
B7.CONTROL OIL DRILLING	1680		0				0	
TOTAL B. PROGRAMME	6375		830		1680			
C.WASTE MANAGEMENT PROGRAMME								
C1.GVSP PHASE II	35000	7500	7500	ADB	35000	ADB	100	*
C2.GVSP PHASE III	59250		0				0	
C3.BEAU VALLON SEWERAGE	45800	2500	2500	CCCE	45800	CCCE	100	*
C4.ROCHE CAIMAN SEWERAGE	9000		0			NONE	0	
C5.PINS/ROYALE SEW.STUDY	3500		0		3500	ADB	0	
C6.VOLBERT SEWERAGE STUDY	17200	269	269	CCCE				*
C8.SOLID WASTE TREATMENT	27000	300	300	CCCE	27000	CCCE/ADB	100	*
C9.DISPOSE OF SLUDGE		60	60	SPAIN				*
C10.SEWAGE DISPOSAL DISP.HOMES	1350		0			NONE		
C11.MANAGEMENT TOXIC WASTE	1900		0			NONE		
TOTAL C. PROGRAMME	200000	10629	10629		111300			
E.WATER MANAGEMENT PROGRAMME								
E1.LE NIOL TREATMENT WORKS	6000		0		6000	CDC/IBRD		
E5.PRASLIN WATER SUPPLY	850		0		850	IBRD/GERM		
E6.WATER MANAGEMENT PLANS	4250		0		4250	IBRD		
TOTAL E. PROGRAMME	11100				11100			
F.ENERGY CONSERVATION PROGRAMME								
F1.ENERGY CONSERVATION	1350		0		1350	UNIDO/JAPAN		
F2.STUDY LEAD FREE GAS		60	60	SPAIN				*
TOTAL F.PROGRAMME	1350	60	60		1350			
G.NAT.PARKS CONSERVATION PROG.								
G1.WILDLIFE INVENTORIES	2640				1300	ICBP/EC		
G2.IMPORT PLANTS/ANIMALS	1040		0		1040	ADB		
G3.CONTROL OF PESTICIDES	425		425	FAO			100	*

G4.REHAB.CURIEUSE NAT.PARK	1880				1880	FRANCE		
G5.IMPROVE MARINE PARKS	400		400	EC			100	
G6.REHAB.ALDABRA	1760				1760	GEF		
G7.ERAD.FERAL GOATS ALDABRA	1405				1405	GEF		
G8.UPGRADE BOTANICAL GARDEN	350		100	ACCT			29	
G9.NATIONAL PARKS WILDLIFE SERV	3085		3085	EC			100	
G10.CONSERVATION STRATEGY	350		350	EC			100	
TOTAL G.PROGRAMME	13335		4360		7385			
H.FORESTS MANAGEMENT PROGRAMME								
H1.PRESERVATION ENDEMIC TREES	660		0		0	NONE		
H2.FOREST FIRE PLAN	480		0		0			
H3.NATIONAL FOREST PLAN	320	320		ADB/FINN			100	
TOTAL H. PROGRAMME	1460	320	0		0			
I.COASTAL MANAGEMENT PROGRAMME								
I1.COASTAL BASELINE STUDY	4200		0			EC		
I2.BEACH EROSION CONTROL	4000		0			EC		
I3.ALTERNATIVES TO SAND USE	330		0			EC		
I4.COASTAL ZONE MANAGEMENT	320		0			EC		
TOTAL I.PROGRAMME	8850		0					
J.MARINE RESOURCES PROGRAMME								
J1.PROTECTION OF SEA TURTLES	5800		5800	GEF			100	
J3.MARINE RESOURCES MANAGEMENT	1820				1820	IBRD		
TOTAL J.PROGRAMME	7620		5800		1820			
K.ENVIRONMENTAL LAW PROGRAMME								
K1.ENVIRONMENTAL LEGISLATION	1340		160	UNDP	1340	IUCN/FAO		
TOTAL K.PROGRAMME	1340		160		1340			
L.EDUCATION/TRAINING PROGRAMME								
L1.DOC.CENTRE/INFO.SYSTEM	560		100	ACCT		CFTC/ACCT	18	
L2.PUBLIC INFORMATION	2500		0			CFTC/ACCT		
L3.ENV.EDUCATION	6600		0			CFTC/ACCT		
L4.ENV.TRAINING	4200		0			CFTC/ACCT		
	13860							
TOTAL L.PROGRAMME	27720		100					
Grand Total	319,255		23,994		136,620			
			(13%)		(42%)			

NOTES:
PROJECTS C1;C3;C8 STUDY COSTS FULLY SECURED
PROJECTS G5;G9;G10 SCHEDULED FOR IMPLEMENTATION SEPTEMBER 1992

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EMPS - Investment Programme : Implementation Schedule

Programmes and Project Titles	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
A. Environmental Guidelines and Assessment Programme										
A.1 State of Environment Reports		I—I	I—I	I—I	I—I		I—I		I—I	
A.2 Prepare and Apply Environmental Guidelines			I—I	I—I	I—I					
A.3 Environmental Assessment Procedures		I—I	I—I	I—I	I—I	I—I	I—I	I—I	I—I	I—I
A.4 Conduct Annual Sustainable Development Audits			I—I	I—I						
A.5 Impact Assessment of Climate Warming and Sea Level Rise			I—I	I—I	I—I	I—I	I—I	I—I	I—I	I—I
B. Pollution Monitoring and Control Programme										
B.1 Set Standards for Air and Water Quality and Noise Pollution		I—I	I—I	I—I		I—I	I—I			
B.2 Pollution Monitoring, Control and Advisory Service			I—I		I—I	I—I	I———I			
B.3 Improvement of Vehicle Tests and Testing Facilities										
B.4 Control of Toxic or Potentially Hazardous Chemicals				I—I	I—I		I—I			
B.5 Contingency Plan for Marine Pollution from Ships	I————	————	————I							
B.6 Implementation of Int. Convention Prevention of Ship Pollution			I—I							
B.7 Control Programme for off-shore Drilling		I—I	I—I	I—I	I—I	I—I	I—I	I—I	I—I	I—I

Programmes and Project Titles	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
C. Waste Management Programme										
C.1 Greater Victoria Sewerage Project - Phase II		I———I	I———I							
C.2 Greater Victoria Sewerage Project - Phase III			I———I							
C.3 Beau Vallon Bay Sewerage Project		I———I					I———I			
C.4 Roche Caiman Sewerage Project		I———I								
C.5 Anse Aux Pins - Anse Royale Sewerage Study								I———I		
C.6 Anse Volbert Sewerage Project										
C.8 Solid Waste Treatment Plant and Plan for Mahe		I———I								
C.9 Dispose of Sludge from Victoria Power Station	I—I									
C.10 Study on Improved Sewage Disposal for Disp. Homes and Villages			I———I							
C.11 Feasibility Study for Regional Management of Hazardous Wastes										
E. Water Management Programme										
E.3 Rehabilitation and Upgrading of Le Niol Treatment Works			I———I							
E.5 Praslin Water Supply - Phase II			I—I							
E.6 Assess Water Resources and Prepare Water Managment Plans			I———I							
F. Energy Policy and Conservation Programme										
F.1 Energy Conservation Programme			I—I	I———I		I—I				
F.2 Feasibility Study on Introduction of Lead Free Gas		I—I								

Programmes and Project Titles	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
G. National Parks and Wildlife Conservation Programme										
G.1 Wildlife Inventories and Protection of Rare Endangered Species		I—	——	——	——	——I	I—I	I—I	I—I	I—I
G.2 Control the Import and Export of Plants and Animals						I—I				
G.3 Control of Pesticides	I—	——	——I							
G.4 Rehabilitation of Curieuse National Park										
G.5 Improvement of National Parks			I—I							
G.6 Rehabilitation of Aldabra World Heritage Site			I—	——	——I					
G.7 Eradication of Feral Goats from Aldabra Atoll										
G.8 Upgrading the National Botanical Garden		I—	——	——	——I					
G.9 National Parks and Wildlife Service		I—	——	——I	I—I	I—I	I—I	I—I	I—I	I—I
G.10 Conservation Strategy and National Parks Management Plans		I—	——I							
H. Forests Management Programme			I—	——	——I					
H.1 Preservation of Endemic Tree Species				I—	——	——I				
H.2 Forest Fire Contingency Plan				I—	—I					
H.3 Preparation, Implementation of National Forest Management Plan			I—	—I						

Programmes and Project Titles	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
I. Coastal Environment Management Programme										
I.1 Coastal and Marine Environment Baseline Study			I—					—I		
I.2 Beach Erosion Control			I—		—I					
I.3 Alternatives to Reduce Sand Use in Construction			I—I							
I.4 Review of Coastal Zone Management Plans				I—I						
J. Marine Resources Management Programme										
J.1 Protection of Endangered Sea Turtles			I—	—I						
J.3 Marine Resources Management Plans			I—	—I		I—I		I—I		
K. Environmental Law and Enforcement Programme										
K.1 Revision of Environment Legislation			I—	—I						
L. Environmental Information, Education and Training Programmes										
L.1 Environmental Documentation Centre and Information System		I—I	I—	—I	I—	—I	I—	—I	I—	—I	I—	—I	I—	—I	I—	—I
L.2 Increase Public Information and Participation on Environment		I—I	I—	—I	I—	—I	I—	—I	I—	—I	I—	—I	I—	—I	I—	—I
L.3 Expand Environmental Education	I—		—I		I—	—I	I—	—I	I—	—I	I—	—I	I—	—I	I—	—I
L.4 Expand Environmental Training			I—	—I	I—	—I	I—	—I	I—	—I	I—	—I	I—	—I	I—	—I

ENVIRONMENTAL MANAGEMENT PLAN OF SEYCHELLES (EMPS):

ESTABLISHMENT OF A NATIONAL COORDINATOR

A. BACKGROUND AND JUSTIFICATION

The accompanying review of the progress of the EMPS since the 1991 Donors' Meeting demonstrates that the EMPS is not only a strategy for sustainable development but also an investment program of some 51 proposed projects. For the strategy to be effectively carried out, it is important that the investment program be adequately managed. Although many EMPS projects are underway, a focal point for coordination, information exchange, and ultimate accountability for the EMPS has been lacking. There is a danger that each unit assumes a program is being carried out by someone else, with the result that no one carries it out. Conversely, a single unit or agency, no matter how clearly defined its responsibility for the subject in question, would need to establish channels for regular consultation or collaboration with other interested parties.

Donors' pledges notwithstanding, very considerable efforts still need to be expended, more than a year later, to lay hands on the funds that have been promised. The Ministry of Environment, Economic Planning, and External Relations (MEPER) is primarily preoccupied at present with the task of securing the remaining funding but should also be ensuring the effective implementation of the EMPS by the various sector managers. The fact that, with quite limited staff, it is charged with both tasks is at the heart of EMPS implementation issues.

A significant share of the projects are being or will be managed by SFA, DOI, SIF and other agencies. For these projects the Planning Ministry has only a minimal monitoring role. Most of the projects will be managed by the Environment Division, but it would be useful for MEPER to be able to overview these in the same context as those managed outside the Ministry. Preparation of terms of reference and of short lists of consultants for studies, recruitment of staff or advisers, transportation arrangements, and the like would be handled by the implementing agencies. For these reasons, specific arrangements for information exchange and consultation between the implementing unit and MEPER should be concluded.

B. NATIONAL COORDINATOR

The position of **National Coordinator** will be established in MEPER. The National Coordinator will provide advice, exchange of information on progress of the EMPS in different sectors, and supervision of implementation, but would not manage all projects. The importance and increasingly high profile of the EMPS requires a full-time National Coordinator to ensure that the EMPS meets the national objectives defined for it. With effective coordination of **dispersed management** of EMPS projects within other agencies, the most specialized expertise can be brought to bear on EMPS projects without overburdening one or another ministry.

Up to now, most of the work of coordination of the EMPS has been carried out by the Senior Economist in the Planning Section of MEPER, together with one or two colleagues. Few Seychellois are available at this time to fill a coordinator role of this breadth, although there are young graduates in this ministry who are assisting the Senior Economist.

It is proposed that the Senior Economist be appointed as National Coordinator of the EMPS for a period of 12 to 18 months. His duties will be to see to it that the EMPS is effectively implemented. An Assistant Coordinator will work closely with the National Coordinator, whose job it will be to train the assistant in all aspects of this work.

It is important that this appointment not be made at the expense of other essential work of the ministry. The Planning Section will need to be strengthened, at a mininum by the appointment of another Senior Economist.

The duties of the National Coordinator will be as follows:

- Assist the Government in securing external funds for EMPS projects with realistic financing prospects
- Prepare a monthly report on the progress of implementation of the projects in the EMPS investment plan
- Carry out continuous, on the job training of the Assistant so that he or she may be able to take over as National Coordinator as soon as possible
- Continue to advise the new National Coordinator after his or her appointment to help ensure a smooth transition
- Sustain adequate communication with funding agencies, Government ministries, and other agencies to ensure their full participation in the process of EMPS implementation
- Where implementation responsibility lies outside the ministry, ensure minimum monitoring of progress, it being understood however that management responsibility for these projects lies with the implementing bodies concerned
- Assist the Environment Steering Committee in carrying out periodic reviews of the EMPS investment program
- Provide leadership and clarity of purpose in the EMPS implementation.

As for possible sources of funding of the position of National Coordinator, the Commonwealth Fund for Technical Cooperation (CFTC) is already funding a Senior Economist position in the ministry. The term of this contract expires in February 1993. Although the Government has asked for it to be extended, the contract is not likely to be renewed on the same terms as before. A financing proposal for the National Coordinator position would be submitted

to CFTC, to take effect for the incumbent Senior Economist as from February 1993. The importance of the position and the firmly established handing-over to a Seychellois would satisfy specific criteria of CFTC. It is important, however, that the priority of this proposal be established among the many other requests sent to CFTC by Seychelles.

If CFTC financing does not materialize, other grant funding would be sought. Contact would be made, for example, with the Club of Dublin which deals with national environmental action plans and has access to several interested donors.

