

# GLOBAL ENVIRONMENT FACILITY

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11129-SEY

SEYCHELLES

BIODIVERSITY CONSERVATION AND  
MARINE POLLUTION ABATEMENT PROJECT

December 1992

PROJECT DOCUMENT



## CURRENCY EQUIVALENTS

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

## WEIGHTS AND MEASURES

<u>Metric</u>	<u>US/UK</u>
1 ha	2.47 acres
1 km	0.62 miles
1 km <sup>2</sup>	0.386 square mile
1 kg	2.2 pounds
1 metric ton	2,205 pounds

## ABBREVIATIONS AND ACRONYMS

CFTC	Commonwealth Fund for Technical Cooperation (UK)
CITES	Convention on International Trade in Endangered Species
CODEVAR	Compagnie pour le développement de l'Artisanat, Limited
DOE	Department of Environment
DOI	Department of Industry
EC	European Community
EMPS	Environmental Management Plan of Seychelles
FAC	Fonds d'aide et de coopération (France)
GEF	Global Environment Facility
GET	Global Environment Trust Fund
ICBP	International Council for Bird Preservation
IDC	Islands Development Company
IMO	International Maritime Organization
IUCN	International Union for the Conservation of Nature
MARPOL	International Convention for the Prevention of Marine Pollution from Ships
MEPER	Ministry of Environment, Economic Planning, and External Relations
MTT	Ministry of Transport and Tourism
ORSTOM	Organisation des recherches scientifiques et techniques d'Outre-mer (France)
PMSD	Ports and Marine Services Division, Ministry of Tourism and Transport
RSNC	Royal Society for Nature Conservation
SFA	Seychelles Fishing Authority
SIF	Seychelles Island Foundation
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  
BIODIVERSITY CONSERVATION AND  
MARINE POLLUTION ABATEMENT PROJECT**

**GRANT AND PROJECT SUMMARY**

**Recipient:** Government of Seychelles

**Beneficiaries:** Ministry of Environment, Economic Planning, and External Relations (MEPER); Seychelles Island Foundation (SIF); Ports and Marine Services Division (PMSD); Seychelles Fishing Authority (SFA)

**Amount:** SDR 1.3 million (US\$1.8 million equivalent)

**Terms:** Grant from Global Environment Trust Fund

**Financing Plan:**

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	<u>Local</u>	<u>Foreign</u>	<u>Total</u>
<u>Source</u>	(US\$ million)		
Global Environment Trust Fund (GET) Grant	0.6	1.2	1.8
Government	0.2	0.0	0.2
<b>TOTAL</b>	<b>0.8</b>	<b>1.2</b>	<b>2.0</b>

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**Economic Rate of Return:** Not applicable.

**Staff Appraisal Report:** No. 11259-SEY

**Maps:** IBRD 23521  
IBRD 23522



**MEMORANDUM AND RECOMMENDATION OF THE DIRECTOR  
SOUTH-CENTRAL AND INDIAN OCEAN DEPARTMENT  
TO THE REGIONAL VICE PRESIDENT**

**Background**

1. Seychelles, a group of 115 islands situated in the western Indian Ocean between 4 degrees and 11 degrees south of the equator, contains the world's only oceanic archipelago made up of continental granite. These granitic islands (about 40) are typically mountainous with steep, forested slopes and narrow coastal strips of sand or mangrove. The other, more outlying islands are coral, consisting mostly of sand cays built upon coral reefs. The islands, with a total land area of 455 km<sup>2</sup>, are scattered in a territorial sea covering 1,374,000 km<sup>2</sup> and separated by as much as 1,200 km. For the most part the islands are situated outside the area affected by cyclones. However, some important climatic differences do exist due to the distance between islands and differences in altitude between the granitic and coralline islands.

2. Having evolved in isolation for millions of years, Seychelles possesses unique flora and fauna. There are about 770 species of flowering plants on the central, granitic islands and another 400 species on the outer, coralline islands. Of these, at least 75 species of flowering plants, 15 of birds, 3 of mammals, 30 of reptiles and amphibians and several hundred species of snails, insects, spiders and other invertebrates are endemic (found nowhere else). At least 51 genera of corals have been recorded from the central islands, and 47 from the coral island of Aldabra alone. The marine habitat supports an even richer fauna than the land. There exist at least 900 species of marine fish, of which at least one-third are associated with coral communities. Ecological features of islands combined with isolation result in certain endemic species being confined not just to the Seychelles, but to a single island. The black paradise flycatcher on La Digue, the black parrot on Praslin, the brush warbler on Cousin, and a flightless rail on Aldabra are all examples of highly localized endemism. New plants and animals are often discovered when a scientific expedition visits the islands. An entirely new ecosystem (the Mapou de Grand Bois community, on Silhouette island) was discovered as recently as 1983.

3. The isolation of the islands has also, however, made the resident species quite vulnerable. Many populations are small, have a low breeding rate, and have evolved in stable, and thus fragile, habitats. Human settlement, and its attendant overexploitation of species and attempts to reorganize island ecosystems, has caused declines in populations. Moreover, Seychelles must rely to a great extent on maritime transport for imports. This, along with the rapid development of an industrial tuna fishery, has led to a sharp increase in shipping activities at the country's main port of Victoria. The resulting marine pollution has become a growing problem.

4. Environmental Strategies. As a series of small and vulnerable ecosystems, Seychelles has long been aware of the need to use and manage its resources on a sustainable basis. The country has seen rapid growth since independence, attaining a per capita GNP estimated in 1991 at \$5,160 with health and education standards comparable to those of many developed countries. The two main sources of growth, tourism and fisheries, both depend for

their well-being on a healthy environment. The government has therefore committed itself to an explicit policy of sustainable economic development. This policy 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.

5. In view of the breadth of the environmental strategies adopted, the government has attempted to integrate environmental and natural resource management issues into all the relevant economic sector strategies in its most recent National Development Plan (NDP), for 1990-94. The environment and natural resource management projects and portions of projects in the NDP were then expanded and brought together during 1990-91 in an Environmental Management Plan for Seychelles (EMPS). The EMPS thus became a more detailed and operational extension of the NDP. The EMPS also includes the legal and institutional measures necessary to ensure that all other projects in the NDP support sustainability. Preparation of the EMPS was supported with assistance from the United Nations Environment Program (UNEP), UNDP, the UN Department of Technical Cooperation for Development (UNDTCD), and the Bank. The process made environmental officials more conscious of limitations in the scope and coverage of environmental legislation, the resources required for enforcing protection measures, and the need for a better information base for decision-making. The EMPS, containing 52 projects, was presented to donors at a meeting in Paris in February 1991. Donor commitments to EMPS programs include the European Community (EC) (coastal zone management), UNDP (information, training, and monitoring), the French aid agency (FAC) (environmental assessment guidelines), the Commonwealth Fund for Technical Cooperation (CFTC) (offshore oil drilling control program), and the African Development Bank (waste management), among others. Most recently, the Netherlands has pledged support for a Trust Fund for management of coastal ecosystems, protection of biodiversity, and institutional support. The Netherlands government is expected to ask the Bank to administer this trust fund. A detailed description of the EMPS and implementation issues associated with it is contained in Annex 1.

6. EMPS projects will be carried out by a wide range of public and private groups. The proposed GEF program will support the implementation of several urgent EMPS actions. Overall supervision of the GEF actions and of the EMPS more generally will be entrusted to the Ministry of Environment, Economic Planning, and External Relations (MEPER).

7. Environmental Policies and Institutions. Efforts to protect vulnerable areas and species began in 1778, only eight years after the islands were first settled, when the French commandant tried to limit the taking of crocodiles, giant tortoises, and other species. Early 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 been eliminated. Over the years, many reefs have been mined for coral to use in construction, islands 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.

8. Real conservation began 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. Spear-gun fishing, dynamite fishing, trawling, and other destructive practices have been banned. Following the Cousin island example, Aride island has been managed since 1973 by the Royal Society for Nature Conservation (RSNC). In 1979, the Seychelles Island Foundation (SIF), a charitable trust with international and local members on the Board of Trustees, was established to manage Aldabra, the world's largest coral atoll and a rich environment for terrestrial and marine life. SIF now manages the Vallée de Mai national park on Praslin island in addition to Aldabra, both of which have been designated World Heritage Sites. 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.

9. Legislation alone will not result in protection unless it is accompanied by enforcement, monitoring, research, information, and grass-roots participation. Deficiencies in enforcement and monitoring, caused largely by scarcities of funds and personnel, are the main reasons for the gap between the country's expressed desire to manage its environment and the actual protection of that environment. Problems of inter-agency communication and the absence of clear lines of responsibility clouded the issues further during most of the 1980s. 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 the government's 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 in the Ministry of Environment, Economic Planning, and External Relations (MEPER). This should strengthen the coordination between environment and development planning. It should also give the Environment Division added authority in securing adequate budgets for environment, and in requiring environmental impact assessments for all major development projects. 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.

### **Project Objectives**

10. 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 GEF. The GEF program therefore contains two components: biodiversity conservation, and abatement of marine pollution. One objective of the biodiversity conservation component of this project is to restore equilibrium of the threatened ecosystem of Aldabra, a remarkable environment that contains the only natural population of giant land tortoises (*Geochelone gigantea*) left in the Indian Ocean (the only other population, of a different species of giant tortoise, is in the Galapagos Islands). Aldabra, located 1,200 km southwest of the main Seychelles island of Mahé, has up to now been accessible only by a boat trip lasting several days.