RESTORATION AND PRESERVATION OF THE ALDABRA ECOSYSTEM

PROGRAM DESCRIPTION

A. INTRODUCTION

Aldabra, the world's largest coral atoll, is situated in the Indian Ocean some 1,200 km southeast of Mahé, the main island of the Seychelles. With a land area of 35,000 ha, it consists of 4 main islands which encircle a central lagoon about 30 km in diameter. The islands consist mainly of rough weathered coral rock, there is little soil and a shortage of fresh water. Rainfall is concentrated in the period December to April, followed by an extended dry season. Rainfall averages about 1200 mm annually, compared with 2200 mm on Mahé, with a variation from 1500 mm down to 500 mm.

Its remoteness and inhospitable environment have afforded Aldabra a measure of protection, as early seafarers and colonists had only moderate interest in the island. This has resulted in Aldabra being the only largely intact island ecosystem left in the Indian Ocean, representing what the other coral atolls were like before man arrived. In the region at various times, at least 7 species of tortoises have been present on several Indian Ocean islands. Through human consumption as well as environmental changes, the Aldabra population is the only one remaining in the Indian Ocean and is one of two (with the Galapagos Islands) in the world. Its size permits it to harbor distinct inland ecosystems with endemic plants and insects, a rarity among coral islands. The atoll is surrounded by a rich and largely undisturbed marine environment. There are at least 178 species of flowering plants (of which about 20% are endemic), over 200 species of algae and nearly 1,000 species of insects, of which fully 39% are endemic.

B. THREATS AND DISTURBANCES

Island ecosystems, due to their remoteness and the absence of large predators, often evolve in ways which make their plants and animals especially vulnerable to introduced species and to man. Defense mechanisms such as flight in birds or unpalatable chemicals in plants, did not have to develop. As a result, some 74% of all bird and mammal extinctions have been of island-dwelling species.

The growing scientific interest in Aldabra has contended with attempts at commercial exploitation and with the introduction of non-native species. From its discovery in the 16th century until the late 1800s, exploitation consisted mainly of crews of the occasional ship taking some tortoises, fishing, or felling trees. Aldabra has never sustained any permanent community of settlers, although several attempts were made during the 19th and 20th century. In 1874, the central authorities in Mauritius planned to start a woodcutting and timber industry on Aldabra. This idea was abandoned after Charles Darwin and other naturalists intervened with the Governor of Mauritius. Four years later a hydrographic survey of the atoll was completed. This marked the beginning of organized scientific research on the atoll. Meanwhile the

authorities continued to grant leases for fishing, timber extraction, and the catching of green turtles and giant tortoises. This practice continued after Seychelles was separated from Mauritius in 1903; indeed, some leases were still in effect in 1971 when the Royal Society leased the atoll. Beginning in the 1950s, however, the scientific interest of Aldabra has steadily grown to dominate other interests on the atoll. The most recent, and most severe, threat to this scientific vocation came in 1964-67, when some Western governments, led by the US, drew up plans to turn the atoll into a strategic military installation. The controversy that this proposal brought about was resolved in favor of conservation, and the plans were abandoned.

Threats to the Aldabra ecosystem from introduced species have been continuous for the past hundred years, somewhat in contrast to the the episodic involvement of humans. Goats were introduced on Aldabra in about 1880 as a source of meat. Since tortoises were taken as food by passing ships, the tortoise population at the time was much reduced. It was therefore possible for the goats, with a more extensive range than the tortoise, to increase in numbers. This was at first not perceived as a problem since goats as well as tortoises would be taken by ships passing and the populations were smaller. When the use of goats for ship supply gradually disappeared over the past 50 years, there was no longer any constraint on growth of the goat population.

Goats are a severe threat to the giant tortoise population of Aldabra, estimated at some 150,000 individuals. Goats compete for food with the tortoises, but perhaps even more importantly they destroy the trees and shrubs which the tortoises need for shade as they cannot survive being out in the sun all day. They also prevent regeneration by eating the seedlings of trees and shrubs. Other impacts have included erosion of the already meager soils and destruction of vegetation.

The isolation of the Aldabra atoll has recently been greatly reduced with the completion of an airstrip on Assomption Island, 27 km from Aldabra. This means that Aldabra will be much more easily accessible for tourism in the future. Indeed, some plans have already been made to open Aldabra up for ecotourism similarly to the way this is done in the Galapagos Islands. The opening up of Aldabra for ecotourism calls for a sound management plan to ensure that tourism will not have a detrimental effect on the island.

C. MANAGEMENT OF RESEARCH AND CONSERVATION ON ALDABRA

Scientific work on Aldabra was first recorded in the 1870s but has been ongoing in several stages throughout this century. After the atoll was declared a strict natural reserve in 1971, the island was leased to the Royal Society (UK), which initiated a systematic program of research and built a research station to provide laboratory facilities and accommodation to visiting scientists. In 1980, the Seychelles Island Foundation (SIF), a charitable trust with Seychellois and international members on a Board of Trustees, took over management of Aldabra from the Royal Society. Members of the SIF Board include the Royal Society, the Smithsonian Institution (USA), the International Union for the Conservation of Nature (IUCN), the Royal Society for Nature Conservation (UK), and ORSTOM (France).

The research facility serves the dual purpose of research and conservation. The activities of the research station are directed by the warden, who also is in charge of the strict nature reserve. The warden is assisted by a conservation officer. The engineer is charged with keeping in good working order the 3 electric generators, radio equipment, and equipment of the weather station. The operation relies heavily on several skilled workers such as carpenters, overland guides, and boatmen. An accommodation block with 16 rooms houses visiting and resident scientists.

The station's premises, now 20 years old, are in urgent need of repair and renovation. Similarly, the age and condition of the equipment is affecting the quality of research. Staff may not be sufficient in numbers and training to cope with the new demands posed by greater accessibility of the atoll to tourism. For these reasons the restoration project for Aldabra atoll consists of four main components: (a) rehabilitation of the research facility; (b) strengthening of managerial and scientific personnel; (c) eradication of goats; and (d) preparation of a Long-Term Management Plan.

D. THE RESTORATION PROGRAM FOR ALDABRA

Rehabilitation of the Research Facility

An assessment of the works and equipment necessary for the rehabilitation of the research station was carried out by an engineer from the Ministry of Community Development in 1989. A first phase of works was completed by late 1989. This phase included the renovation of the 5 rain water collection tanks and the construction of 6 laborers' cottages.

The GEF program would finance the second phase, consisting of works and acquisition of equipment. Works include (a) renovation of the laboratory; (b) repairs to the accommodation block, rest area, and clinic; (c) construction of a sanitation system; and (d) reconstruction of the slipway. Equipment to be acquired includes tables, bookcases, water and gas supply, beds, and camping equipment. The supply of boats, the only form of transportation around the atoll, would be enhanced through acquisition of a 17-ft. dory with 2 40-hp outboard motors, and 3 25-hp outboards for existing boats. Acquisition of laboratory equipment would be limited to 2 microscopes, as scientists are expected to bring most of their own small equipment.

Managerial and Scientific Personnel

It has proved increasingly difficult for SIF to recruit, for a long term assignment on Aldabra, someone with the leadership talents as well as knowledge of conservation issues and government policies to function as both scientist and nature warden. Many previous attempts to place qualified scientists or managers on the atoll failed due to the difficult living conditions and isolation. To overcome this difficulty and ensure the necessary continuity of action for conservation programs, it is proposed to recruit a team of two scientists with managerial experience. Taking advantage of the improved access through the airstrip on Assomption Island, the scientist-managers could share their time or alternate between Aldabra, Mahé, and overseas

travels. SIF advertised for such a person in 1989, but could not find a suitable candidate locally. Recruitment of expatriate personnel is therefore considered to be necessary.

The full-time manager's role would be to oversee the upgrading of services, provide guidance to visiting scientists, and help ensure a suitable quality standard for scientific research. In so doing the manager would improve the functioning of SIF itself. At present, the SIF Board of Trustees, half of whom are expatriates from research organizations around the world, meets once a year. The Seychellois executive group of the Board of Trustees meets once a month to handle problems that have arisen as well as to prepare for Board meetings. There is currently no permanent staff managing the SIF. With the greater opportunities for ecosystem restoration afforded by the present program, in addition to the pressure from increased access to visitors, it is doubtful whether SIF in its present form will be able to manage the increased level of activities. The full-time manager would address this issue.

The program would cover salary complements for external assistance and overseas social security contributions for a period of 2 years, as well as overseas travel expenses and a vehicle.

Control of Goats

Goat control has been attempted on Aldabra since research began. Confinement to one island of the group was ineffective, since goats can swim the channels between islands. The GEF-supported goat control program has involved a broader investigation into all methods of removal. SIF will apply these methods in a control campaign that will extend over a full year, for maximum coverage. The program can be extended by six months if necessary.

Long-Term Management Plan

Long-range planning for Aldabra is vital, to ensure that the easier access to the atoll yields greater scientific knowledge without encouraging encroachment on the ecosystem. Critical issues that would be addressed in the Long-Term Management Plan for the atoll include the number and frequency of visits by non-scientists, supervision of visitors while on the island, liaison with other reserves and national parks in Seychelles, and the prospects for ecotourism programs. The Management Plan would specify the institutional requirements for the adequate functioning of the SIF and the management system on Aldabra itself.

Preparation of the Management Plan would be the responsibility of SIF, which would draw primarily upon the experience of the warden and managers on Aldabra and the technical expertise within the Division of Environment. A total of 2 specialist-months of expatriate assistance will be financed under the program to assist SIF in specific aspects of preparation.

TURTLE PROTECTION PROGRAM

A. THE SETTING

Sea turtle populations around the world are rapidly being depleted. This has occurred to such an extent that the CITES Convention (the Convention on International Trade in Endangered Species of Wild Flora and Fauna) considers all species of sea turtles as being endangered. Consequently, trade in these species or in products made from them is prohibited. CITES is the world's major treaty regulating international trade in species threatened or endangered by commerce. When CITES entered into effect in 1975, most species of sea turtles were included in Appendix I, a listing of species considered to be in danger of extinction. By 1981 all species of sea turtles were so listed.

The depletion of the turtle populations has mainly been caused by human activities such as alterations in feeding and nesting areas, hunting for domestic consumption and export, egg collection, and accidental capture in fishing nets. Of these, the international trade in turtle products has been the main cause of depletion of stocks around the world.

The sea turtle species that breed on the Seychelles islands are the **Green** *(Chelonia mydas)* and **Hawksbill** *(Eretmochelys imbricata)* turtles. Both species have been important economically since the islands were first settled. The Green turtle was once plentiful in the northern granitic islands of Seychelles, but is now virtually extinct in the granitic islands and rare in the Amirantes Group. Its last large wild refuge is on Aldabra. Where it is found on other outlying islands, however, Green turtles continue to be caught mainly for local consumption by residents of these islands. Restrictions were placed by a December 1990 law on the number of licenses for the taking of Green turtles issued to the Islands Development Company (IDC), which manages most outer islands, by the Seychelles Fishing Authority (SFA). An earlier (1987) law forbids the killing of female Green turtles, but has proved difficult to enforce. Their shells are usually discarded as being of limited value. In 1983, the population of Green turtles in Seychelles was estimated at 3,500 - 5,000 nesting females.

Hawksbill turtles are caught for their shell, which is worked by about 20 artisans and sold mainly to tourists. There has also been some direct export of shells that are unprocessed. The flesh of the Hawksbill is not consumed as it is considered poisonous. However, the eggs of both species are consumed. Current knowledge of Hawksbill populations in Seychelles is derived largely from the comprehensive study carried out in the early 1980s by J. Mortimer, under the auspices of the International Union for the Conservation of Nature (IUCN) and the World Wildlife Fund. The study concluded that both species of sea turtles were severely overexploited in Seychelles and would vanish from many of the islands if the exploitation continued unabated. The study also concluded that on the inner, granitic islands the Hawksbill turtle had ceased to be an exploitable resource. In 1983, the population of Hawksbill turtles was estimated at 1,200 -1,800 nesting females.

Several attempts have been made to reduce the harvesting of sea turtles to arrive at a sustainable level of exploitation. Legislation enacted in 1925 remained the basis for management of catches of sea turtles until 1987, when the law was strengthened for protection purposes. However, enforcement was weak or nonexistent. Some provisions in the law were impractical, such as the condition that only males can be taken (most turtles are caught by harpooning in the water, when it is impossible to distinguish male from female). Based on the results of the Mortimer study and on discussions during the September 1990 Technical Seminar to prepare the EMPS, the issuance of licenses to capture Hawksbill turtles has been stopped as of December 1990. This measure will remain in effect until an agreed protection plan (to be undertaken under the present GEF program) is completed. The local sale of Hawksbill shell items is still legal, from the stocks available before the ban went into effect. The international sale of Hawksbill items has been illegal since Seychelles acceded to the CITES convention in 1977. (CITES concerns only international, not local, trade).

Seychelles is therefore not, strictly speaking, in violation of CITES regulations when it permits the sale of Hawksbill turtle items in the local market. But these products are almost exclusively sold to tourists, who then (often unknowingly) export them illegally. The Seychelles authorities recognize that the Hawksbill trade violates the spirit if not the letter of CITES, and should consequently be stopped. There is a potential US$10,000 fine and/or imprisonment for the smuggling of turtle products out of the country, but it is not known whether greater environmental awareness is having an effect on the numbers doing so. Several reports have also been made of unlawful catches, but no one has yet been prosecuted.

B. OBJECTIVES

The objectives of the GEF-financed turtle conservation program vary according to the specific protection requirements of each species. For the **Green turtle** the main objective is to establish and maintain a harvesting regime which ensures that local consumption does not exceed the sustainable harvesting volume. For the **Hawksbill turtle**, the principal goal is to enable Seychelles to comply with the stipulations of the CITES convention. The GEF program will support the preparation of a protection and management plan for each species.

C. PROGRAM DESCRIPTION

Green Turtle Program

A critical element of the Green turtle management plan is a new stock assessment. The most recent data are by now 10 years old. The stock assessment will be carried out for all of Seychelles, and is expected to take 2 years. During the first year, expatriate expertise will be involved on a continuous basis, to establish a local monitoring program. Activities will be continued largely by local staff during the second year. The Hawksbill turtle will be included in the stock assessment. During this period the conservation consultant carrying out the task will

be responsible for helping to train and strengthen local conservation officers in their current stock assessment work. For several years after the initial assessment, the consultant will return to carry out updated assessments and assist in capacity building within the Conservation and National Parks section of the Division of Environment, MEPER.

Once the stock assessment is completed, the management plan will be prepared. The management plan will indicate numbers, size, gender, and locations of the offtake of males that can be permitted in the three major island groups. A feasible program for monitoring the offtake, especially the trade between the outer islands and Mahé, will be a central feature of the management plan. Training in enforcement and regulation for the Conservation and National Parks section will also be carried out.

Hawksbill Turtle Program

Those in Seychelles favorably disposed toward turtle farming or ranching are aware that under CITES, export of turtle products could be considered if a successful program of production of the endangered species, which ensures the recovery of the wild population, can be established. Some interest has been expressed in Seychelles in establishing a Hawksbill turtle farm. Moreover, the continuing commercial interest in turtles, and some success in ranching crocodiles, have resulted in sea turtle ranching proposals being advanced at the CITES meetings of 1983, 1985, and 1987.

These proposals were found to be deficient in several respects. Although the concept is theoretically attractive, the fact remains that no Hawksbill turtle farms have become commercially viable anywhere in the world. In the last few decades, sea turtle captive rearing operations for trade and conservation have been attempted in Australia, Suriname, Palau, Indonesia, Cuba, Reunion, and the Cayman Islands. None has succeeded. These efforts have focused mainly on Green turtles, which are arguably easier to raise in captivity than Hawksbills. The Reunion project was closed in 1988 after extensive press reports of unsanitary conditions and the illegal killing of small turtles. The Cayman Islands operation, after nearly 20 years of commercial non-viability, has evolved into a research facility, partially supported by tourism and local sales of turtle meat. Consequently, the chances of such a farm succeeding in Seychelles are considered to be remote.

The feasibility study of turtle farming will aim to estimate the full costs (often underestimated in past studies) as well as benefits of such an operation. If the study concludes that Hawksbill farming is not justified either on technical, economic, or environmental grounds, no Hawksbill turtle farm will be established. If the study deems Hawksbill farming feasible, Seychelles may decide to start farming. Any application for an exemption to the CITES restrictions would be filed only after it has been demonstrated that the enterprise is successful.

In the meantime, the turtle shell products trade, based on capture in the wild, is being phased out. The phasing out of the trade in turtle shell products will be supported by the GEF program, which will provide the artisans with alternatives and compensation. The training and development of artisans is the responsibility of the artisan development company CODEVAR,

under the leadership of the Department of Industry (DOI). Existing stocks of turtle shell can only be sold, worked and resold as finished products by people possessing a license, the issuance of which will be strictly limited.

An effort by the GEF program will also be launched on the demand side to inform tourists of the consequences of smuggling turtle products, but also emphasizing the positive aspects of saving sea turtles. A short film will be prepared to be shown to tourists coming to Seychelles. Public information materials will also be prepared in English, French, and Italian. These efforts will be managed by the Division of Environment, MEPER. Training and education within the Conservation and National Parks section, MEPER and in schools, as well as the general public, will also be financed under the program. Training materials in Creole will be prepared for this purpose.

In summary, the program for protection of the Hawksbill turtle will:

a. conduct a feasibility study of Hawksbill turtle farming;

b. carry out a turtle trade compensation study;

c. provide for retraining of artisans involved in working Hawksbill turtle shell;

d. provide alternative materials during the training period;

e. provide, when necessary, revenue compensation for artisans for a period of up to three years; and

f. furnish educational materials for Seychellois and tourists on the legal and conservation aspects of trade in and purchase of turtle products.

RECEPTION AND DISPOSAL OF MARINE WASTES AT THE PORT OF VICTORIA

A. SEA-BASED POLLUTION

Because of its remote location, Seychelles relies largely on maritime transport for imports. In addition, the rapid growth of tuna processing has been accompanied by a sharp increase in shipping activity at the country's main port, Victoria, on Mahé island.

This increased activity has affected the marine coastal areas of Seychelles, especially in Victoria harbor and the surrounding waters. The commercial fishing fleet generates some 1 million liters of waste petroleum oil annually, which is dumped at sea. Including garbage and fish wastes, about 14,000 tons of waste is produced each year by the commercial fishing fleet.

There is a need for immediate action to assess and monitor the coastal environment and resources and to determine present levels and sources of pollution. The most urgent need is to provide adequate facilities at the Port of Victoria for the reception, storage, and recycling or disposal of waste from commercial vessels.

B. THE PORT OF VICTORIA

The port of Victoria, located on the east coast of Mahé, is the only deepwater facility in the islands. The commercial port handles bulk oil and cement imports, general cargo and containers, and all vessels requiring bunkers. The adjacent fishing port with recent additions handles all fishing vessels, inter-island schooner traffic, and frozen fish exports. The fishing port is separated from the commercial port by an enclosed basin used for mooring yachts (see also Map No. 23522). The only ship repair facility is located near this basin.

Traffic volumes in 1991, mainly imports, amounted to about 200,000 tons, of which 54% was crude oil. The major imported goods are foodstuffs, oil, transport equipment, and livestock, whereas major exported products include fish, copra, and cinnamon. The location of Seychelles, on or near the main Indian Ocean trade routes, benefits Victoria which is used as a port of call en route between the Far East and Southern Africa and between Europe and Mauritius/Reunion.

Port operations are managed by the Ports and Marine Services Division (PMSD), Ministry of Tourism and Transport, and in particular by the Harbourmaster's Office. PMSD is responsible for accounting for all charges, dues, and fees derived from water-related port operations, except for shore handling of goods and fuel deliveries at the fishing port.

C. ABATEMENT OF MARINE POLLUTION: THE MARPOL CONVENTION

In the early 1970s, the International Maritime Organization (IMO), a United Nations Agency, had already taken action to deal with pollution of the seas. However, further development of modern industrial practices made it clear that action on a much broader scale was required. The result was the International Convention for the Prevention of Pollution from Ships, usually known as the MARPOL Convention, adopted in 1973. The Convention has two Protocols dealing respectively with Reports on Incidents involving Harmful Substances, and with Arbitration. It also has five Annexes which spell out the regulations for preventing various forms of marine pollution:

Annex I:	pollution by oil
Annex II:	pollution by noxious liquid substances carried in bulk
Annex III:	pollution by harmful substances carried in packages, portable tanks, freight containers, road or rail tank wagons, and so on
Annex IV:	pollution by sewage from ships; and
Annex V:	pollution by garbage from ships.

Five years later, at the time of the International Conference on Tanker Safety and Pollution Prevention held in February 1978, problems in the ratification by countries of the MARPOL convention were discussed. Countries were reluctant to ratify the Convention mainly because of Annex II (pollution by noxious liquid substances carried in bulk). A Protocol approved in 1978 stated that if countries agreed to adopt Annex I, they could have a delay of three years in adopting Annex II. The Protocol also requires that segregated ballast tanks be protectively located; that is, they must be positioned in such a way that they will help protect the cargo tanks in the event of a collision or grounding. Another innovation concerned a new approach to crude oil washing, which had recently been developed by the oil industry. Storage tanks would henceforth be washed not with water but with crude oil itself, eliminating the need for discharge of oily water. Crude oil washing under the Protocol is an alternative to segregated ballast tanks for existing tankers, and is required on new tankers. The 1978 Protocol also introduced stricter regulations for the survey and certification of ships. In effect, the 1978 Protocol absorbed the parent 1973 Convention. The Convention of 1973 and the Protocol of 1978 are thus referred to together as "MARPOL 73/78."

Two amendments were introduced in 1984 and 1985, both designed to make implementation easier and more effective. The 1985 amendment, mainly concerning Annex II, incorporates further technological advances and is intended to simplify its adoption and implementation. The amendments make the International Bulk Chemical Code mandatory, and also reduce the need for port reception facilities for chemical wastes.

Annexes I, II, and V are currently in force. The provisions of Annex III, although not yet in force, are now being implemented through the International Maritime Dangerous Goods Code (IMDG Code). Annex IV, covering sewage from ships, is not yet in force. Under the terms of the MARPOL provisions, ships are no longer able to discharge their wastes at sea, as they have traditionally done. This implies that ports of call must be able to receive the wastes and to dispose of them in an environmentally sound manner.

D. GEF-SUPPORTED ACTIVITIES

The GEF program would support a study in two phases of waste reception facilities at the Port of Victoria. Terms of Reference for this study are included as Appendix 1 to this Annex. In the first phase, the scope and nature of the problem will be analyzed, technical features of the facilities will be described up to the level of preliminary designs, and the institutional and financial implications for the Port of Victoria will be defined. Map No. 23522 shows the currently proposed locations of waste reception facilities, which would be subject to adjustment as the first phase of the study is carried out. Also to be covered in this phase are the institutional arrangements for construction and management of the facilities, cost recovery through port charges, and the roles and responsibilities of PMSD.

An important feature of the first phase of the study will be recommendations on adequate collection and disposal of the waste deposited at the port. In this regard, the study will establish linkages with ongoing efforts addressed specifically to this issue. The current sanitary landfills in use at La Retraite and on the east coast have nearly reached the capacity that can be sustained without harmful environmental impacts. A study recently completed by the French firm ANRED has recommended the construction of a composting and incineration plant for more efficient disposal of waste. A complementary study now underway will focus more attention on the economic and financial implications of such a solution. Recommendations of the GEF port waste reception study will be based in part on the findings of these and other studies, so that the solutions proposed are fully consistent with island-wide approaches to solid waste collection and disposal.

The second phase of the study will focus largely on preparation of detailed engineering designs for the proposed facilities. Actual construction of the facilities would be the subject of a separate financing request in a subsequent GEF tranche by the Seychelles Government.

PRASLIN IMPROVEMENT PROGRAM

Setting: Praslin Island

Praslin island, the second largest of the Seychelles islands, is about 12 km long by 4 km wide with a total land area of 41 sq km. The island has a tropical climate with an average annual rainfall of about 1,700 mm. The topography is rugged in the central portions and in the northwest, but access by boat is facilitated by the wide plains along the southern and northern coasts and the sheltered Baie Ste. Anne facing the neighboring island of La Digue. There are numerous scenic beaches. The population of 5,000 is employed mainly in services (especially tourism), communications, and public utilities. Agriculture, aside from an experiment station near Anse Kerlan in the northwest, is mainly confined to family plots. Praslin lies two hours by boat, and 15 minutes by air, from the main island of Mahé.

Almost the entire population of Praslin lives along the coast. The two principal concentrations are the villages of Baie Ste. Anne on the northern, and Grand Anse on the southern, side of the island. There are also some smaller settlements and the rest of the people live scattered over the lower parts of the island. The center of Praslin is virtually uninhabited, largely the result of the steep, forested terrain and the lack of water. Although population growth has been modest, employment opportunities are growing rapidly and a labor shortage is emerging.

As the prime tourist destination after Mahé, Praslin is striving to maintain its identity as an island where the pace is slower than that of Mahé, the environment even more accessible, but the tourist amenities fully satisfactory. So far, tourism has been absorbed on Praslin without major impacts on the environment, in part because it is the relatively untouched environment that draws the visitors. In 1990 the island had some 325 rooms with 650 beds available in hotels and guesthouses. This accounted for about 150,000 tourist-nights spent on the island. Tourists arrive throughout the year, with no strong peak seasons. Most hotels are clustered at Côte d'Or, on the northern coastal plain. The newest hotel, financed by South African and other investors, was completed in 1991 along the Anse Consolation road in the southeast, and there are plans to build another at Anse Kerlan. A popular beach in the northeast is accessible from Côte d'Or, but the idea of opening a second access to this beach from Anse Kerlan, only 0.8 km away, has been resisted on environmental grounds. The most well-known attraction, one of the world's only stands of coco-de-mer coconut trees, is protected in the Vallée de Mai National Park. To maintain the balance between the environment and growth is the central challenge facing the island in the future.

The government intends to protect the natural attractions of the area and has decided to limit hotel expansion for the immediate future. It is also the policy to discourage mass tourism and, as much as possible, move tourism up-market. The current ceiling allows for an additional 250 hotel rooms, which would increase the total number of beds to about 1,150. Some 40 percent of this expansion is now under implementation or recently completed, and consists mostly of additional rooms for established small and medium size hotels and guesthouses. Because of the existing contacts and the reputation of the island, combined with a strong demand for hotel space on Praslin, it does not take long before high occupancy rates are achieved for the added capacity.

Under the project, basic infrastructure on Praslin would be improved in order to maintain the momentum of development of the local economy and ensure that visitor access to environmental attractions is well managed. Improvements in water supply, airport facilities, and roads would be carried out simultaneously so that the investments can be fully complementary.

Water Supply

The Praslin water supply consists of two independent systems (see Map IBRD 23524). The northern and western system relies mainly on water supplied from the Fond B'Offay river, and secondarily from the Salazie river, to supply the community of Baie Ste. Anne and the hotels at Côte d'Or. The southern and eastern system uses as its main source the Nouvelle Découverte river, and secondarily the Mont Plaisir river, to serve the community of Grand Anse and nearby settlements. The works at the four water supply sources consist of intakes, sedimentation tanks, pressure filters and storage tanks. Construction of most of these works occurred between 1983 and 1986 and constituted the Praslin Water Supply, Phase I project. The water gravitates to the distribution systems composed of 100 to 150 mm of asbestos cement and ductile iron pipes. For a smaller area around Baie Ste. Anne a booster pumping station has been installed. The capacity of the existing systems is decided by the capacity of the pressure filters, amounting to 432 cubic meters per day (m^3/day). This would correspond to a capacity of 864 m^3/day for the Baie Ste. Anne system and also for the Grand Anse system.