Recent construction of an airstrip on the neighboring island of Assomption, however, will greatly improve the future access of Aldabra, and makes a comprehensive preservation program all the more urgent. Under the GEF program, SIF would develop monitoring and conservation programs and promote international research on Aldabra by improving the capacity of the research station, restoring the natural ecosystem through control of an introduced species, and strengthening its managerial and scientific capacities. The consequences of these and other activities aimed at the restoration and preservation of the Aldabra ecosystem will be described in a long-term management plan that will be prepared for the atoll as part of the GEF program.

11. One of the most remarkable groups in the Seychelles fauna is the marine turtles. Another objective of the biodiversity conservation component is consequently to carry out comprehensive management plans to restrict or prohibit the exploitation of marine turtles in accordance with the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), to which Seychelles acceded in 1977. The sea turtle species that breed in the Seychelles islands, and for which management plans will be prepared and carried out as part of the GEF program, are the Green (*Chelonia mydas*) and Hawksbill (*Eretmochelys imbricata*) turtles.

12. Actions to reduce ship-generated pollution of the sea are essential for preserving the marine environment. Most urgently needed are adequate facilities at the Port of Victoria to receive and dispose of waste from ships. The main objective of the marine pollution abatement component is to support the study and design of facilities that would improve the capacity of the port to handle ship wastes. The facilities would enable Seychelles to comply with the requirements of the International Convention for the Prevention of Pollution from Ships (MARPOL Convention), which was ratified by the Seychelles government in 1990.

## **Project Description**

### **Biodiversity Conservation**

13. Restoration and Preservation of Aldabra Ecosystem. The program for the restoration and preservation of Aldabra 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. The research station on Aldabra, now 20 years old, is in urgent need of repair and renovation. The GEF project would support upgrading of the laboratory, accommodation block, rest area, and clinic, construction of a sanitation system, reconstruction of the slipway, and provision of boats and other equipment.

14. To strengthen the management of Aldabra, SIF proposes to recruit two scientists with managerial experience. The role of these managers would be to oversee the upgrading of services, provide guidance to visiting scientists, help ensure a suitable quality standard for scientific research, carry out monitoring, and contribute to the long-term management plan. The GEF project would cover salary complements for external assistance as well as overseas social security contributions for a period of two years, in addition to overseas travel expenses and a vehicle.

15. The unique value of Aldabra continues to be threatened by non-native species introduced decades ago, especially goats. A severe threat to the giant tortoise population, goats



compete for food with the tortoises and destroy the trees and shrubs which the tortoises need for shade. Goat control has been attempted on Aldabra since research began. Under the GEF program the scientists responsible for the earlier campaign will plan and lead a one-year program aimed at controlling the goat population. The program can be extended by six months if necessary.

16. 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. The GEF project would support the preparation of a long-term management plan for Aldabra, that 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.

17. A more detailed description of the Aldabra program and terms of reference for the long-term management plan are found in Annex 4.

18. Protection of Sea Turtles. The Green turtle protection program would define the sustainable exploitation level for the Green turtle to accommodate domestic consumption. Technical assistance would be provided for two years to undertake a stock assessment and prepare the Management Plan. The sustainable offtake would be determined as part of the management plan, and would take into account the internal trade in Green turtle meat between the islands of Seychelles, in particular from the outer islands to the main island of Mahé.

19. 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 for Seychellois and tourists on the consequences of trade in and purchase of turtle products. On the basis of experience elsewhere, the chances of a turtle ranching operation succeeding in Seychelles are remote. To accurately gauge these chances, the feasibility study will aim to estimate the full costs (often underestimated in past studies) as well as benefits of such an operation. The existing practice of not issuing licenses for the taking of Hawksbill turtles will be supplemented by a ban on the capture of Hawksbill turtles and of trade in turtle products. Finally, equipment, training, and revenue compensation will assist turtle shell artisans to pursue other lines of work. Compensation will take the form of technical assistance, equipment and materials, and in some cases support for working capital, so that artisans can re-establish themselves in other occupations.

20. Annex 5 contains further details on the turtle protection program, and terms of reference for the studies to be carried out.

#### Abatement of Marine Pollution

21. The marine pollution abatement program will evaluate the reception and disposal facilities needed to comply with the MARPOL requirements (see also para. 13) and to control pollution from fishing and commercial vessels, cruise ships, and yachts. The study phase, to be supported by the present GEF project, will be carried out in two stages. The first stage will include assessments of the institutional, manpower, and equipment requirements for effective enforcement of MARPOL stipulations, based on updated estimates of the waste generated by ships and the likely quantities to be discharged. Preliminary designs and cost estimates for the facilities will be prepared on this basis. Following government review, the second phase will

include further analysis of fleet traffic and disposal methods, final justification of the facilities proposed, and preparation of detailed engineering designs and bid documents. A subsequent phase, beyond the current GEF project, will consist of the actual construction of the facilities, and the training of marine pollution inspectors and ship surveyors for monitoring and enforcement.

22. A fuller description of the marine pollution abatement program, together with terms of reference for the study of waste reception facilities, is found in Annex 6. Cost estimates for all GEF program elements are included in Schedule A below.

## **Implementation**

23. The project for which GEF financing is requested is part of a larger Environment and Transport project, whose estimated total cost is US\$ 7 million. The Environment and Transport project would be financed by a proposed US\$ 4.5 million Bank loan and by a government contribution of US\$ 0.7 million equivalent, in addition to the proposed GEF grant of US\$1.8 million equivalent.

24. The EMPS as a whole is being carried out under the guidance of the Ministry of Environment, Economic Planning, and External Relations (MEPER). The Environment Steering Committee, which meets monthly and is chaired by the Minister of MEPER, is the main coordinating mechanism for implementation of all parts of the EMPS, including the GEF project. A National Coordinator will be appointed within MEPER to keep up the momentum of implementation and ensure that the role of MEPER in each project, ranging from minimal monitoring to direct implementation responsibility, is appropriate for the task to be accomplished. A description of the requirements for EMPS coordination, and terms of reference for the position of National Coordinator, are found in Annex 2.

25. Within this framework, other ministries and agencies in addition to MEPER will bear direct responsibility for portions of the GEF project. SIF will manage the program for restoration and preservation of Aldabra. In carrying out this program, SIF will draw upon the expertise of agencies such as the Seychelles Fishing Authority (SFA) and the Islands Development Company (IDC). These and other responsibilities will be spelled out in a Memorandum of Understanding to be concluded between the Government and SIF. A full-time Executive Director will be appointed by SIF to manage its operations, including the Aldabra program. The Environment Division of MEPER will handle the turtle protection program, with assistance from the Department of Industry and the artisan company CODEVAR for re-training and introduction of turtle shell artisans into other lines of work. Port of Victoria officials in the Ports and Marine Services Division (PMSD), Ministry of Tourism and Transport, in collaboration with the Harbour Master's Office, will manage the study of waste reception facilities at the port. PMSD is already collaborating with the International Maritime Organization (IMO) in the organization and implementation of the study. Procurement and disbursement arrangements for GEF programs are included in Schedule B below.

26. To ensure prompt availability of funds for the GEF program a Special Account (revolving fund) will be established in US dollars at a commercial bank. The initial deposit into the Special Account will be US\$ 100,000. All expenditures under US\$ 10,000 will be met from the Special Account. For expenditures above this threshold, the direct payment or Special Commitment procedure may be used. Replenishment requests will be submitted monthly, and

all expenditures will be fully documented except (i) expenditures under contracts of less than US\$ 20,000; (ii) local training; and (iii) artisan compensation and re-installation.

27. Monitoring and Evaluation. Each quarter, MEPER will prepare reports describing the progress of each program element from the physical, financial, and socio-economic standpoint. These reports will review the performance of implementing agencies, monitor key indicators of progress in fulfillment of program goals, and identify any major problems with their recommended solutions. A mid-term review, focusing on implementation of the EMPS as a whole, will be conducted prior to the end of 1994 and will be an important occasion for applying lessons learned up to that time. The main objective of this exchange of views will be to evaluate the success at mid-course of program elements and reach agreement on any remedial measures required. Key indicators whose evolution will be closely followed during implementation are included in Annex 7.

### **Sustainability**

28. The EMPS represents a commitment to carry out an integrated program of environmental preservation and sustainable development through the year 2000. A strengthened MEPER, combining environment with economic planning, will be increasingly able over the 1990s to incorporate the lessons of EMPS experience into development planning. Likewise, SIF will be able to supervise plans and actions for research, conservation, and possibly limited ecotourism on Aldabra. It is expected that the GEF program will significantly strengthen SIF management capabilities. This strengthened management capacity will in turn enhance the ability of SIF to attract financial support for its programs. Sustained monitoring of cost recovery in the treatment of ship wastes will ensure successful replication in Seychelles and other similar economies of the region.

### **Lessons from Previous Bank Involvement**

29. The Bank has carried out a transport project in Seychelles and appraised an Environment and Transport project, of which the present GEF project is a part. Since early 1990 the Bank has also participated in preparation of a water supply project which is nearing the appraisal stage. Implementation experience with the completed transport project was generally satisfactory. Flexibility in project design, allowing adaptations, if and as required during implementation, proved to be extremely useful, especially in the road maintenance component which took account of changes in the condition of the roads and in maintenance requirements between appraisal and actual implementation. Largely as a result of the more intensive involvement over the past three years, Seychelles has become much more familiar with Bank policies and procedures.