The present population and number of hotel beds, including those under renovation or extension, for areas covered by the two water supply systems are:

	Population	Hotel Beds
Baie Ste. Anne	2,510	572
Grand Anse	2,492	168
Total	5,002	740

The above total of 740 hotel beds does not include the possible addition of 184 beds from the hotel planned for Anse Kerlan, but does include the recently completed hotel at Anse Consolation. A final decision has not been made on construction of the Anse Kerlan hotel. The present water demand for domestic and hotel consumption in m^3/day is based on a per capita consumption of 140 liters per capita per day (lcd), and 100 lcd (expected to be achieved by the year 2020), and 450 lcd for hotels. The consumption in m^3/day corresponds to:

	Domestic	Hotel	Total
Baie Ste. Anne			
- at 140 lcd	351	257	608
- at 100 lcd	251	257	508
Grand Anse			
- at 140 lcd	349	76	425
- at 100 lcd	249	76	325

The combined dry weather safe yield for the Baie Ste. Anne and Grand Anse systems amounts to 536 m^3/day and 380 m^3/day respectively. After reduction of unaccounted-for water of 20 percent, the safe yield would correspond to 429 m^3/day and 304 m^3/day respectively. Thus the present safe yield falls below consumption for both systems, especially for Baie Ste. Anne where water scarcities in the dry season of March through August can have a significant impact on tourism. There is a clear justification for an increase in the availability of the dry weather flow.

With the project, the safe yield of the Baie Ste. Anne and Grand Anse systems will rise to 597 m^3/day and 400 m^3/day respectively. This compares to anticipated demand in 1994 of 520 and 331, and in the year 2000 of 580 and 400 m^3/day respectively. The works financed under the project would therefore just permit the expected demand in 2000 to be met.

The existing intake structures at Fond B'Offay and Nouvelle Découverte are both located at an elevation of 90 m above mean sea level. The new intakes will be located at 30 m above mean sea level at Fond B'Offay and 60 m above mean sea level at Nouvelle Découverte. The water will be pumped from these locations to an existing break pressure tank (Fond B'Offay) and a sedimentation tank (Nouvelle Découverte), and will then gravitate through the pressure filters. The capacity of the pressure filters will still be adequate after the increase in water production. The additional works to be required include: (a) supply and installation of 4 pumps; (b) construction of 2 pumphouses; (c) construction of 2 intakes including grit tanks and sumps; and (d) installation of 100 mm ductile iron pipes with a length of about 900 m. The pipes are available in stock.

Implementation of these works will avoid much more costly additions to capacity until at least the year 2000. The goal of the current national development plan is to make treated water available to at least 95 percent of the Seychelles population by 1995. Soon after the existing (Phase I) works were completed, plans for a Phase II were drawn up. The proposed Phase II consisted of a dam and reservoir to be constructed at Plaine Hollandaise, in the center of the island, which would yield at least 500 kiloliters of water per day. However, this project was expensive (US$5 million was the initial estimate) and even more important, would have seriously altered or destroyed the Plaine Hollandaise wetlands, one of the last remaining such areas on the island. The present Phase II scheme is proposed as an alternative much lower in cost, in order to better utilize existing capacity and postpone a decision on additional source development until it becomes absolutely necessary.

An option considered during preparation of the currently proposed Phase II scheme was to interconnect the Baie Ste. Anne and Grand Anse systems, thereby achieving an island-wide distribution system. Such an approach has been adopted in the Mahé Integrated Water Supply program, in an advanced stage of preparation. Interconnection would involve the installation of a 4-km long pipeline in the southwestern part of the island. This option will be further analyzed in the course of project implementation, to determine the related costs versus potential benefits and the possibility of this approach meeting additional requirements beyond the year 2000.

Road Rehabilitation

The main road system on Praslin has a length of about 40 km, of which 25 km are already paved, and the remainder are improved earth roads. The dispersal of the Praslin population leads to a demand for transport to reach places of employment and social amenities. SPTC operates scheduled bus services which are extensively used by the local population. SPTC also runs chartered services to take shift workers to hotels and to transport tourists. However, the poor road conditions have resulted in dissatisfaction, especially since all the main roads on Mahé are now hard surfaced. On Praslin vehicle operating costs are high, buses break down more frequently, and the population is displeased with bumpy and dusty rides. There is, therefore, strong pressure to have the remaining main roads on the island improved.

The motor vehicle fleet on Praslin numbers about 300. Some 125 of these vehicles are directly involved in carrying tourists, as hire vehicles, minibuses, and taxis for tourist transport. At least another 25 vehicles appear to be exclusively involved in transport directly related to the tourism industry, such as hotel vehicles carrying supplies and buses carrying hotel personnel. This figure could actually be much higher in view of the dominant position of tourism in Praslin's economy.

Based on the growth of the number of hotel rooms and accounting for a lower than average occupancy rate for the new rooms during the first two years, it has been estimated that the number of bed-nights will grow by 10 percent per year during the period 1990-96. Hotel service traffic may grow somewhat more slowly than the actual tourist transport. The overall vehicle fleet in Seychelles increased between 1985 and 1990 by some 9 percent per year. On Praslin the tourist transport traffic is expected to increase at 9 percent per year from 1990 to 1996, and is assumed to grow at only 3 percent per year afterward. Other traffic on Praslin is assumed to grow at 3 percent per annum throughout the entire planning period. In combining these estimates, a rate of 4 percent per year has been used for the growth of traffic as a whole on Praslin roads, except for the western section (Anse Kerlan) where an 8 percent rate was forecast.

An economic and envrionmental analysis of the Praslin road rehabilitation program, which at that time consisted of four road segments, was conducted in early 1992. The analysis concluded that the proposed works involved modest negative environmental impacts that could be mitigated by low-cost measures such as widening only to the minimum acceptable width and avoiding where possible the removal of vegetation and rocks. These measures have been adopted in the proposed design. However, one road segment of the four, that of paving the 2.9-km Pasquière track crossing the island at a narrow point, was found to pose a danger to the environmentally sensitive Plaine Hollandaise wetlands area. Following extensive discussion with LTD and consultation with the local population, it was decided to drop this road segment from the program.

Detailed engineering for the three remaining roads in the program was completed by mid-1992. Among the most important concepts guiding the design was the need to keep to the existing alignment with only some minor geometric changes. These will involve small amounts of earthwork. Removal of trees and rock blasting will also be kept to a minimum. Maintaining the existing alignment has contributed to lower costruction costs, since the majority of the road components such as edgewalls and culvert bridges are already in existence. The road

width between existing road edgewalls will be maintained. Along sections where new edgewalls will be constructed, the new road width will be a minimum of 4.5 m and a maximum of 6 m, depending on the cost of widening and the environmental consequences. The road surface will be of asphalt premix of at least 40 mm thickness for Anse Consolation and Anse Boudin and at least 30 mm thickness for Anse Kerlan.

Technical characteristics of proposed works are summarized below:

Anse Boudin road

Length:	4.6 km
Objective:	All-weather motorable surface
Description of Works:	Widening and realignment of several sections to motorable standard. Provide adequate road side drains, repair existing bridges, culverts, road edgewalls, and seawalls. The existing concrete segment (0.1 km) will be provided with 15 mm asphalt overlay. New edgewall and bus lay-bys will be constructed where required. Surface treatment of 40 mm asphalt including all base preparation.

Anse Consolation road

Length:	5.8 km
Objective:	All-weather motorable surface
Description of Works:	Provision of drainage and road edgewalls, and repair of existing road edgewalls, seawalls and culverts. Limited realignment to conform to motorable standard. Existing segments of asphalt surface will be provided with 15 mm asphalt overlay. Passing bays and bus lay-bys will be constructed where required. Retaining wall will be provided to prevent the embankment from further erosion. Surface treatment of 40 mm asphalt premix including all base preparation along the earth surface sections.

Anse Kerlan road

Length:	2.9 km

Objective:	All-weather motorable surface
Description of Works:	Provision of adequate drainage along entire road to prevent flooding during rainy season. Construction of road edgewalls with some sections prevented from further erosion by rock armoring or groins. Bus lay-bys will be constructed and the hard shoulder landscaped. Surface treatment of at least 30 mm asphalt premix including all base preparation.

Airport Improvements

When officially opened in 1975, the Praslin airport had an unpaved airstrip and a small shed for passenger processing. Since that time, several measures to upgrade facilities have been undertaken, including construction of an asphalt runway opened in June 1988, construction of a technical building, provision of approach and airport terminal control services, and installation of runway lights. The Praslin airport presently has a passenger throughput of 146,700, with about 14,000 flights each year. Over 50 percent of passengers are tourists.

During peak periods totalling 6 1/2 hours per day, traffic runs at eight aircraft operations per hour. For this level of operations, the airport as a whole operates at maximum capacity. In particular, the apron has insufficient capacity for aircraft to park. The load bearing capacity of the runway cannot safely accommodate larger aircraft than those presently using the facility. The Directorate of Civil Aviation (DCA) turns down requests from general aviation aircraft in the 22,000 kg MTOW range to fly to Praslin, because of load restrictions and safety implications.

DCA has commissioned a master plan for the long-term development of the Seychelles International (Mahé) and Praslin airports. Measures expected to be examined include strengthening of the present runway to accommodate 30-35 passenger aircraft (22,000 MTOW), widening the present runway to 30 m, relocation of the terminal building, construction of a helipad, and improvement in the drainage system.

The justification for strengthening the runway is closely tied to the eventual acquisition by Air Seychelles of 30-35 passenger aircraft. However, the domestic airline has no plans to acquire such aircraft before 1994 at the earliest, since airstrips on the outer islands are not now able to accommodate them and the extra traffic to and from Praslin would not by itself make such an acquisition cost-effective. It was therefore decided to limit the works supported in the present project to a preliminary phase of airport development, consisting of an overlay on the runway and extension of the parking apron. Completion of this preliminary phase will provide the airport with the capacity to handle a greater number of operations with the present types of aircraft being used. It will also allow greater flexibility in scheduling as well as accommodation of military and general aviation aircraft, which often arrive on Praslin with little or no advance warning.

SEYCHELLES
ENVIRONMENT AND TRANSPORT PROJECT

RESOURCE MANAGEMENT PROGRAM

DETAILED COST ESTIMATES
(SR'000)

	Local Currency	Foreign Exchange	Total
A. Praslin Water Supply, Phase II			
1. Supply and installation of 4 pumps	-	163.0	163.0
2. Construction of 2 pumphouses	48.5	12.2	60.7
3. Construction of 2 intakes including grit tanks and pumps	72.7	18.3	91.0
4. Laying of 100 mm ductile iron pipes (900 m)	409.1	-	409.1
Sub-total	530.3	193.5	723.8
B. Water Resources Study and Management Plans for Outer Islands			
1. Diagnostic Mission (2 sp-months)	18.0	162.0	180.0
2. Senior Hydrologist (2 sp-years)	180.0	1,620.0	1,800.0
3. Inter-island transportation, accommodation, and travel allowance	758.0		758.0
4. Hydrological and Meteorological equipment	-	1,956.0	1,956.0
5. Data Processing Software	-	21.0	21.0
6. Training for Counterpart	-	82.0	82.0
Sub-total	956.0	3,841.0	4,797.0
C. Marine Resource Management Plans			
1. Marine Resources Specialist (2 sp-years)	180.0	1,620.0	1,800.0
2. Equipment and Software	-	302.0	302.0
3. Short-term expertise (5 sp-months)	45.0	405.0	450.0
4. Training and Educational Materials	176.0	176.0	352.0
5. 1 light vehicle for wildlife inventories	-	72.0	72.0
Sub-total	401.0	2,575.0	2,976.0
D. Organizational Study of Division of Environment			
Consulting Services (4.5 sp-months)	117.0	275.0	392.0
Sub-total	117.0	275.0	392.0
TOTAL	**2,004.3**	**6,884.5**	**8,888.8**

SEYCHELLES
ENVIRONMENT AND TRANSPORT PROJECT

RESOURCE MANAGEMENT PROGRAM

COST ESTIMATES BY YEAR
(SR'000)

	1993			1994			1995			1996			TOTAL		
	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total
A. Praslin Water Supply, Phase II	530.3	193.5	723.8										530.3	193.5	723.8
B. Water Resources Study and Management Plans for Outer Islands															
1. Diagnostic mission	18.0	162.0	180.0										18.0	162.0	180.0
2. Senior Hydrologist				90.0	810.0	900.0	90.0	810.0	900.0				180.0	1,620.0	1,800.0
3. Inter-island transportation, accommodation and travel allowance	152.0		152.0	303.0		303.0	303.0		303.0				758.0		758.0
4. Hydrological and meteorological equipment					1,956.0	1,956.0								1,956.0	1,956.0
5. Data processing software					21.0	21.0								21.0	21.0
6. Training for counterpart					82.0	82.0								82.0	82.0
SUB-TOTAL	170.0	162.0	332.0	393.0	2,869.0	3,262.0	393.0	810.0	1,203.0				956.0	3,841.0	4,797.0
C. Marine Resources Management Plans															
1. Marine Resource Specialist	90.0	810.0	900.0	90.0	810.0	900.0							180.0	1,620.0	1,800.0
2. Equipment and Software		151.0	151.0		151.0	151.0								302.0	302.0
3. Short-term expertise				9.0	81.0	90.0	27.0	243.0	270.0	9.0	81.0	90.0	45.0	405.0	450.0
4. Training and Educational materials				135.0	135.0	270.0	41.0	41.0	82.0				176.0	176.0	352.0
5. 1 light vehicle		72.0	72.0											72.0	72.0
Sub-total	90.0	1,033.0	1,123.0	234.0	1,177.0	1,411.0	68.0	284.0	352.0	9.0	81.0	90.0	401.0	2,575.0	2,976.0
D. Organisational Study of Division of Environment	117.0	275.0	392.0										117.0	275.0	392.0
TOTAL	907.3	1,663.5	2,570.8	627.0	4,046.0	4,673.0	461.0	1,094.0	1,555.0	9.0	81.0	90.0	2,004.3	6,884.5	8,888.8