### **Rationale for GEF Funding**

30. The government ratified the MARPOL Convention, as well as CITES, because it sees the medium- to long-term benefits of protecting the marine environment as outweighing the costs of disposal and treatment facilities. It has shown a strong commitment to achieving the objectives of each part of the GEF project. GEF support of biodiversity protection will allow the implementation of a program that, for the first time, takes full account of the socioeconomic,

institutional, and legal aspects of the protection of endangered species. For CITES to become a reality, the government needs a comprehensive plan of action for turtle protection, including the satisfaction of legitimate local consumption demands. Along with activities in the Galapagos islands, the proposed program represents the GEF pilot phase demonstration of how to meet the challenges of preservation of endemic biodiversity in isolated island communities.

31. However, the costs of undertaking the programs are substantial for the Seychelles economy. The government, with its budget already severely constrained as a result of the drop in tourism receipts in 1991, finds it difficult to finance them. Although the programs are part of the EMPS, they did not secure funding at the donors' conference on the EMPS held in February 1991. Donors at the conference expressed strong support for the programs, which have high priority on an international level, but were unable to provide financing. Similarly, the conservation NGOs familiar with these programs, while supporting their aims, find it hard to commit funds for these activities. Therefore, the project activities would not be carried out in the absence of GEF financing. GEF funds are proposed for MARPOL activities because in fulfilling the MARPOL obligations, countries do not necessarily receive national benefits commensurate with the costs they incur or with the benefits accruing to the world community. It is consequently GEF financing that will make it worthwhile for Seychelles to design and construct these facilities.

32. The Aldabra program, rather than seeking only to arrest degradation, aims at restoration of the ecosystem. The turtle protection program will provide alternative forms of livelihood and compensation for the foregone benefits of turtle harvesting to local populations, enabling Seychelles to comply with CITES. Radio-collaring and other innovative techniques of feral goat control will be demonstrated. For marine pollution aspects the main innovation is the identification of cost-effective facilities at quayside for fishing and commercial fleet wastes. GEF financing of Phase 1 of the marine pollution program would send a concrete signal of the international donor community's willingness to support the implementation of measures that it has been advocating for the developing countries. Among nations of the western Indian Ocean, only Seychelles has signed the MARPOL Convention. Demonstration of how to deal with wastes partly generated outside of national boundaries will therefore be of value to many other small island nations with fishing fleets operating in their economic zones.

### **Agreed Actions**

33. Terms of reference of the studies to be carried out with GEF support have been prepared, and are included as appendices to Annexes 4, 5, and 6. Consultants with experience on Aldabra have been identified, and short lists are being prepared for the remaining studies. Moreover, several actions will be undertaken to ensure timely implementation of the GEF program. These actions include:

- a. As a condition of grant effectiveness, establishment at MEPER of the position of National Coordinator of the EMPS. This position is expected to be filled by an incumbent MEPER Senior Economist (para. 25);
- b. As conditions of disbursement for the respective actions, signature of Memoranda of Understanding as follows: (i) between the government and SIF for implementation of the Aldabra program for restoration and preservation of Aldabra ecosystems; (ii) between MEPER and PMSD for management of the

waste reception facilities (MARPOL) study; and (iii) between MEPER and DOI/CODEVAR for management of the turtle trade compensation study and for re-training and compensation of artisans (para. 26);

- c. As a condition of disbursement for the Aldabra program, appointment by SIF of a full-time Executive Director (para. 26);
- d. Continuation of adequate budgetary allocations to finance the operational budget of the Environment Division, MEPER (para. 10);
- e. Approval, by December 31, 1993, of legislation banning domestic trade in Hawksbill turtle shell products, as a complement to existing practice which forbids the taking of Hawksbills (para. 20).

### **Environmental Aspects**

34. The project is expected to have significantly positive effects on the environment. Negative impacts are expected to be minimal. Studies and management comprise the bulk of the project. Civil works at the Aldabra scientific research station will consist of rehabilitation of existing facilities rather than a major expansion. Environmental effects will be closely monitored by the Environmental Assessment and Pollution Control section of MEPER.

### **Benefits**

35. The approach taken in this project to conservation should be replicable in other small island settings in which ecosystems are threatened. The Aldabra atoll is a World Heritage Site because of its remarkable and endangered endemic plants and animals. Most extinctions in historic times have occurred on islands, and the main cause there has been the introduction of exotic species. Tightly managed feral goat control techniques will provide valuable demonstration benefits where similar feral animal populations threaten important ecosystems. Of special importance will be the lessons learned from efforts to secure a balance between increased visitor access and conservation requirements.

36. Turtle populations are threatened around the world, and the attention devoted to issues of turtle farming, domestic consumption, artisan employment, and international trade will have impacts in many other similar contexts. The set of actions ultimately adopted will provide a test of the requirements for effective enforcement of species protection legislation. Finally, for the marine pollution program, demonstration of how to deal with fishing fleet wastes will be beneficial to many other small islands which have fishing fleets operating in their marine economic zones.

### **Risks**

37. Scarcity of staff is the most important risk for project execution. With government units often staffed by only a handful of people, the benefits of staff deployment and training for a given task can prove to be short-lived if even a few staff changes occur. This risk will be minimized first by judicious use of local or foreign specialists as appropriate, and second

by the fact that the EMPS will be carried out by a wide range of public and private groups in partnership rather than only by the government. Staff leaving public service often continue to exercise their profession in the private or semi-public sectors, and can therefore continue to play a role.

38. A second, related risk is that, good legislation and an impressive EMPS notwithstanding, people may be reluctant to alter their habits or practices to the extent necessary to achieve the desired conservation goals. This risk too will be kept to reasonable levels by actions aimed directly at influencing domestic and foreign demand for threatened species, such as audio-visual materials on Hawksbill turtle protection for visiting tourists. Implementation of the program will be kept flexible in order to place more emphasis if required on the actions designed to induce changes in behavior.

Attachments

## Seychelles: GEF Program

## Estimated Costs

Component:	Local	Foreign	Total	Local	Foreign	Total
	(SR 000)			(US\$000)		
<b>A. Restoration and Preservation of Aldabra Ecosystem</b>						
1. Civil Works	208	323	531	42	65	106
2. Equipment, Supplies, & materials		543	543		109	109
3. Consulting Services	114	1,785	1,899	23	357	380
Subtotal	322	2,651	2,973	64	530	595
<b>B. Protection of Sea Turtles</b>						
1. Equipment, Supplies, & materials		324	324		65	65
2. Consulting Services	386	1,792	2,178	77	358	436
3. Artisan Training and re-installation	2,643	168	2,811	529	34	562
Subtotal	3,029	2,284	5,313	606	457	1,063
<b>C. Abatement of Marine Pollution</b>						
1. Consulting Services	77	688	765	15	138	153
Subtotal	77	688	765	15	138	153
TOTAL BASE COST	3,428	5,623	9,051	686	1,125	1,810
Physical Contingencies	271	135	406	54	27	81
Price Contingencies	161	238	399	32	48	80
TOTAL PROJECT COST	3,860	5,996	9,856	772	1,199	1,971

## Seychelles: GEF Program

## Financing Plan

Source:	Local	Foreign	Total
	----- (US\$ million) -----		
GEF Grant	0.6	1.2	1.8
Government	0.2		0.2
TOTAL	0.8	1.2	2.0

## SEYCHELLES

BIODIVERSITY CONSERVATION AND  
MARINE POLLUTION ABATEMENT PROJECTPROCUREMENT ARRANGEMENTS  
(US\$ '000)

ITEMS	----- Procurement Method -----			TOTAL
	LCB	IS/DP	OTHER	
1. Civil Works	120 (95)			120 (95)
2. Equipment, Materials, and Supplies	20 (20)	170 (170)		190 (190)
3. Consulting Services			970 (970)	970 (970)
4. Artisan Training and Reinstallation			570 (424)	570 (424)
5. Salaries, Operation and Maintenance			121 (121)	121 (121)
TOTAL	140 (115)	170 (170)	1,661 (1,515)	1,971 (1,800)

## Notes:

LCB       = Local Competitive Bidding  
IS/DP     = International Shopping and Direct Purchase  
Other      = Includes consulting services to be procured in accordance with Bank  
            guidelines for hiring of consultants

Figures in parentheses are expenditures for GEF grant.



### DISBURSEMENTS

ITEMS	DISBURSEMENT AMOUNT (US\$ million)	% FINANCING
1. Civil Works	0.1	100% of foreign and 75% of local expenditures
2. Equipment, Materials, and Supplies	0.2	100%
3. Consulting Services	0.9	100%
4. Artisan Training and Reinstallation	0.4	100% of foreign and 50% of local expenditures
5. Salaries, Operation and Maintenance	0.1	100%
6. Unallocated	0.1 ---	
<b>TOTAL</b>	<b>1.8</b> ===	

### ESTIMATED GEF DISBURSEMENTS BY YEAR

	----- IBRD FISCAL YEAR -----			
	1993	1994	1995	1996
Annual	0.3	0.7	0.6	0.2
Cumulative	0.3	1.0	1.6	1.8

Closing Date: December 31, 1996

**SEYCHELLES**

**BIODIVERSITY CONSERVATION AND  
MARINE POLLUTION ABATEMENT PROJECT**

**TIMETABLE OF KEY PROJECT PROCESSING EVENTS**

Time Taken to Prepare:	10 months (September 1991 to June 1992)
Prepared by:	Government of Seychelles: Ministry of Environment, Economic Planning, and External Relations in collaboration with public and private agencies  World Bank: Orville Grimes, Aubert Zohore, Jan Post, Carl Gustaf Lundin, Franklin Cardy
First Bank Mission:	July 1991
Appraisal Mission Departure:	June 1992
Date of Negotiations:	November 12-14, 1992
Planned Date of Effectiveness:	January 1993
Summary Supervision Plan:	Missions are planned for 4-6 month intervals to supervise progress.  Technical expertise required: Ecologists, sea turtle specialists, economist/financial analysts, port engineers, institutional specialists.  Reporting arrangements: (i) EMPS monitoring through MEPER information base and implementation reports; (ii) GEF monitoring reports prepared by Bank missions; (iii) summary reports of study conclusions with future action plans.
List of Relevant PCRs and PPARs:	Project Completion Report, Transport Project (Ln. 2492-SEY), June 23, 1992.

## **A N N E X E S**

- |                 |   |
|-----------------|---|
| <b>Annex 1:</b> | <b>Environmental Management Plan of Seychelles (EMPS): Progress on Implementation</b>                                     |
| <b>Annex 2:</b> | <b>Environmental Management Plan of Seychelles (EMPS): Establishment of a National Coordinator</b>                        |
| <b>Annex 3:</b> | <b>Ministry of Environment, Economic Planning, and External Relations<br/>Environment Division<br/>Organization Chart</b> |
| <b>Annex 4:</b> | <b>Restoration and Preservation of the Aldabra Ecosystem</b>  |
| <b>Annex 5:</b> | <b>Turtle Protection Program</b>  |
| <b>Annex 6:</b> | <b>Reception and Disposal of Marine Wastes at the Port of Victoria</b>  |

Annexes 1 and 2 describe in detail the institutional context of implementation of Seychelles environmental programs, and Annex 3 sets out the organizational framework for implementation. Annexes 4, 5, and 6 are each composed of two parts. The first part describes in detail the actions to be carried out under each program, and the roles and responsibilities of each participating group or agency. The second part consists of Terms of Reference for studies and management plans. For the fullest understanding of all parties involved in the actions to be undertaken, the Terms of Reference repeat the portions of the Annexes which describe the setting and rationale of program elements.



**SEYCHELLES: GEF PROGRAM**  
**ENVIRONMENTAL MANAGEMENT PLAN OF SEYCHELLES (EMPS):**  
**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 decision making, laws and the 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; and international cooperation and management plans for key policy areas.

Part III of Volume 1 contains the details of the management plans (programs) 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). 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 launched 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). It has also recently completed a Human Resources Development Plan for 1992-96, which 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 downgrading 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 Conservation 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 (Vallée de Mai) 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 began in October 1992, aims to 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 released in November 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 42% of the total land area has been designated as national parks, reserves, or special areas, and a further 228 km<sup>2</sup> 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 began 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.

**Environmental Management Plan for Seychelles**

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**Figure III-1 : Priority Ranking for EMPS Projects.**

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**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

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### 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. STUDY PROJ. COST COST	FUNDS SECURED	DONOR SECURED	FUNDS IDENTIFIED	DONOR IDENTIFIED	% SECURED	PROJECT STARTED	
A. ENV. GUIDELINES/ASSESS. PROG. 52 000'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 WARN.	645	0		645	GEF	0		
TOTAL A. PROGRAMME	4015	2055		645				
B. POLLUTION MONIT/CONTZ. PROG								
B1. STANDARDS AIR/WATER/NOISE	230	230	UNDP			100		
B2. POLLUTION MONITORING/CONTROL	130	8		120	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. MAR. POL (PHASE I)	440	440	GEF			100		
B7. CONTROL OIL DRILLING	1620	0				0		
TOTAL B. PROGRAMME	6175	830		1620				
C. WASTE MANAGEMENT PROGRAMME								
C1. GVSP PHASE II	35000	7500	7500	ADB	35000	ADB	100	*
C2. GVSP PHASE III	59250	0				0		
C3. SEAO VALCON SEWERAGE	45800	2500	2500	CCCC	45800	CCCC	100	*
C4. ROCHE CAIRMAN SEWERAGE	9000	0			NONE	0		
C5. PINS/ROYALE SEW. STUDY	3500	0		3500	ADB	0		
C6. VOLBERT SEWERAGE STUDY	17200	269	269	CCCC			*	
C8. SOLID WASTE TREATMENT	27000	300	300	CCCC	27000	CCCC/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			
D. WATER MANAGEMENT PROGRAMME								
D1. LE NIOL TREATMENT WORKS	6000	0		6000	CCC/IBRD			
D5. FRASCIN WATER SUPPLY	850	0		850	IBRD/GEF			
D6. WATER MANAGEMENT PLANS	4250	0		4250	IBRD			
TOTAL D. PROGRAMME	11100			11100				
E. ENERGY CONSERVATION PROGRAMME								
E1. ENERGY CONSERVATION	1350	0		1350	UNIDO/JAPAN			
E2. STUDY LEAD FREE GAS		60	60	SPAIN			*	
TOTAL E. PROGRAMME	1350	60	60	1350				
F. NAT. PARKS CONSERVATION PROG.								
F1. WILDLIFE INVENTORIES	2640			1300	ICSP/EC			
F2. IMPORT PLANTS/ANIMALS	1040	0		1040	ADB			
F3. 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 SEZY	3085		3085	EC		100
G10. CONSERVATION STRATEGY	350		350	EC		100
<hr/>						
TOTAL G. PROGRAMME	13335		4360		7385	
<hr/>						
H. FORESTS MANAGEMENT PROGRAMME						
<hr/>						
H1. PRESERVATION ENDEMIC TREES	660		0		NONE	
H2. FOREST FIRE PLAN	480		0			
H3. NATIONAL FOREST PLAN	320	320		ADB/FINN		100
<hr/>						
TOTAL H. PROGRAMME	1460	320	0		0	
<hr/>						
I. COASTAL MANAGEMENT PROGRAMME						
<hr/>						
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	
<hr/>						
TOTAL I. PROGRAMME	8850		0			
<hr/>						
J. MARINE RESOURCES PROGRAMME						
<hr/>						
J1. PROTECTION OF SEA TURTLES	5800		5800	GEF		100
J3. MARINE RESOURCES MANAGEMENT	1820				1820	1820
<hr/>						
TOTAL J. PROGRAMME	7620		5800		1820	
<hr/>						
K. ENVIRONMENTAL LAW PROGRAMME						
<hr/>						
K1. ENVIRONMENTAL LEGISLATION	1340		160	UNDP	1340	IUCN/FAO
<hr/>						
TOTAL K. PROGRAMME	1340		160		1340	
<hr/>						
L. EDUCATION/TRAINING PROGRAMME						
<hr/>						
L1. OCC. 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					
<hr/>						
51 TOTAL L. PROGRAMME	27720		100			
<hr/>						
Grand Total	319,255		23,994		136,620	11
			(13%)		(42%)	

## NOTES:

PROJECTS CANCELLED STUDY COSTS FULLY SECURED

PROJECTS G1/G2/G10 SCHEDULED FOR IMPLEMENTATION SEPTEMBER 1992

**EMPS - Investment Programme : Implementation Schedule**

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<b>Programmes and Project Titles</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>
<b>A. Environmental Guidelines and Assessment Programme</b>										
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>B. Pollution Monitoring and Control Programme</b>										
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	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	I—I	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
<b>C. Waste Management Programme</b>										
C.1 Greater Victoria Sewerage Project - Phase II		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 Calman 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 Maha		I—								
C.9 Dispose of Sludge from Victoria Power Station	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										
<b>E. Water Management Programme</b>										
E.3 Rehabilitation and Upgrading of Le Nioi Treatment Works			I—		I—					
E.5 Praslin Water Supply - Phase II			I—							
E.6 Assess Water Resources and Prepare Water Management Plans			I—		I—					
<b>F. Energy Policy and Conservation Programme</b>										
F.1 Energy Conservation Programme			I—	I—	I—	I—				
F.2 Feasibility Study on Introduction of Lead Free Gas		I—								

Programmes and Project Titles	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
<b>G. National Parks and Wildlife Conservation Programme</b>										
G.1 Wildlife Inventories and Protection of Rare Endangered Species		I—	—	—	—	I—	I—	I—	I—	I—
G.2 Control the Import and Export of Plants and Animals						I—				
G.3 Control of Pesticides	I—	—	I—							
G.4 Rehabilitation of Curieuse National Park			I—							
G.5 Improvement of National Parks			I—							
G.6 Rehabilitation of Aldabra World Heritage Site			I—	—						
G.7 Eradication of Feral Goats from Aldabra Atoll										
G.8 Upgrading the National Botanical Garden		I—	—	—						
G.9 National Parks and Wildlife Service		I—	—	I—	I—	I—	I—	I—	I—	I—
G.10 Conservation Strategy and National Parks Management Plans		I—	I—							
<b>H. Forests Management Programme</b>			I—	—	—					
H.1 Preservation of Endemic Tree Species				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
<b>I. Coastal Environment Management Programme</b>										
I.1 Coastal and Marine Environment Baseline Study			I—	I—	I—	I—	I—	I—	I—	I—
I.2 Beach Erosion Control			I—	I—	I—	I—	I—	I—	I—	I—
I.3 Alternatives to Reduce Sand Use in Construction			I—	I—	I—	I—	I—	I—	I—	I—
I.4 Review of Coastal Zone Management Plans				I—	I—	I—	I—	I—	I—	I—
<b>J. Marine Resources Management Programme</b>										
J.1 Protection of Endangered Sea Turtles			I—	I—	I—	I—	I—	I—	I—	I—
J.3 Marine Resources Management Plans			I—	I—	I—	I—	I—	I—	I—	I—
<b>K. Environmental Law and Enforcement Programme</b>										
K.1 Revision of Environment Legislation			I—	I—	I—	I—	I—	I—	I—	I—
<b>L. Environmental Information, Education and Training Programmes</b>										
L.1 Environmental Documentation Centre and Information System		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—
L.3 Expand Environmental Education	I—	I—	I—	I—	I—	I—	I—	I—	I—	I—
L.4 Expand Environmental Training			I—	I—	I—	I—	I—	I—	I—	I—

## **SEYCHELLES: GEF PROGRAM**

### **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 a 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. The National Coordinator will report to the Director-General of the Environment Division, and keep the Director-General of Planning and Economic Cooperation closely informed on the discharge of his duties. His main task 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 minimum 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.