Seychelles: GEF Program

Biodiversity Conservation

Restoration and Preservation of Aldabra Ecosystem

Detailed Cost Estimates

	Local	Foreign	Total	% Total
	---------- (SR 000) ----------			
A. REHABILITATION OF RESEARCH STATION				
1. Renovation and repair of buildings & facilities	208	323	531	
2. Laboratory & other equipment a/		355	355	
Subtotal	208	678	886	0.30
B. STRENGTHENING OF MANAGERIAL AND SCIENTIFIC PERSONNEL				
1. Salaries	74	697	771	
2. International travel		151	151	
3. 1 Light vehicle (Mahe)		75	75	
Subtotal	74	923	997	0.34
C. CONTROL OF GOATS				
1. Salaries and Stipends		519	519	
2. Equipment b/		113	113	
3. Domestic and international travel	88	100	188	
Subtotal	88	732	820	0.28
D. PREPARATION OF LONG TERM MANAGEMENT PLAN				
1. Short-term specialists (3 sp-months)	27	243	270	
Subtotal	27	243	270	0.09
Total Cost	397	2,576	2,973	1.00

a/ fiberglass dory, outboard engines, laboratory equipment, beds and mattresses, camping equipment

b/ radiocollars, headsets, shoes, flashlights and batteries

Seychelles: GEF Program

Biodiversity Conservation

Restoration and Preservation of Aldabra Ecosystem

Cost Estimates by Year

	1993			1994			1995		
	Local	Forgn	Total	Local	Forgn	Total	Local	Forgn	Total
	(SR 000)								
A. REHABILITATION OF RESEARCH STATION									
1. Renovation and repair of buildings & facilities	208	323	531						
2. Laboratory & other equipment		215	215		140	140			
Subtotal	208	538	746		140	140			
B. STRENGTHENING OF MANAGERIAL AND SCIENTIFIC PERSONNEL									
1. Salaries	19	173	192	36	351	387	19	173	192
2. International travel		32	32		76	76		43	43
3. 1 Light vehicle		75	75						
Subtotal	19	280	299	36	427	463	19	216	235
C. CONTROL OF GOATS									
1. Salaries and Stipends		310	310					209	209
2. Equipment		113	113						
3. Domestic and international travel	70	91	161	12	15	27			
Subtotal	70	514	584	12	15	27		209	209
D. PREPARATION OF LONG TERM MANAGEMENT PLAN									
1. Short-term Specialists (3 sp-months)				18	162	180	14	76	90
Subtotal				18	162	180	14	76	90
Total Cost	**297**	**1,332**	**1,629**	**66**	**744**	**810**	**33**	**501**	**534**

Seychelles: GEF Program

Biodiversity Conservation

Turtle Protection Program

Detailed Cost Estimates

	Local	Foreign	Total	% Total
	(SR 000)			
A. GREEN TURTLE MANAGEMENT PROGRAM				
1. Consulting Services for Stock Assessment and Management Plan		1306	1306	
2. Accommodation for Consultant	124		124	
3. Domestic Travel	208		208	
Subtotal	332	1306	1,638	0.31
B. HAWKSBILL TURTLE MANAGEMENT PROGRAM				
1. Turtle Ranching Study (3 sp-months expertise)	27	243	270	
2. Turtle Trade Compensation Study (3 sp-months expertise)	27	243	270	
3. Re-training of artisans	243	168	411	
4. Materials for re-training		324	324	
5. Revenue Compensation Package	2400		2400	
Subtotal	2697	978	3,675	0.69
Total Cost	**3,029**	**2,284**	**5,313**	**1.00**

Seychelles: GEF Program

Biodiversity Conservation

Turtle Protection Program

Cost Estimates by Year

	1993			1994			1995		
	Local	Forgn	Total	Local	Forgn	Total	Local	Forgn	Total
				(SR 000)					
A. GREEN TURTLE MANAGEMENT PROGRAM									
1. Consulting Services for Stock Assessment and Management Plan		653	653		653	653			
2. Accommodation for Consultant	62		62	62		62			
3. Domestic Travel	104		104	104		104			
Subtotal	166	653	819	166	653	819			
B. HAWKSBILL TURTLE MANAGEMENT PROGRAM									
1. Turtle Ranching Study	27	243	270						
2. Turtle Trade Compensation Study	14	121	135	14	121	135			
3. Training of Artisans	81	56	137	81	56	137	81	56	137
4. Materials for re-training		108	108		108	108		108	108
5. Revenue Compensation Package	900		900	800		800	700		700
Subtotal	1022	528	1,550	895	285	1,180	781	164	945
Total Cost	**1,188**	**1,181**	**2,369**	**1,061**	**938**	**1,999**	**781**	**164**	**945**

Seychelles: GEF Program

Abatement of Marine Pollution

Waste Reception Facilities (MARPOL) Study

Detailed Cost Estimates

	Local	Foreign	Total	% Total
		(SR 000)		
A. PHASE 1A				
Consulting Services (5.5 sp-months)	50	445	495	
Subtotal	50	445	495	0.65
B. PHASE 1B				
Consulting Services (3 sp-months)	27	243	270	
Subtotal	27	243	270	0.35
Total Cost	**77**	**688**	**765**	**1.00**

Seychelles: GEF Program

Abatement of Marine Pollution

Waste Reception Facilities (MARPOL) Study

Cost Estimates by Year

	1993			1994			1995		
	Local	Forgn	Total	Local	Forgn	Total	Local	Forgn	Total
	(SR 000)								
A. PHASE 1A									
Consulting Services (5.5 sp-months)	50	445	495						
Subtotal	50	445	495						
B. PHASE 1B									
Consulting Services (3 sp-months)	27	243	270						
Subtotal	27	243	270						
Total Cost	**77**	**688**	**765**						

SEYCHELLES
ENVIRONMENT AND TRANSPORT PROJECT

PRASLIN ROAD IMPROVEMENT PROGRAM

DETAILED COST ESTIMATES
(SR'000)

	COMPONENT	Local Currency	Foreign Exchange	Total	% of Total
A.	**Anse Consolation**				
1.	Road Widening and Excavation	0.9	0.3	1.2	1
2.	Edgewalls and Retaining Walls	471.6	491.6	963.2	24
3.	Seawalls	31.9	15.2	47.1	1
4.	Drains and Culverts	89.3	191.0	280.3	7
5.	Bus Lay-bys	11.3	59.9	71.2	2
6.	Base Course	31.5	31.5	63.0	2
7.	Asphalt Surfacing and Overlay	508.4	1,869.2	2,377.6	62
8.	Site Development	32.2	5.7	37.9	1
	Sub-total	1,177.1	2,664.4	3,841.5	100
B.	**Anse Boudin**				
1.	Road Widening and Excavation	6.8	3.0	9.8	1
2.	Edgewalls and Retaining Walls	371.8	562.7	934.5	24
3.	Seawalls	24.7	11.8	36.5	1
4.	Drains and Culverts	147.6	320.3	467.9	13
5.	Bus Lay-bys	11.3	59.9	71.2	2
6.	Repair of Bridge	48.1	22.8	70.9	2
7.	Base Course	33.0	33.3	66.3	2
8.	Asphalt Surfacing	442.4	1,626.8	2,069.2	54
9.	Site Development	6.4	1.2	7.6	1
	Sub-total	1,092.1	2,641.8	3,733.9	100
C.	**Anse Kerlan**				
1.	Road Widening and Excavation	10.3	4.5	14.8	1
2.	Edgewalls and Retaining Walls	148.3	224.4	372.7	19
3.	Drains and Culverts	80.6	172.8	253.4	13
4.	Bus Lay-bys	19.4	102.7	122.1	6
5.	Base Course	20.0	20.2	40.2	2
6.	Asphalt Surfacing	236.3	868.7	1,105.0	57
7.	Site Development	29.2	5.2	34.4	2
	Sub-total	544.1	1,398.5	1,942.6	100
D.	**Equipment and Training**				
1.	Materials Testing Equipment	13.0	112.0	125.0	
2.	Training of Technicians	112.0	176.0	288.0	
3.	Work Attachment Overseas for site engineer (1 sp-month)		45.0	45.0	
	Sub-total	125.0	333.0	458.0	
	TOTAL	2,938.3	7,037.7	9,976.0	

SEYCHELLES
ENVIRONMENT AND TRANSPORT PROJECT

PRASLIN ROAD IMPROVEMENT PROGRAM

COST ESTIMATES BY YEAR
(SR'000)

	1993			1994			1995			TOTAL		
	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total
A. Anse Consolation	1,177.1	2,664.4	3,841.5							1,177.1	2,664.4	3,841.5
B. Anse Boudin												
1. Civil Works (road widening, edgewalls, seawalls, drains culverts, bus lay-bys)	281.1	478.8	759.9	281.1	478.9	760.0				562.2	957.7	1,519.9
2. Base Course and Surfacing				475.4	1,660.1	2,135.5				475.4	1,660.1	2,135.5
3. Site Development and Repair of bridge				54.5	24.0	78.5				54.5	24.0	78.5
SUB-TOTAL	281.1	478.8	759.9	811.0	2,163.0	2,974.0				1,092.1	2,641.8	3,733.9
C. Anse Kerlan												
1. Civil Works (road widening, edgewalls, drains and culverts, bus lay-bys)				258.6	504.4	763.0				258.6	504.4	763.0
2. Base Course and Surfacing				192.2	666.7	858.9	64.1	222.2	286.3	256.3	888.9	1,145.2
3. Site Development							29.2	5.2	34.4	29.2	5.2	34.4
SUB-TOTAL				450.8	1,171.1	1,621.9	93.3	227.4	320.7	544.1	1,398.5	1,942.6
D. Equipment and Training	28.0	180.0	208.0	97.0	153.0	250.0				125.0	333.0	458.0
TOTAL	1,486.2	3,323.2	4,809.4	1,358.8	3,487.1	4,845.9	93.3	227.4	320.7	2,938.3	7,037.7	9,976.0

SEYCHELLES
ENVIRONMENT AND TRANSPORT PROJECT

PRASLIN AIRPORT IMPROVEMENTS

DETAILED COST ESTIMATES
(SR'000)

	Local Currency	Foreign Exchange	Total
A. Apron Extension			
40 mm thickness asphalt, 800 m2	29.1	154.1	183.2
B. Runway Strengthening			
15 mm thickness overlay of 1,190 m x 23 m	223.9	1,029.2	1,253.1
TOTAL	**253.0**	**1,183.3**	**1,436.3**

SEYCHELLES
ENVIRONMENT AND TRANSPORT PROJECT

PRASLIN AIRPORT IMPROVEMENTS

COST ESTIMATES BY YEAR
(SR'000)

	1993			1994			TOTAL		
	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total
A. Apron Extension	14.5	77.0	91.5	14.6	77.1	91.7	29.1	154.1	183.2
B. Runway Strengthening	111.9	514.6	626.5	112.0	514.6	626.6	223.9	1,029.2	1,253.1
TOTAL	126.4	591.6	718.0	126.6	591.7	718.3	253.0	1,183.3	1,436.3

SEYCHELLES
ENVIRONMENT AND TRANSPORT PROJECT

ROAD TRAFFIC SAFETY PROGRAM

DETAILED COST ESTIMATES
(SR'000)

	Local Currency	Foreign Exchange	Total
A. Road Traffic Safety Study	18.0	162.0	180.0
Sub-total	18.0	162.0	180.0
B. Action Plan			
1. Street Lighting	61.0	245.0	306.0
2. Road Marking and Reflectors	121.0	183.0	304.0
3. Crash Barriers	-	611.0	611.0
4. Road Signs	101.0	408.0	509.0
5. Construction of Footpaths	121.0	183.0	304.0
			0.0
Sub-total	404.0	1,630.0	2,034.0
TOTAL	**422.0**	**1,792.0**	**2,214.0**

SEYCHELLES
ENVIRONMENT AND TRANSPORT PROJECT

ROAD TRAFFIC SAFETY PROGRAM

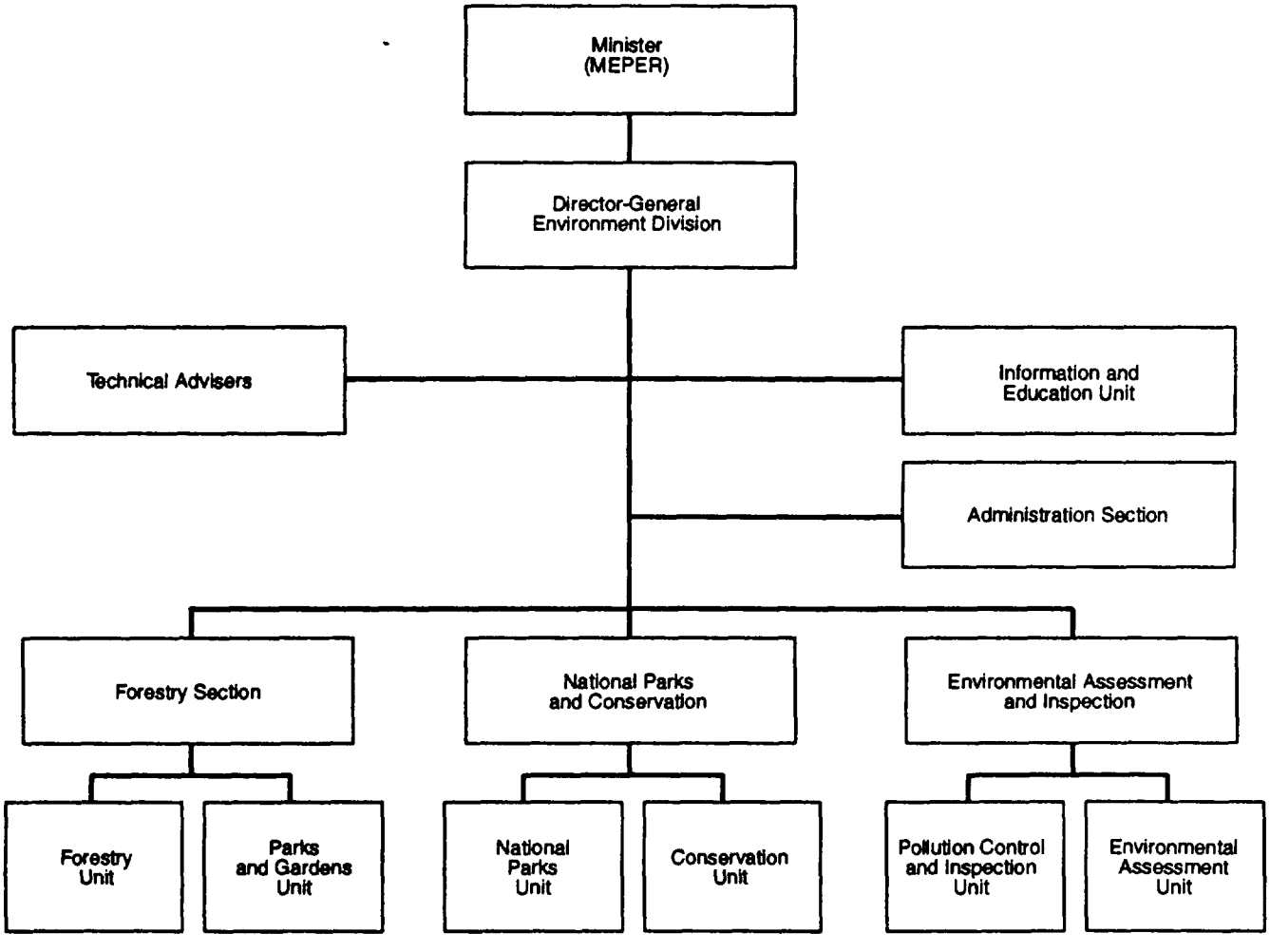
COST ESTIMATES BY YEAR
(SR'000)