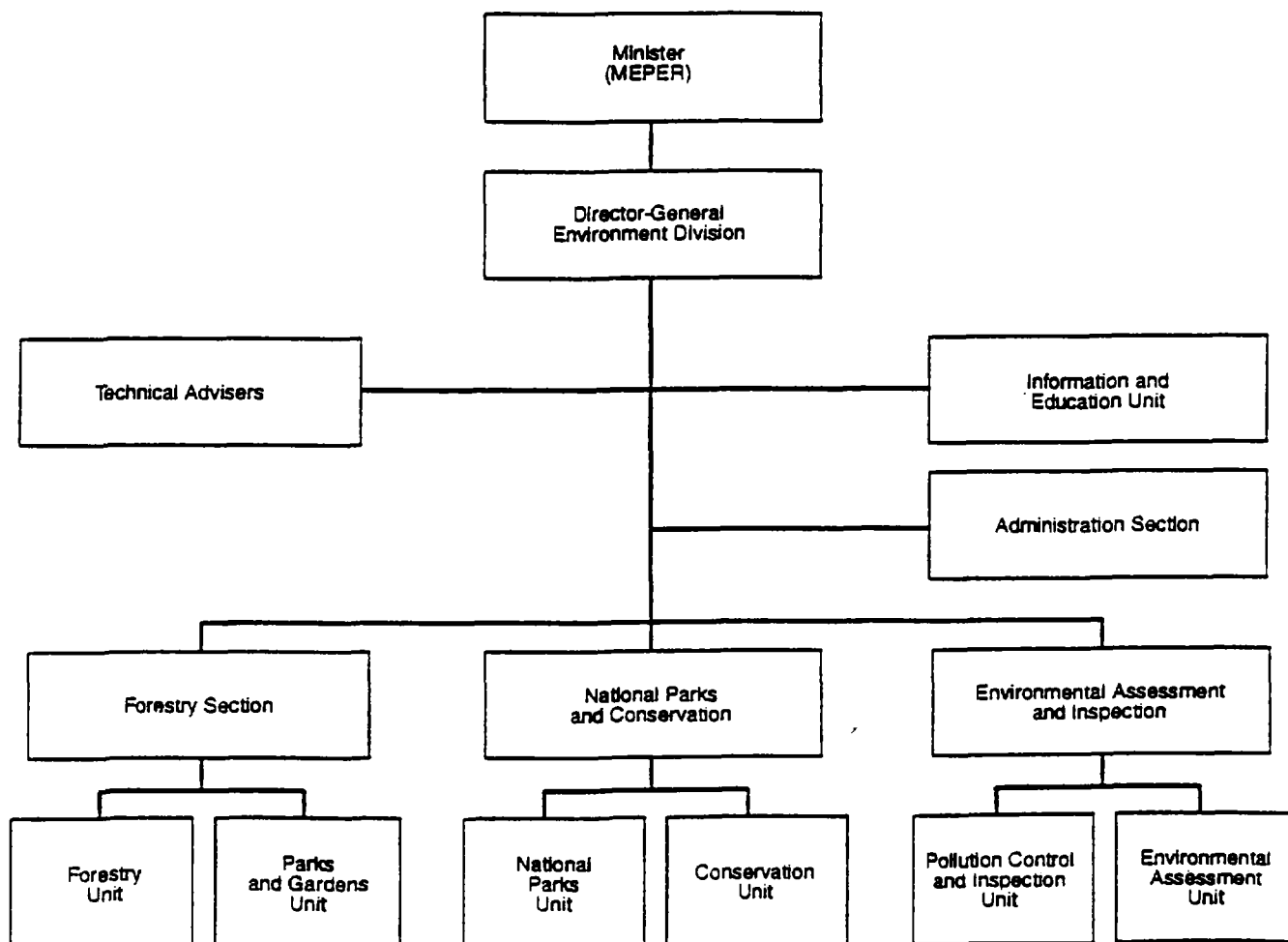
If CFTC financing does not materialize, other grant funding would be sought. Contact would be made, for example, with the Club of Dublin which deals with national environmental action plans and has access to several interested donors.



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

**ENVIRONMENT DIVISION**

**Organizational Chart**



## **SEYCHELLES**

### **BIODIVERSITY CONSERVATION**

#### **RESTORATION AND PRESERVATION OF THE ALDABRA ECOSYSTEM**

##### **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 of tortoises 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 were not always required: birds did not have to fly or plants to secrete unpalatable chemicals. 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.

Detailed cost estimates for the Aldabra ecosystem restoration program, as well as annualized costs showing the time path of implementation, are attached as Appendix 2 and 3 of this Annex.

## **SEYCHELLES**

### **ALDABRA RESTORATION AND PRESERVATION PROGRAM**

#### **TERMS OF REFERENCE**

The Management Plan for Aldabra consists of four main components: (a) rehabilitation of the research station; (b) strengthening of managerial and scientific capacity of the SIF; (c) eradication of goats; and (d) preparation of a Long-Term Management Plan. The background section of these Terms of Reference describes the interrelationship between these components, and is followed by a separate scope of work for each of the components.

#### **Background**

##### **A. DESCRIPTION OF ALDABRA**

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 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 capacity of the SIF; (c) eradication of goats; and (d) preparation of a Long-Term Management Plan.

### **D. THE RESTORATION AND PRESERVATION 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 sewerage 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.

### **Strengthening of Managerial and Scientific Capacity of the SIF**

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 Assumption 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. One or both consultants to be seconded to the SIF for two years under the strengthening of SIF's managerial and scientific capacity program are expected to draft much or all of the Management Plan while a total of 2 specialist-months of expatriate assistance could be financed under the program to assist SIF in specific aspects of the preparation of this Plan.

**SEYCHELLES**  
**BIODIVERSITY CONSERVATION**  
**ALDABRA RESTORATION AND PRESERVATION PROGRAM**  
**REHABILITATION OF ALDABRA RESEARCH FACILITY**  
**IMPLEMENTATION GUIDELINES**

**Objectives**

The objectives of this portion of the Aldabra program are to (i) carry out necessary repairs and renovation on the scientific research buildings and associated facilities on Ile Picard; and (ii) provide additional equipment, materials, and supplies to improve the research capability of permanent and visiting staff.

**Scope of Work**

- (a) With inputs from the Manager and staff of the research station and from participating research institutions, the Seychelles Island Foundation (SIF) will prepare a detailed work plan for the improvements including a description of the scope and content of rehabilitation works, cost estimates, and timetable for implementation. The work plan will include an assessment of the capability of technical staff and laborers on Aldabra to carry out specific portions of the works. It would also specify the relationship between the Research Manager on Aldabra and the works supervisor. On this basis SIF would recommend, if appropriate, which portion of the rehabilitation would be undertaken directly by staff of the research station. Works would begin in March 1993 and extend until December 1993.
- (b) Excluding any portion to be carried out by research station staff, local contractors and construction firms would be invited to bid on rehabilitation works as a package. Bid invitations would be advertised locally and transmitted to foreign embassies represented in Seychelles. Foreign firms, although they are not expected to show strong interest in the rehabilitation works, will be allowed to bid.
- (c) Equipment, materials, and supplies would be obtained through local shopping procedures with at least three price quotations.

## **Implementation**

SIF, in collaboration with the Division of Environment of the Ministry of Environment, Economic Planning, and External Relations, will supervise the rehabilitation program and the acquisition of equipment and materials.

**SEYCHELLES**  
**BIODIVERSITY CONSERVATION**  
**ALDABRA RESTORATION AND PRESERVATION PROGRAM**  
**STRENGTHENING OF MANAGERIAL AND SCIENTIFIC PERSONNEL**  
**AND PREPARATION OF A LONG-TERM MANAGEMENT PLAN**

**TERMS OF REFERENCE**

**Objectives**

The objectives of this portion of the Aldabra program are to enable the SIF to better manage Aldabra so as to achieve the long-term objectives for the atoll. For this purpose, the secondment of two scientists with managerial skills is envisaged for a period of two years. During this period, in accordance with a timetable to be established by SIF in consultation with the Division of Environment, a long-term management plan for Aldabra will be prepared. It is expected that preparation will be launched when the upgrading of research facilities and the goat eradication program are well advanced or completed.

**Scope of Work**

The Managerial and Scientific Personnel will:

- (a) Supervise the upgrading of facilities on Aldabra, by delegation from the resident Manager of the research station
- (b) Provide assistance to SIF in all aspects of its operation, including a review of its organisational structure, operating procedures, and relations with Government ministries and agencies
- (c) Participate in planning of fund-raising for financial sustainability of SIF
- (d) Assist with preparation of public information materials on Aldabra
- (e) Ensure liaison with external organisations having an interest in Aldabra.