	1993			1994			1995			1996			TOTAL		
	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total
A. Road Traffic Safety Study	18.0	162.0	180.0	-	-	-	-	-	-	-	--	-	18.0	162.0	180.0
B. Action Plan															
1. Street Lighting	12.2	49.0	61.2	18.3	73.5	91.8	18.3	73.5	91.8	12.2	49.0	61.2	61.0	245.0	306.0
2. Road Marking and Reflectors	24.2	36.6	60.8	36.3	54.9	91.2	36.3	54.9	91.2	24.2	36.6	60.8	121.0	183.0	304.0
3. Crash Barriers	-	305.5	305.5	-	305.5	305.5	-	-	-	-	-	-	-	611.0	611.0
4. Road Signs	20.2	81.6	101.8	40.4	163.2	203.6	20.2	81.6	101.8	20.2	81.6	101.8	101.0	408.0	509.0
5. Construction of Footpaths	48.4	73.2	-	48.4	73.2	-	24.2	36.6	60.8	-	-	-	121.0	183.0	304.0
SUB-TOTAL	105.0	545.9	650.9	143.4	670.3	813.7	99.0	246.6	345.6	56.6	167.2	223.8	404.0	1,630.0	2,034.0
TOTAL	123.0	707.9	830.9	143.4	670.3	813.7	99.0	246.6	345.6	56.6	167.2	223.8	422.0	1,792.0	2,214.0

SEYCHELLES
MINISTRY OF ENVIRONMENT, ECONOMIC PLANNING AND EXTERNAL RELATIONS (MEPER)

ENVIRONMENT DIVISION

Organizational Chart



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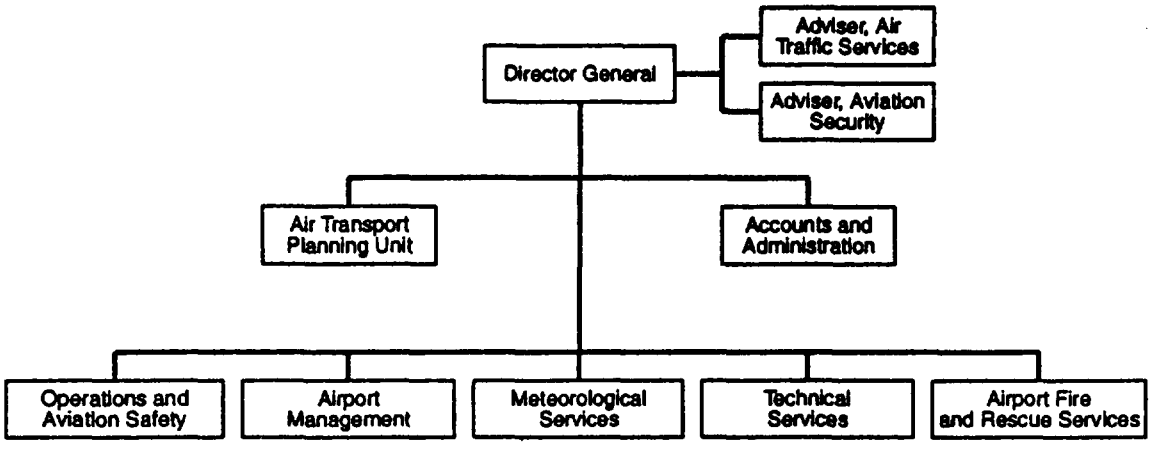
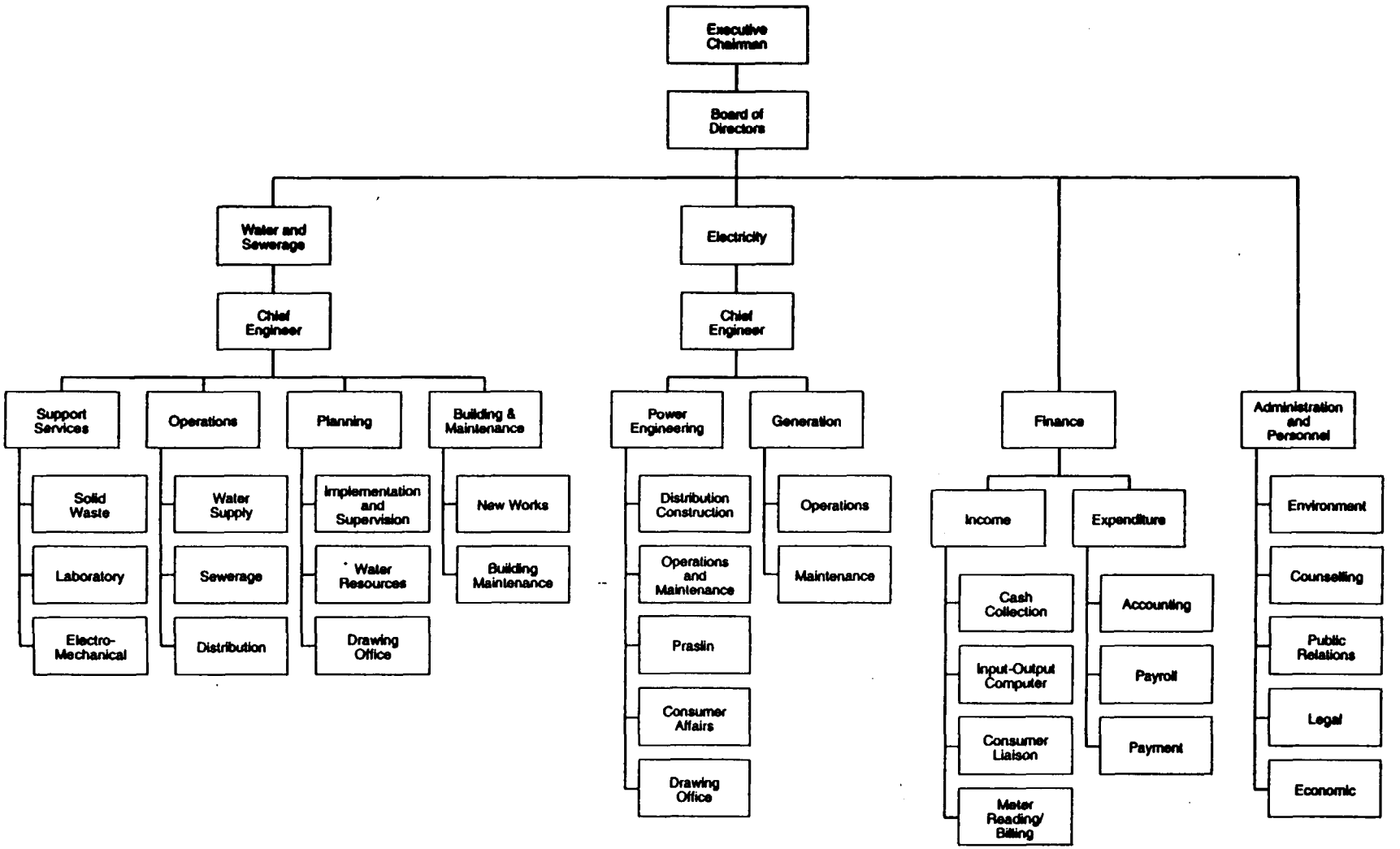
SEYCHELLES
DIRECTORATE OF CIVIL AVIATION
Organization Chart



SEYCHELLES
PUBLIC UTILITIES CORPORATION
Organizational Structure



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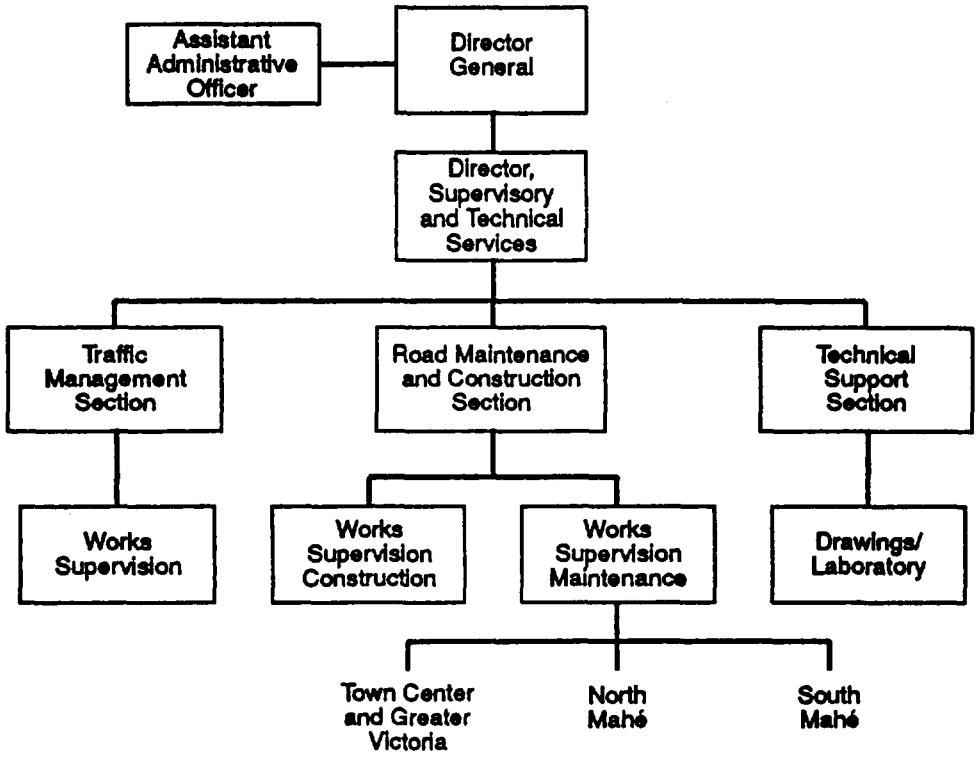
LAND TRANSPORT DIVISION
MINISTRY OF TOURISM AND TRANSPORT
Organization Chart



SEYCHELLES

ENVIRONMENT AND TRANSPORT PROJECT

ROAD SAFETY

The accident rate in Seychelles, at 19 deaths per 10,000 vehicles/year, compares with 14 deaths per 10,000 vehicles/year in Mauritius and 4-5 in most industrialized countries. The steep terrain, rainstorms, and congestion in built-up areas are partial explanations for the high accident rate. Another is the modest standards which the authorities have adopted for their road system: tight curves, small shoulders, and lack of sidewalks increase the risk of accidents. Over the past several years, however, it has become clear that negligent driving is the single most prevalent cause of accidents on Mahé and Praslin. Negligent driving now accounts for 92% of all accidents. More specifically, about 40% of all accidents are caused by drunk drivers.

The number of accidents, and consequently the cost in property damage, personal injury, and death has been increasing steadily (see Appendix 1 to this Annex). Insurance claims paid nearly tripled between 1988 and 1991, and 80% of all claims filed are for road accidents. In part because of the lack of physical separation between vehicles and pedestrians on many roads, about one-third of all injuries are to pedestrians.

A Road Traffic Safety Commission, chaired by the Director-General of LTD, was established in May 1992 to improve traffic flows at black spots, help with enforcement of traffic regulations, and promote driver awareness of safety concerns. The first phase of its program is a diagnostic and evaluation study, which will be supported by the project. Terms of Reference for this study are included in Appendix 2 to this Annex. The study would define an Action Plan to be carried out by LTD in collaboration with the Road Traffic Safety Commission.

The Action Plan would be implemented in the second phase of the road safety campaign. In this phase the project would support specific elements to implement the recommendations of the study. These elements include (a) street lighting along main roads on Mahé; (b) road marking; (c) installation of crash barriers to ward drivers of obstructions or built-up zones; (d) road signs; and (e) construction of a 3-km footpath along a steep section of the Cascade road, southwest of Victoria. Along this road, there is usually no separate pedestrian walkway, and the accident rate is second only to Victoria. A footpath at this location can therefore be expected to substantially reduce the accident rate involving pedestrians.

The campaign includes several other actions being taken in parallel with the first and second phases defined above. A public awareness campaign was launched in June 1992, and has featured a Road Safety Week held in October 1992. Assistance in the preparation of information and educational materials has been offered by the National Safety Council of Singapore. The UK Transport Research Laboratory (TRL, formerly TRRL) is helping the country to computerize records on accidents.