The Long Term Management Plan will include:

- (a) An assessment of the state of the environment of Aldabra Atoll

- (b) An evaluation of the necessity and feasibility of the eradication or control of other introduced species such as rats and cats
- (c) Detailed presentation of scenarios for the future of Aldabra. The presentation will include impact analysis of alternative futures including (i) no change in current status; (ii) eventual wider access to the atoll, or designated parts of it, for nature tourism and ecotourism; and (iii) consequences for organization of visits, areas accessible to and closed to visitors, guides, rules and regulations concerning protection of ecosystems, etc. Full costs and benefits of each scenario will be assessed.
- (d) Planning of marine ecotourism in conjunction with terrestrial ecotourism
- (e) Drafting of procedures and regulations for scientific research
- (f) Determination of requirements for staff, including task descriptions
- (g) Determination of any additional equipment, infrastructure, or facilities that will be necessary for attainment of long-term objectives.

### **Implementation**

SIF will be responsible for the provision of scientific and managerial personnel. Preparation of the long-term management plan will be the responsibility of the Government of Seychelles. The Government has designated SIF as lead agency in this effort. SIF as representative of the Government will ensure that the full range of relevant views held by Government ministries, the private sector, and concerned international research institutions is expressed during preparation of the long-term management plan.

In drafting the plan, SIF will bring to bear its own resources, in addition to those of the scientific and managerial personnel on Aldabra. A total of three months of specialist expertise is also available to SIF through the GEF program for this purpose. Close liaison will be maintained throughout with the Division of Environment, Ministry of Environment, Economic Planning, and External Relations.

**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/ 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) -----									
<b>A. REHABILITATION OF RESEARCH STATION</b>									
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>B. STRENGTHENING OF MANAGERIAL AND SCIENTIFIC PERSONNEL</b>									
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
<b>C. CONTROL OF GOATS</b>									
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
<b>D. PREPARATION OF LONG TERM MANAGEMENT PLAN</b>									
1. Short-term Specialists (3 sp-months)				18	162	180	14	76	90
Subtotal				18	162	180	14	76	90
<b>Total Cost</b>	<b>297</b>	<b>1,332</b>	<b>1,629</b>	<b>66</b>	<b>744</b>	<b>810</b>	<b>33</b>	<b>501</b>	<b>534</b>

**SEYCHELLES**  
**BIODIVERSITY CONSERVATION**  
**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 was stopped in December 1990. This situation 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.

The compensation and re-installation package to be offered to artisans includes financial and technical assistance for the acquisition of equipment and materials, market analyses and advice in alternative occupations, and in some cases financial support for working capital. The three-year time frame for the program, combined with the ban on commerce in turtle products, is expected to be long enough for artisans to move out of the turtle craft trade and become fully accustomed to their new livelihoods. DOI will continuously monitor the progress of the artisans involved. If required, the package can provide for additional assistance toward the end of the three-year period for any cases requiring a somewhat longer transition to new occupations.

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 management 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.

**SEYCHELLES**  
**BIODIVERSITY CONSERVATION**  
**TURTLE PROTECTION PROGRAM**  
**GREEN TURTLE MANAGEMENT PLAN**

**TERMS OF REFERENCE**

**A. BACKGROUND**

Sea turtle populations around the world are rapidly being depleted to such an extent that the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) recognizes all sea turtles as being endangered and consequently prohibits trade in these species or in parts of or products made from them. 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 dominant cause of depletion of the stocks around the world. In 1990 Seychelles completed an Environmental Management Plan (EMPS). The EMPS includes a project which aims at the protection of sea turtles.

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. Green turtles are caught mainly for domestic consumption, while their shells are usually discarded, being of limited value. Hawksbill turtles are caught for their shell, which is worked by 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. The eggs of both species are consumed however. Extensive information exists on the status of the Green and Hawksbill turtle in Seychelles in a study carried out during 1981-84 by Dr. 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 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 dwindled as an exploitable resource.

Several attempts have been made to reduce the harvesting of sea turtles to arrive at a sustainable level of exploitation. Legislation approved 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 and some provisions in the law, such as the stipulation that only males can be taken, were impractical. Many turtles (mainly Green Turtles) are caught by harpooning in the water, when it is impossible to distinguish male from female. On the basis of deliberations during the Technical Conference on the EMPS in 1990 and in view of the preparation of the GEF turtle protection program, the issuance of licenses to

capture Hawksbill turtles was stopped in December 1990. Enforcement of the regulations, however, leaves ample room for improvement. There are several reports of unlawful catches, but no one has yet been prosecuted.

The sea turtle management program consists of 2 parts which are closely linked and which are expected to yield data relevant to both parts: a management plan for Hawksbill turtle and a plan for Green turtle management. Close coordination between the two management plans is therefore required. The Terms of Reference given below concern the Green turtle.

Seychelles wishes to continue to allow the harvesting of Green turtles for local consumption, but is concerned that the current level of harvest is not sustainable. Consequently there is a risk that Green turtles will disappear from many islands in the Seychelles. The report by Mortimer gives recommendations for the management of Green turtles, the most important of which are still valid today. However, the quotas established for the capture of male Green turtles are based on data which are now nearly 10 years old. It is therefore necessary to carry out a new census to redefine the quota and advise on management measures, in view of the changes that have taken place since the preparation of the EMPS.

### **Objectives**

The objective of this program is to prepare a management plan for the Green turtle in Seychelles that will ensure population recovery and a sustainable level of exploitation.

### **Scope of Work**

Preparation of the Green Turtle Management Plan will include:

- a. A stock assessment of Green turtles for all the Seychelles islands.
- b. Evaluation of the importance of the present trade and consumption of green turtles in Seychelles.
- c. An estimate of the quota and gender of Green turtles which could be sustainably harvested from each of the islands based on the stock assessment.
- d. Recommendations on the method of harvesting.
- e. A review of the inter-island trade in Green turtle products and advice on the implementation of restrictions.
- f. Review of the present legislation on Green turtle protection and recommendations for improvement as necessary.
- g. Assessment of the trend in turtle populations based on past and present data.

- h. Training of local conservation officers in their current stock assessment and surveillance work.
- i. Recommendations for effective institutional arrangements for Green turtle management.
- j. Collection of information on critical habitats, specific localities of significance and aspects of turtle biology of direct importance to the formulation of conservation measures.
- k. Preparation of a detailed map of the nesting beaches of Green turtles to provide guidance for their protection.
- l. Recording of any information on Hawksbill turtles gathered during the study and the field work.
- m. Elaboration and design of public information campaigns and programs.
- n. Formulation of a Management Plan for Green turtles in Seychelles.

### **Implementation**

The work of the consultant will be supervised by the Environment Division, Ministry of Environment, Economic Planning, and External Relations, and in particular by the Conservation and National Parks Section of this Ministry. The consultant will submit a brief progress report to the Ministry every two months.

The first year of the study will be devoted to field work in Seychelles. A final report will be submitted at the end of this year. During the second year, the consultant would visit Seychelles for two months to evaluate the continuation of the work carried out by local staff. Total consultant time input is therefore estimated at 14 months.

The consultant should have at least ten years' experience in sea turtle research and management, involving significant work with Green turtles. Also required is practical field experience with an open mind for the realities of management of a traditionally exploited resource to which access has been virtually unrestricted.



**SEYCHELLES**  
**BIODIVERSITY CONSERVATION**  
**TURTLE PROTECTION PROGRAM**  
**HAWKSBILL TURTLE MANAGEMENT PLAN**

**TERMS OF REFERENCE**

**A. BACKGROUND**

Sea turtle populations around the world are rapidly being depleted, to such an extent that the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) recognizes all sea turtles as being endangered and consequently prohibits trade in these species or in parts of or products made from them. 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 dominant cause of depletion of the stocks around the world. In 1990 Seychelles completed an Environmental Management Plan (EMPS). The EMPS includes a project which aims at the protection of sea turtles.

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. Green turtles are caught mainly for domestic consumption, while their shells are usually discarded, being of limited value. Hawksbill turtles are caught for their shell, which is worked by 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. The eggs of both species are consumed, however. Extensive information exists on the status of the Green and Hawksbill turtle in Seychelles in a study carried out during 1981-84 by Dr. 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 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 dwindled as an exploitable resource.

Several attempts have been made to reduce the harvesting of sea turtles to arrive at a sustainable level of exploitation. Legislation approved 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 and some provisions in the law, such as the population that only males can be taken, were impracticable. Many turtles (mainly Green turtles) are caught by harpooning in the water, when it is impossible to distinguish male from female. On the basis of deliberations during the Technical Conference on the EMPS in 1990 and in view of the preparation of the GEF turtle protection program, the issuance of licenses to

capture Hawksbill turtles was stopped in December 1990. Enforcement of the regulations, however, leaves ample room for improvement. There are several reports of unlawful catches, but no one has yet been prosecuted.

The sea turtle management program therefore consists of 2 parts which are closely linked and which are expected to yield data relevant to both parts: a management plan for Hawksbill turtles and a plan for Green turtle management. Close coordination between the two management plans is therefore required. The Terms of Reference given below concern the Hawksbill turtle.