SEYCHELLES

ENVIRONMENT AND TRANSPORT PROJECT

Accidents by Vehicle and Year

Vehicle Type	1988	1989	1990	1991	Total
Private cars	818	933	1,047	1,069	3,867
Commercial vehicles	225	253	177	263	918
Self drive/hired cars	134	159	180	166	639
SPTC buses	114	153	155	161	583
Taxis	48	54	24	46	172
Government vehicles	94	76	79	82	331
Motorcycles	7	18	3	8	36
Bicycles	11	3	5	7	26
Trucks	-	5	7	6	18
Diplomatic registration	5	1	1	3	10
Mechanical plant	1	1	1	3	6
TOTAL	1,457	1,656	1,679	1,814	6,606

Source: LTD and Road Traffic Safety Commission

SEYCHELLES

MINISTRY OF TOURISM AND TRANSPORT

LAND TRANSPORT DIVISION

TERMS OF REFERENCE FOR ROAD TRAFFIC SAFETY STUDY

The consultant will conduct a road safety study to propose a 5-year traffic safety program for the Seychelles. The objectives of this study are to (a) carry out a diagnosis of the existing situation, (b) propose actions necessary to ensure the improvement of road traffic safety and (c) determine the cost effectiveness of the measures.

The study will focus on, but should not be limited to the following aspects:

(i) A diagnosis of the current situation based on official accident records, visits of the road network, traffic data and discussions with experienced drivers, transport officials, insurance officials, and traffic police.

(ii) An evaluation of the economic and social costs of road accidents.

(iii) Based on (i) and (ii) above, recommendations for the proposed course of action will be made with due consideration being given to the following:

  (a) revision of the regulatory framework regarding traffic safety and enforcement;

  (b) enforcement of traffic regulations including recommendations concerning an appropriate institutional set-up;

  (c) improvements to existing traffic safety monitoring system;

  (d) improvements and extension of media/educational campaigns on road safety;

  (e) appropriate improvements to the road infrastructure and/or vehicles to improve road safety, based on economic analysis.

The study will be carried out by a traffic engineer/road safety specialist in collaboration with a staff member of the Land Transport Division (LTD) of the Ministry of Tourism and Transport. Financing for the traffic engineer/road safety specialist for a total of 8 specialist weeks is provided through financing made available to the Government of Seychelles by the World Bank. The services of the LTD staff member plus local transportation and appropriate work facilities are provided by LTD.

Field work is expected to account for at least 6 of the 8 specialist weeks of the traffic engineer/road safety specialist. The draft final report should be sent to LTD for review no later than 4 weeks after completion of the field work.

AIR SEYCHELLES

FINANCIAL PERFORMANCE, 1989–91

	SR'000		
	1989	1990	1991 a/
Gross Revenue	139,957	220,440	239,053
Cost of Sales	187,199	191,761	194,744
Administrative Expenses	18,974	33,109	18,385
Operating Profit(Loss)	(66,216)	(4,430)	25,924
Government Subsidy	68,660	18,379	–
Net Interest Payable	2,002	2,774	4,061
Profit(Loss)	442	11,175	21,863

a/ Unaudited

Source: Air Seychelles

Annex 14

SEYCHELLES

ENVIRONMENT AND TRANSPORT PROJECT

SCHEDULE OF ESTIMATED DISBURSEMENTS
(US$ MILLION)

		Disbursements		Cumulative Disbursements		Undisbursed Balance	
IBRD Fiscal Year	Semester Ending	Amount	%	Amount	%	Amount	%
1993	December 1992	0.0	0	0.0	0	4.5	100
	June 1993	0.8	18	0.8	18	3.7	82
1994	December 1993	0.9	20	1.7	38	2.8	62
	June 1994	1.0	22	2.7	60	1.8	40
1995	December 1994	0.8	18	3.5	78	1.0	22
	June 1995	0.3	7	3.8	85	0.7	16
1996	December 1995	0.3	7	4.1	92	0.4	9
	June 1996	0.2	4	4.3	96	0.2	4
1997	December 1996	0.2	4	4.5	100	0.0	0

Closing Date: June 30, 1997

SEYCHELLES

ENVIRONMENT AND TRANSPORT PROJECT

Implementation Schedule and Supervision Plan

Implementation Schedule

The schedule given below provides details on the timing of steps to be taken in the execution of all project activities. All contracts for civil works, acquisition of equipment and materials, and consulting services will be awarded according to the procurement procedures described in paras. 3.15 - 3.17.

IMPLEMENTATION SCHEDULE

CY	1993	1994	1995	1996
Project Component				
A. Resource Management				
1. Praslin Water Supply, Phase II	BE-----	M		
2. Water Resources Management Plans	R--R---	E-----M	--E----	
3. Marine Resources Management Plans	R---E--	------M	---------	--
4. Organizational Study Division Environment	R---	M		
B. Biodiversity Conservation and Marine Pollution Abatement				
1. Aldabra Ecosystem	BR---E-	------M	---------	--
2. Protection of Sea Turtles	R--R---	R-----M	---------	---
3. Waste Reception Facilities Study	R---	M		
C. Transport				
1. Praslin Road Improvements	B-E----	R-----M	-----	
2. Praslin Airport Improvements	B----	M		
3. Road Traffic Safety	B---E--	--E---M	------E	---------

Abbreviations

B: Bid or design preparation, evaluation, and contract award
E: Acquisition of equipment
M: Mid-term Review
R: Recruitment of consultants, advisers, and specialists

Supervision Objectives and Organization

Supervision of the Environment and Transport project, and of the GEF program on Biodiversity Conservation and Abatement of Marine Pollution, will be a joint effort of the Bank and the Government of Seychelles. Both major participants in supervision would solicit, as required, the assistance of implementing ministries and agencies, NGOs, the private sector, and external donors. Supervision of specific project actions will focus on review of progress, procurement actions, progress reporting, financial record-keeping, and the like. In turn, this supervision will influence and be influenced by more general assessments of progress of the Environmental Management Plan of Seychelles (EMPS). Supervision of the project, GEF program, and EMPS will take place under the general guidance of MEPER.

The Bank expects to be requested by the Government of the Netherlands to administer a Trust Fund of up to US$500,000 for biodiversity conservation, coastal zone management, and institutional support. Supervision would therefore include the actions supported by this Trust Fund.

Supervision Plan

The schedule of supervision activities, with resource requirements and estimated Bank staff inputs, is given below.

Dates	Emphasis Activity	Expected Skill Requirements	Bank input (staff-weeks)
2/93	Completion Org. Study of DOE	Spec. Environmental Management	1
2/93	Completion Road Safety Action Plan Water master plans	Road safety spec. (cons.) Highway engineer	1
3/93	Supervision Mission and project launch	Economist/financial analyst Biodiversity spec. Sanitary engineer Highway engineer National Coordinator	5
4/93	Launch Praslin Roads program	Civil engineer(Mgr.) National Coordinator	1

6/93	Aldabra Program	Exec. Dir. SIF National Coordinator Ecologist	2
9/93	Completion of MARPOL study Praslin WS Water resources and Marine plans Supervision Mission	Biodiversity spec. Port engineer Economist/financial analyst Sanitary engineer Marine biologist	7
11/93	Turtle ranching study evaluation Airport improvements Road safety data collection	Biodiversity spec. Economist/engineer National Coordinator Turtle spec. consultant	3
12/93	Accounts and financial reporting	Project accountant National Coordinator	1
3/94	Praslin roads evaluation Water and Marine plans Artisan training Supervision Mission	Highway engineer Construction industry specialist Training spec. Marine biologist	5
4/94	Green turtle stock assessment	Biodiversity spec.	1
7/94	Aldabra program	Exec. Dir. SIF National Coordinator Biodiversity spec. Financial analyst/ economist	3
9/94	Road safety review Praslin airport improvements and master plan Supervision Mission	Aviation spec. Biodiversity spec. Road safety cons.	5

11/94	Mid-Term Project Review	National Coordinator Economist/financial analyst Port engineer Biodiversity spec.	8
2/95	Water resources data maintenance	Water engineer/spec.	2
3/95	Water resources Marine resources Supervision mission	Economist/financial analyst Water engineer Marine biologist National Coordinator	6
5/95	Implementation of turtle management plans	Biodiversity spec. National Coordinator	4
9/95	GEF follow-up EMPS mid-course review preparation Supervision mission	Biodiversity spec. National Coordinator Financial analyst/ Economist	6
1/96	EMPS mid-course review	National Coordinator cons. specialists from at least 5 EMPS program categories	8
3/96	Supervision mission	Biodiversity spec. Economist/financial analyst Marine biologist Water resources spec.	5
9/96	Supervision mission	Marine biologist Ecologist Road safety spec.	5 == 79

SEYCHELLES

ENVIRONMENT AND TRANSPORT PROJECT

Progress Reporting and Key Indicators

Progress Reporting

Reports on progress of actions supported by the Bank loan and the GEF program will be prepared quarterly under the direction of the National Coordinator's office, MEPER. While providing details on implementation, the reports will focus especially on (i) the extent to which actions carried out have had the desired impact on development objectives of the operations; (ii) problems of management and organization that implementation has brought into sharper focus within each implementing agency; and (iii) participation of the intended beneficiaries in benefits derived from the operations.

The format for quarterly reports (will be) discussed during negotiations. The draft format is given below.

Seychelles: Environment and Transport Project

Format for Quarterly Reports

I. Situation at end of previous reporting period

(including summary of develomental objectives and main features of operation)

II. EMPS Implementation Issues

III. Review of Progress by Program and Sub-Program

A. Resource Management Program

1. Praslin Water Supply, Phase II
2. Water Resource and Water Management Plans for Outer Islands
3. Marine Resources Management Plans
4. Organizational Study of Division of Environment

B. Biodiversity Protection and Marine Pollution Abatement Program

1. Aldabra Restoration and Preservation
2. Protection of Sea Turtles
3. Waste Reception Facilities Study

C. Transport Program

1. Praslin Road Rehabilitation Program
2. Praslin Airport Improvements
3. Road Traffic Safety Program

IV. Impacts and Consequences of Project Activities

A. Environmental Preservation

B. Training and Capacity Building

C. The Local Economy

D. Living Standards and Welfare

ANNEXES

Annex 1: Six-month Future Work Program

Annex 2: Procurement Summary

Annex 3: Progress of Disbursements

Annex 4: Key Indicators

Key Indicators

As shown above, progress toward project objectives as measured by key performance indicators is an integral part of progress reporting and one for which the implementing agencies and MEPER will be accountable.

Performance indicators will be represented both as benchmarks and as interim measures of progress. Each quarterly report will compare actual progress achieved with two

benchmark indicators: the ultimate objectives initially set, and the extent to which these objectives should have been met in the month and year in question.

It is recognized that for activities expected to significantly improve the current data base, such as the water resources and marine resources studies and the turtle stock assessments, not all indicators will have been defined at the start but will emerge during the course of implementation.

Below, grouped by category, are the proposed core indicators to be maintained throughout the implementation period, and to be supplemented by others identified later. It is expected that quantitative information for Section C will not be substantial at the beginning, but would be supplied largely through special evaluations such as the Mid-Term Review.

A. Framework for Implementation

1. Financial covenants
2. Undertakings of Government and of implementing agencies
3. Legislation
4. Budget requests and allocations

B. Program and Sub-Program Indicators

1. Praslin Water Supply, Phase II

- % competion
- dry weather flows (service reliability)
- cost reductions PUC

2. Water Resources Management Plans

- % completion of hydrological, meteorological, and geotechnical surveys
- establishment of benchmarks and monitoring of water quality
- preparation of management plans

3. Marine Resources Management Plans establishment of benchmarks and monitoring of catches:

- tuna
- lobster
- artisanal reef fisheries

4. Organizational Study of Div. Environment

   % completion/stage reached

5. Aldabra
   - procurement progress and % completion, research facility
   - % completion goat eradication program
   - recruitment scientific and managerial staff
   - % completion long term management plan

6. Biodiversity Conservation
   - % completion turtle ranching study
   - % completion turtle trade compensation study
   - No. artisans reinstalled
   - training completed
   - % completion stock assessment

7. Marine Pollution
   - % completion waste reception facilities study

8. Praslin Roads
   - procurement progress and % completion
   - maintenance expenditures per km
   - training completed

9. Praslin Airport
   - procurement progress and % completion
   - flight frequency

10. Road Safety
    - accident rate Mahé and Praslin
    - police accident reporting system: introduction and functioning of MAAP system

C. Indicators of Impact

1. Number and type of persons benefiting

2. Biodiversity trends (numbers of individuals)

3. Praslin development (No. of bed-nights, vehicle fleet, air passenger arrivals)

SEYCHELLES
ENVIRONMENT AND TRANSPORT PROJECT
PRASLIN ROAD IMPROVEMENT PROGRAM

Economic Analysis
(SR'000)

Year	ANSE BOUDIN ROAD			ANSE CONSOLATION ROAD			ANSE KERLAN ROAD		
	Cost	Benefits	Net	Cost	Benefits	Net	Cost	Benefits	Net
1992									
1993	1867		-1867	1921		-1921	971		-971
1994	1867	801	-1066	1921	495	-1426	971	192	-779
1995		833	833		515	515		207	207
1996		866	866		535	535		223	223
1997		901	901		557	557		242	242
1998		937	937		579	579		261	261
1999		975	975		602	602		282	282
2000		1014	1014		626	626		293	293
2001		1054	1054		651	651		305	305
2002		1096	1096		677	677		317	317
2003		1140	1140		705	705		330	330
2004		1186	1186		733	733		343	343
2005		1233	1233		762	762		357	357
2006		1282	1282		793	793		371	371
2007		1334	1334		824	824		386	386
2008		1387	1387		857	857		401	401
2009		1443	1443		891	891		417	417
Economic Return		27.0%			15.1%			12.7%	

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PUC PRASLIN/LA DIGUE WATER DIVISION

Actual and Projected Income Statements for the year ended March 31
(current SR '000)

	Actual	Projected				
	1992	1993	1994	1995	1996	1997
Income						
Water Sales	2,378	2,497	2,613	2,715	2,761	2,790
	2,378	2,497	2,613	2,715	2,761	2,790
Expenses						
Personnel Emoluments	1,012	1,042	886	729	729	729
Admin. Expenses	100	103	108	112	118	125
Trans & Equipment	755	777	700	540	540	540
Other Operating exp.	470	484	460	435	452	470
Interest expense	-	-	60	60	60	60
Depreciation expenses	-	131	521	509	498	487
	2,337	2,537	2,778	2,614	2,603	2,594
Net Income	41	(40)	(122)	330	364	379
Working Ratio	98%	96%	85%	70%	70%	70%
Return on Net Fixed Assets				2.0%	2.2%	2.3%

Assumptions

- Demand assumed at 900 m^3/day for 1994, 935 m^3/day for 1995, 950 m^3/day for 1996 and 960 m^3/day in 1997
- Straight line depreciation at 2.5% per annum.
- Praslin/La Digue water assets are valued at SR 21 million
- Local inflation is estimated at 3% for 1993 and 4% thereafter
- 8% interest per annum on loan of SR 0.75 million

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ENVIRONMENT AND TRANSPORT PROJECT

Road Sector Revenue and Expenditure
(SR million)

	1990	1991 Actual	1992	1993	1994 Projected	1995
Revenue						
Vehicles and driving licences 1/	4.3	4.6	4.6	4.8	5.1	5.5
Recurrent Expenditures						
Road Maintenance	2.9	4.9	3.9	4.9	4.9	4.9
LTD Administration	4.3	4.4	4.4	4.5	4.7	4.9
	7.2	9.3	8.3	9.4	9.6	9.8
Budget Allocations	7.2	9.3	8.3	9.4	9.6	9.8

Source : Seychelles Government, Treasury Department, July 1992

1/ Not including fuel taxes or customs duties. Estimated annual increase of 6%.