On strictly legal grounds, Seychelles is not violating CITES regulations when it permits the sale of turtle products in the local market. But turtle products are almost exclusively sold to tourists who then (often unknowingly) export these products 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 one provision in the CITES Convention however which could permit the trade in animals or their products which would otherwise be prohibited. This provision stipulates that the parties to CITES could consider export permission 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. The chances of success are deemed slight, however, as such farming operations have been tried many times in localities which are better suited to them than the Seychelles. None of these operations has as yet succeeded in a technically and economically sound way.

Agreement has therefore been reached that consultants will carry out a feasibility study on the establishment of a Hawksbill turtle ranch. If the study concludes that Hawksbill farming is not feasible either on technical, economic, environmental, legal or other grounds, no Hawksbill turtle farm will be established in Seychelles. If the study considers Hawksbill farming feasible, Seychelles may decide to start farming, which would necessitate the securing of additional funding for a pilot project. Provided it has been shown that the enterprise is successful according to the criteria established under CITES, an application may be filed with CITES for an exemption to the trade restrictions.

In the meantime, the turtle shell products trade, based on capture in the wild, is being phased out. To this aim, the issuance of licenses to capture Hawksbill turtles was stopped in December 1990. The phasing out of the trade in turtle shell products will be supported by the GEF project 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).

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, Ministry of Environment, Economic Planning, and External Relations. Training and education within the Conservation and

National Parks Section of this Ministry 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.

### **Objectives**

The main objectives of the program to prepare a management plan for the Hawksbill turtle are (i) to advise the Environment Division on measures to protect the wild Hawksbill turtle population; and (ii) to enable Seychelles to comply with the stipulations of the CITES convention. A Management Plan would be prepared to accomplish both objectives.

### **Scope of Work**

The tasks to be carried out in preparation of the Management Plan are the following:

- a. Review of literature and data pertaining to Hawksbill turtle farming from throughout the world, and concerning in particular the technical and economic aspects. Where relevant, findings from Green turtle ranching will be related to Hawksbill turtle ranching. During this period the validity of the conclusions and recommendations of reports, such as "Implantation d'un élevage de tortues carets aux Seychelles," by G. Lebrun, 1988, would be assessed.
- b. Evaluate and advise on the feasibility of Hawksbill turtle ranching in Seychelles from the standpoint of full costs and benefits, including (i) technical feasibility; (ii) economic and financial feasibility, taking full account of operating and maintenance expenditures; (iii) environmental impacts, including implications for local and eventual international Hawksbill turtle protection, as well as impact on the wild population; (iv) comparative advantage of Seychelles for such a pilot project; and (v) international legal implications.
- c. Advise on legislation concerning protection of Hawksbill turtles.
- d. Identify in detail the revenue compensation needs of artisans and implementation arrangements for the compensation package, in conjunction with other elements of the re-installation program.
- e. Recommend appropriate measures for effective organisation and management of the enforcement of legislation on Hawksbill turtle protection.
- f. Advise on site-specific measures to be taken to protect Hawksbill turtles, based on all available data including those on Hawksbill turtles collected during the Green turtle stock assessment.
- g. Elaboration and design of public information campaigns and programs.

h. Formulation of a Management Plan for Hawksbill turtles in Seychelles.

**Implementation**

The work of the consultants will be supervised by the Environment Division, Ministry of Environment, Economic Planning, and External Relations, and in particular by the Conservation and National Parks Section of this Ministry. The Ministry will implement the program in collaboration with the Seychelles Fishing Authority (SFA). The consultant will submit a brief progress report to the Ministry every two months.

A total of three specialist-months is anticipated to be required for preparation of the management plan. Subject to adjustment during the study, this time may be allocated as follows: (i) review of literature and data, 0.5 months; (ii) preparation of "State of the Art" report on Hawksbill turtle farming; 0.5 months; (iii) field work in Seychelles, 1.5 months; and (iv) preparation of final management plan, 0.5 months.

The involvement of two consultants, one for the biological and management aspects and one for the economic and financial aspects, is planned. The consultant(s) should have at least ten years' experience in sea turtle research and management, of which a significant portion has been devoted to Hawksbill turtle research. Also required is the ability to evaluate the full range of parameters determining the potential feasibility of sea turtle farming.

**Seychelles: GEF Program**  
**Biodiversity Conservation**  
**Turtle Protection Program**  
**Detailed Cost Estimates**

	Local	Foreign	Total	% Total
	----- (SR 000) -----			
<b>A. GREEN TURTLE MANAGEMENT PROGRAM</b>				
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>B. HAWKSBILL TURTLE MANAGEMENT PROGRAM</b>				
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
<b>Total Cost</b>	<b>3,029</b>	<b>2,284</b>	<b>5,313</b>	<b>1.00</b>

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)								
<b>A. GREEN TURTLE MANAGEMENT PROGRAM</b>									
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>B. HAWKSBILL TURTLE MANAGEMENT PROGRAM</b>									
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
<b>Total Cost</b>	<b>1,188</b>	<b>1,181</b>	<b>2,369</b>	<b>1,061</b>	<b>938</b>	<b>1,999</b>	<b>781</b>	<b>164</b>	<b>945</b>

## **SEYCHELLES**

### **ABATEMENT OF MARINE POLLUTION**

#### **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.

**SEYCHELLES**  
**ABATEMENT OF MARINE POLLUTION**  
**WASTE RECEPTION FACILITIES (MARPOL) STUDY**

**TERMS OF REFERENCE**

**Background Information**

Seychelles is an archipelago of some 115 islands (70,000 inhabitants), located in the Western Indian Ocean with a total area of about 445 km<sup>2</sup>. The archipelago is located to the northeast of Madagascar and includes three major islands: Mahé, Praslin and La Digue. Because of its remote location, Seychelles relies largely on maritime transport for imports. Moreover, the rapid development of an industrial tuna fishery has resulted in a sharp increase in shipping activities at the country's main port of Victoria (Mahé island). The marine coastal areas of Seychelles have been affected to some extent by the activities of the maritime sector, particularly in Victoria harbor and surrounding coastal waters. Some 14,000 tons of waste is produced per year by the commercial fishing fleet, consisting mainly of garbage, fish wastes and oil. Additionally, brine contaminated by fish waste and blood is pumped into Seychelles' waters regularly by commercial fishing vessels during the cleaning of holds or vats. Waste petroleum-oil from the commercial fishing fleet, amounting to some one million liters, is dumped at sea annually because adequate facilities are not yet available at Port Victoria for the reception, storage, and disposal of waste matter from commercial vessels.

Another major cause of concern is a risk of pollution to the marine environment from the activities of commercial shipping. The Western Indian Ocean is a major crude oil transportation artery, and the risk of an oil spill is high. An estimated 450 million tons of oil is transported from the Middle East around Southern Africa and the Cape of Good Hope each year. An additional 22 million tons transit the region en route to Eastern and Southern Africa. This transport involves approximately 1,200 very large crude carrier (200,000 tons) voyages and 4,000 medium size tanker (average 60,000 tons) voyages each year in the Western Indian Ocean (UNEP 1982). With the known traffic pattern and the heavy volume of oil in transit through the region, accidental large spills or operational spills resulting in slicks and tar balls must be expected.

There is a need for immediate action to assess and monitor the coastal environment and resources and determine present levels and sources of pollution and degradation. Additionally, it is essential to set and monitor coastal water quality standards, especially at public beaches; to set and enforce standards for marine discharges by ships; and to implement the local and regional oil spill contingency plan that has recently been prepared. It is also imperative that the discharge of wastes in Victoria harbor and other coastal waters be reduced by 1995. The most urgent action is to provide adequate facilities at the Port of Victoria for the reception, storage, recycling or disposal of waste from commercial vessels.

## **The Port of Victoria**

The port of Victoria, located on the east coast of the island of Mahé, is the principal port and only deepwater facility in the archipelago. The commercial port handles bulk oil and cement imports, general cargo and containers and all vessels requiring bunkers. The old "long pier" with recent additions handles all fishing vessels, inter-island schooner traffic and frozen fish exports and is separated from the commercial port facilities by an enclosed basin used for mooring yachts. The only ship repair facility - a marine railway - is located adjacent to this basin.

The traffic in 1991 was about 220 000 tons (mainly importation), of which 54% was crude oil. The major imported goods are foodstuffs, oil, transport equipment, and livestock, whereas major exported products are fish, copra and cinnamon. The location of Seychelles, near the main 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 Reunion-Mauritius.

## **The Marpol Convention**

Attempts are being made to control the pollution of the oceans and coastal waters. One major step toward this objective has been the introduction of the MARPOL 73/78 Convention through the International Maritime Organization (IMO), an agency of the United Nations. The convention is aimed at preventing vessels of all kinds from discharging wastes at sea which are considered to be pollutants. The MARPOL Convention currently has five annexes covering various categories of pollutants. These are:

Annex I	:	Oil (dirty ballast water; oily tank washing; oily bilge water; slops; sludge; fuel residues; waste oil).
Annex II	:	Noxious liquid substances (chemicals) in bulk - tank cleaning after discharge of cargo.
Annex III	:	Harmful substances carried in packaged form, in freight containers, portable tanks or similar.
Annex IV	:	Sewage.
Annex V	:	Garbage; trash; foodstuffs; oily rags; plastics; packing materials and dunnage.

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

## **Objectives of the Study**

The objective of the study is to evaluate and implement the reception and disposal facilities needed to comply with the MARPOL requirements, and necessary to control pollution from ships. Consultancies are required to (a) assess institutional, manpower, and equipment requirements for effective enforcement of MARPOL stipulations, based on updated estimates of waste generated on board ships and the likely quantities to be discharged; and (b) prepare feasibility studies, detailed designs, equipment and implementation schedules with cost estimates for construction of reception and disposal facilities.

## **Scope of Services**

The study will concentrate on the following topics: (a) identification of the types and quantities of waste generated by ships; (b) environmentally safe and efficient disposal elsewhere on the island of waste accumulated in the facilities; (c) financing and cost recovery aspects; (d) manpower and management aspects; and (e) siting of the facilities at the port in relation to pumping and transfer requirements, and the like. The facilities proposed would be evaluated up to the preliminary design (Phase 1A) and subsequently to the detailed design (Phase 1B) stage.

## **Methodology**

The study will consist of two phases:

Phase 1 A (5.5-month consultancy) would be conducted to:

- (a) analyze present and future shipping volumes (to the year 2005) in order to ascertain quantities of wastes generated on board ships visiting the Port of Victoria and the likely quantities available for discharge;
- (b) evaluate the reception facilities, including suitable methods of disposal required to dispose of oil, oil residues, sewage, brine and other wastes produced by shipping and fishing fleets;
- (c) assess modifications which may be required to the national commercial and fishing fleets in order to comply with international standards and requirements;
- (d) advise on manpower and equipment for pollution inspectors and ship surveyors that will be required to effectively enforce international conventions and national legislation dealing with ship-generated pollution;

In addition to the analysis of shipping volumes described above, Phase 1A will contain a more specialized analysis of present and future fishing fleet volumes. This analysis will:

- (e) analyze present and future fishing fleet volumes to the year 2005 in order to determine quantities of wastes generated by ships visiting the Port of Victoria and the likely quantities available for discharge;
- (f) evaluate the existing reception facilities and disposal methods employed by commercial fishing fleets; and
- (g) assess the impact on the marine environment resulting from dumping of fish waste and recommend improvements in re-use or disposal techniques, including the viability of alternative methods.

Following the completion of Phase 1A, the Government will review the conclusions of the study and take a decision on whether or not the solutions proposed are appropriate and justified.

Phase 1 B (three-month consultancy) will be carried out when results from Phase 1A are available and endorsed by the relevant authorities. This phase would entail the preparation of detailed engineering designs and bid documents, equipment and implementation schedules, and detailed cost estimates for the required facilities.

## **Implementation**

The managing government unit will be the Ministry of Tourism and Transport, in collaboration with the Environment Division (Ministry of Environment, Economic Planning, and External Relations), Public Utilities Corporation, and Seychelles Petroleum Company. The management of this study will be the responsibility of the Ports and Marine Services Division (PMSD), including the Harbourmaster's Office, of the Ministry of Tourism and Transport.

## **Staff Requirements**

The study will require for Phase 1A: (i) a shipping and fishing industries specialist, especially for point (a); (ii) a port engineer and environmental specialist, mainly for points (b), (d), and (e); and (iii) an economist, particularly for point (c). For Phase 1B the requirements are: (i) a fishing industries specialist, concentrating on points (a) and (b); and (ii) an environmental specialist and port engineer, mainly for points (c) and (d). It is strongly recommended that the consultants take into account the results of related studies, such as: (i) a general study on MARPOL entitled "The Economic Implications and Other Issues in Providing Reception Facilities for Ship Wastes in Sub-Saharan African Ports", World Bank Technical Paper, June 1991; and (ii) local studies including that on solid waste disposal carried out by ANRED. Furthermore, consultants are invited to review (and adapt) the approaches used by ports in northern Europe, and determine what lessons can and should be learned about reception facilities from the recently completed study in the Caribbean.

### **Duration of the Study and Reporting Requirements**

The study will be carried out over four months, about half of which will be spent on field visits. A preliminary report will be submitted at the end of Phase 1A. The final report including Phase 1B will contain a detailed proposal and cost estimate for the reception works, to be carried out in a subsequent Phase 2.

**Seychelles: GEF Program**  
**Abatement of Marine Pollution**  
**Waste Reception Facilities (MARPOL) Study**

**Detailed Cost Estimates**

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

**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) -----									
<b>A. PHASE 1A</b>									
Consulting Services (5.5 sp-months)	50	445	495						
Subtotal	50	445	495						
<b>B. PHASE 1B</b>									
Consulting Services (3 sp-months)	27	243	270						
Subtotal	27	243	270						
<b>Total Cost</b>	<b>77</b>	<b>688</b>	<b>765</b>						



## **KEY INDICATORS**

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. The actual progress achieved will be compared 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 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.

### **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**

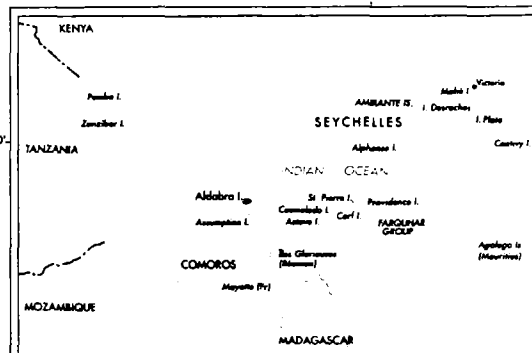
1. Aldabra
  - procurement progress and % completion, research facility
  - % completion goat control program
  - recruitment scientific and managerial staff
  - % completion long term management plan
2. Biodiversity Conservation
  - % completion turtle ranching study
  - % completion turtle trade compensation study
  - No. artisans reinstalled
  - training completed
  - % completion stock assessment

3. Marine Pollution

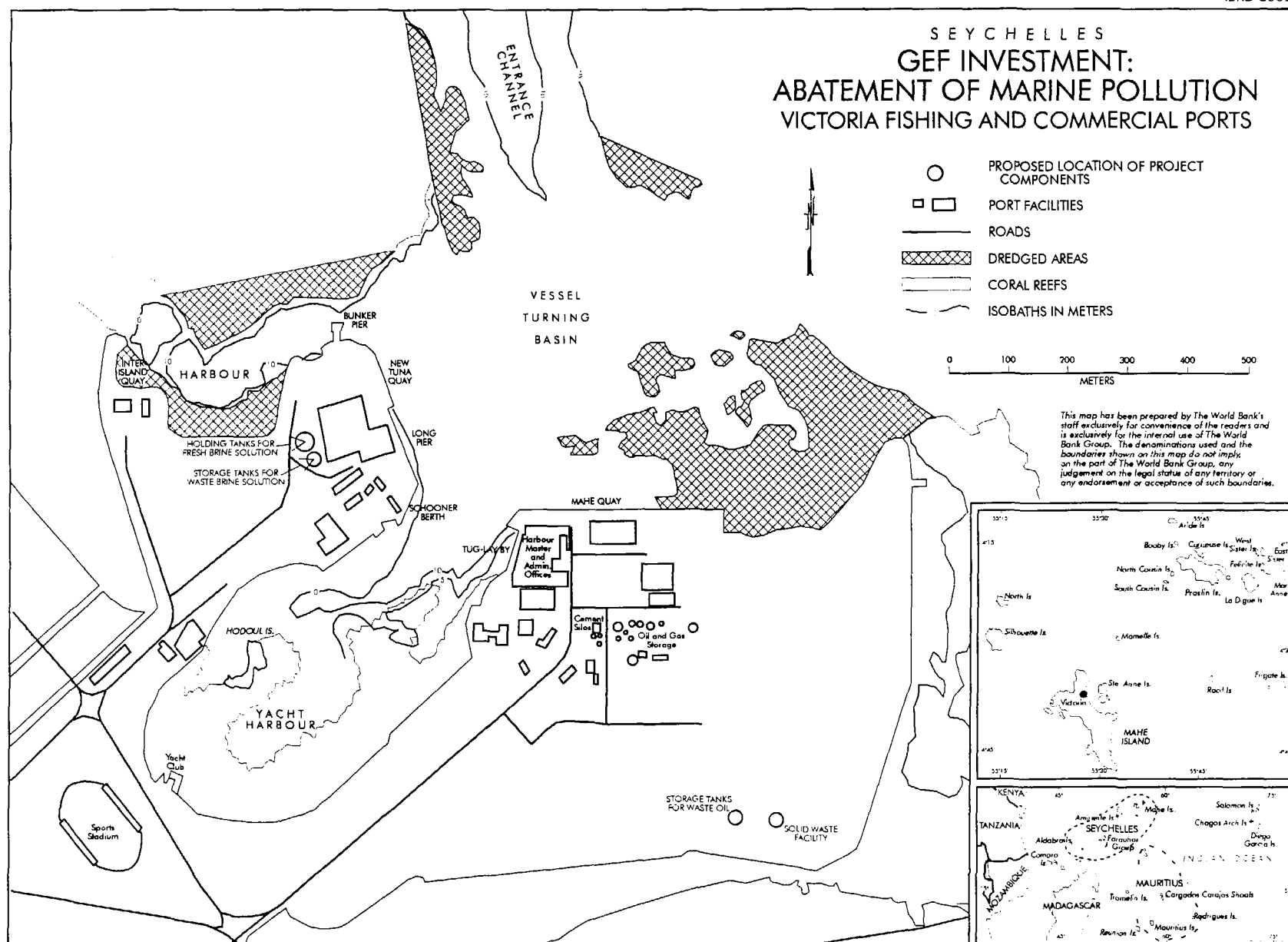
- % completion waste reception facilities study

C. Indicators of Impact

1. Number and type of persons benefiting
2. Biodiversity trends (numbers of individuals)











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