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ENVIRONMENT AND TRANSPORT PROJECT

Praslin Aerodrome
Revenue and Expenditures

	Actual	Projected		
	1992	1993	1994	1995
	SR 000			
Revenues:				
Landing & other fees 1/	500	1,049	1,103	1,161
	500	1,049	1,103	1,161
Expenditures:2/				
Salaries & Allowances	698	719	748	778
Maintenance	108	111	115	120
Other expenses	171	176	183	190
	977	1,006	1,046	1,088
Surplus (Deficit)	(477)	43	57	73

1/ Based on 8% increase in passenger traffic, and increase in landing fees from SR 15 to SR 30 per 1,000 kg of permissible weight of aircraft. Base year FY92 - 150,000 passengers. 1992 revenues includes miscellaneous income of 160,000 for non-passenger traffic demand per year constant through 1995

2/ Reflect price contingencies of 3% in 1993 and 4% thereafter.

SELECTED DOCUMENTS AND DATA AVAILABLE IN THE PROJECT FILE

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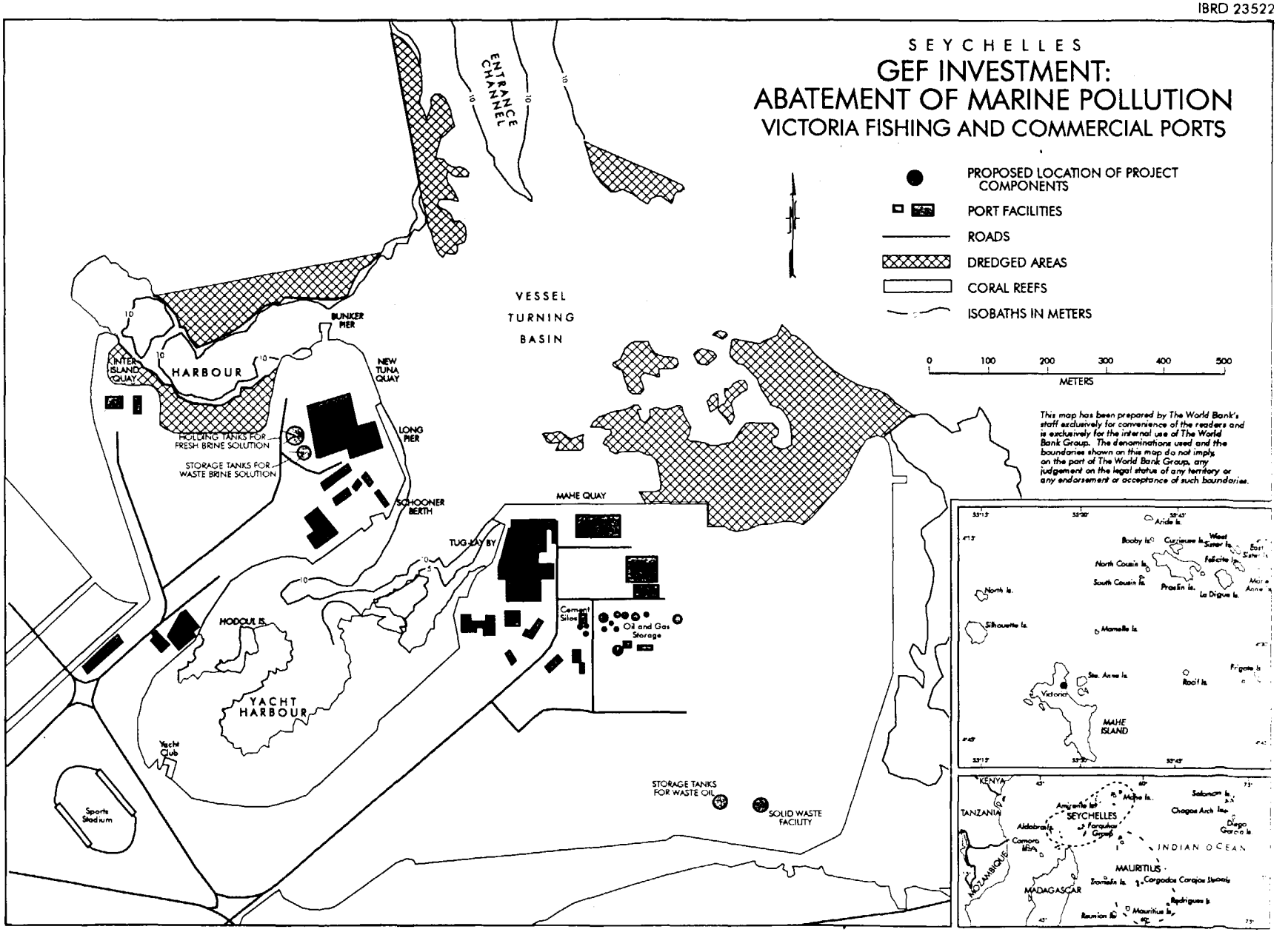

FEBRUARY 1992

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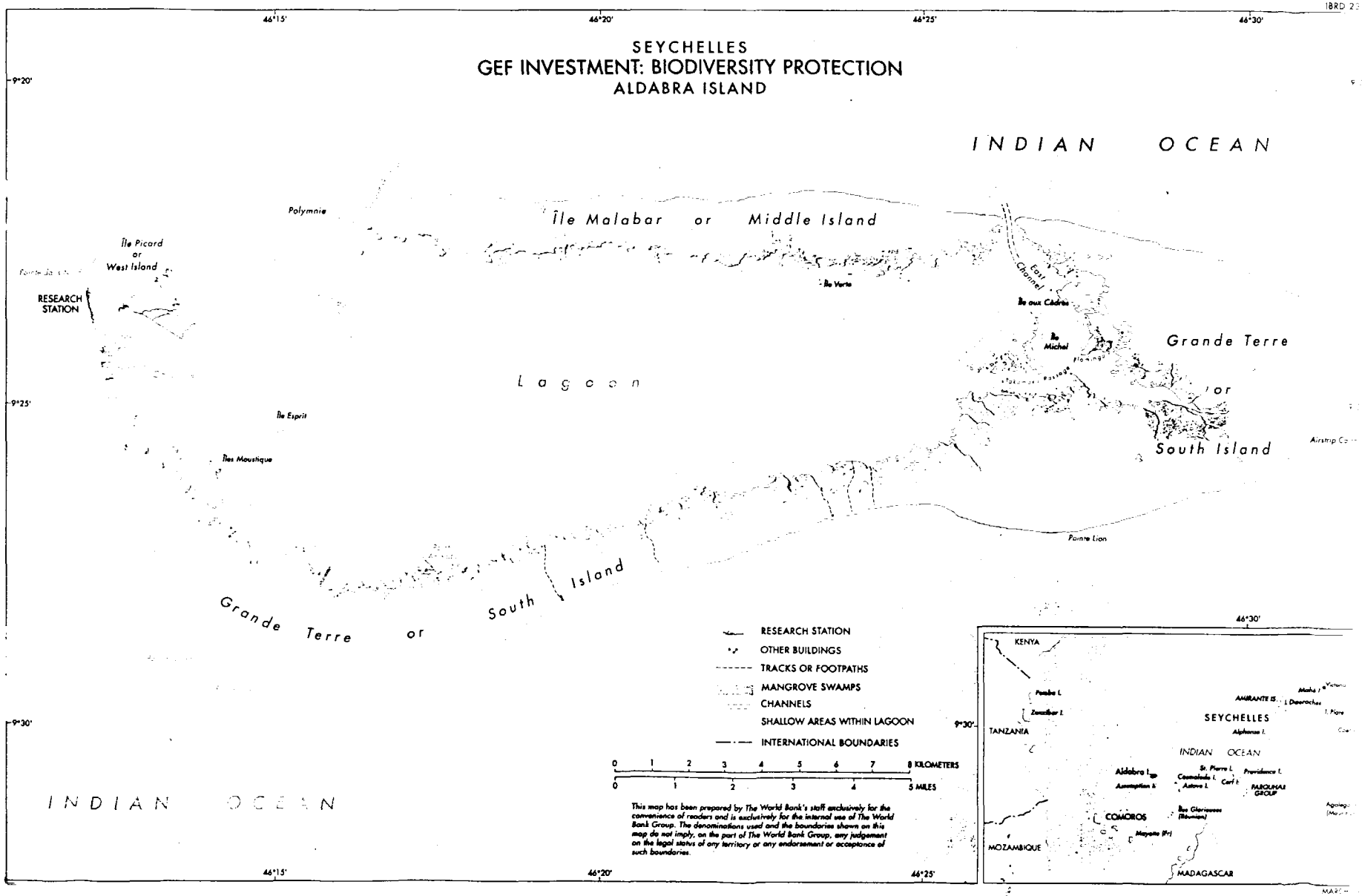
SEYCHELLES
GEF INVESTMENT: BIODIVERSITY PROTECTION
ALDABRA ISLAND



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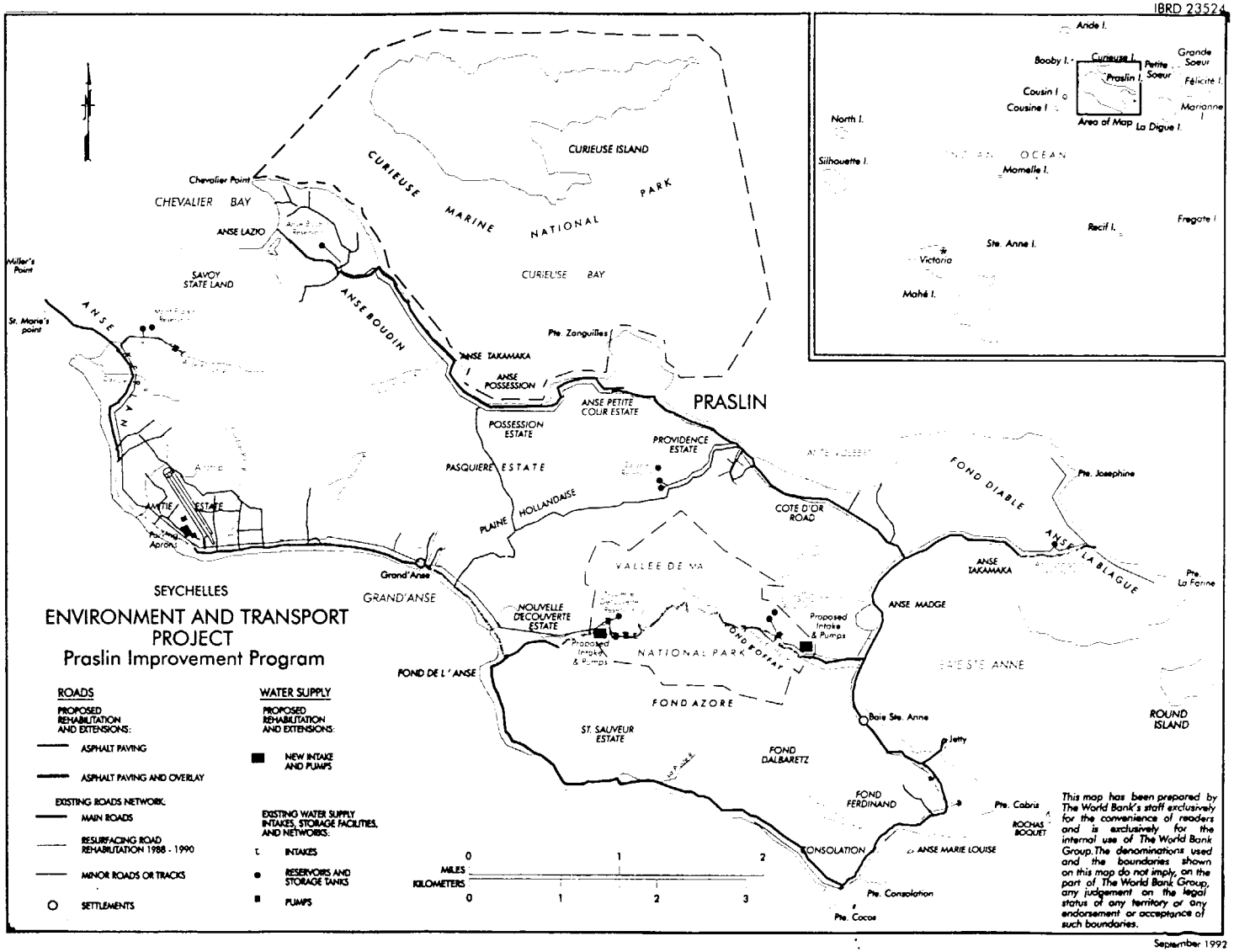

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