Part IV

IMPLEMENTING THE PLAN

1. Institutional Implications :

In June 1989, following the re-election of President France Albert Rene as President of the Republic for his third consecutive mandate, the Government of Seychelles undertook a major reorganization. The Cabinet has been enlarged from seven to ten Ministers. In particular, the numerous responsibilities of the former Ministry for National Development, which was in charge, through its Forestry and Environment Section, of environmental matters, have been shared between four new Ministries and Departments.

A new Department of the Environment (DOE) was created, under the direct authority of the President.

1.1 Present Institutional Arrangements :

The present institutional structure for the Government of Seychelles is shown in Figure I-1.

1.11 Responsibilities and Resources of the Department of Environment :

The new DOE has two major substantive units, the Forestry Division and the Environment Division, with the following responsibilities.

Forestry Division :

- Undertake and monitor all reafforestation programmes;
- Provide tree-felling services when dangerous trees are involved;
- Control and monitor all trees protected by law;
- Control the burning of wood for charcoal;
- Prevent and suppress forest fires;
- Provide landscaping services;
- Maintain parks and public gardens.

Environment Division :

- Ensure the conservation and protection of the natural environment;

- Undertake the management of national parks and nature reserves and protect terrestrial and marine flora and fauna;

- Control and monitor refuse disposal;

- Provide advice on site preparation procedures for infrastructure, housing and agricultural projects so as to eliminate the risk of soil erosion and other environmental hazards;

- Participate in the formulation and implementation of policies and the review of legislation pertaining to environmental matters;

- Provide advice on sand and gravel extraction and ensure such activities are carried out in an environmentally sound manner.

In early 1990, the DOE had 9 professionals and senior managers, 19 intermediate cadres and technicians (forest officers, environment inspectors and park rangers), 16 administrative and secretarial staff and 171 forestry labourers, drivers and cleaners. Its total budget in 1990 was SR 6,700 000, of which SR 4.5 million was for the Forestry Division alone.

Both the staff and budget have been severely stretched to carry out all of these major responsibilities and functions. In addition, the DOE has had a major role in preparing the 1990-94 National Development Plan and the lead role in preparing the Environmental Management Plan for 1991-2000.

As the DOE will have the lead role in implementing many EMPS-90 projects and the overall responsibility for coordinating the implementation of the other EMPS-90 projects, both its staff and budget will need to be increased in order for this to be done effectively.

1.12 Environment Related Functions of Other Government Agencies :

All other Departments and Ministries and many parastatal organizations have at least some environment related functions and activities.

These are summarized for easy reference in Annex 2.

In particular, the following organizations play the most significant role :

Public Utilities Corporation (PUC) :

The Public Utilities Corporation, established in 1986, merged the former Seychelles Electricity Corporation and the Seychelles Water Authority.

The PUC mandate is to supply electricity and water and to provide sewerage facilities. In 1987, PUC assumed also the responsibilities to collect and dispose solid waste.

To carry out these functions, PUC is divided into two principal technical Divisions - the Electricity Division and the Water and Sewerage Division. It comprises as well a Finance Division and an Administration and Personnel Division.

The Water and Sewerage Division is responsible for water distribution, sewerage and solid waste collection.

It employs some 350 persons, of which 8 have completed university training. It is organized into 7 operational sections, namely the Distribution, Supply, Sewerage, Solid Waste, Workshop, Planning and Hydrology sections.

The DOE has parent responsibility for the Water and Sewerage Division of PUC. Both organizations work in close collaboration. The DOE has an important role of guidance and control in policy - making and planning of major investments, while the PUC is the Department's operational arm for water supply, sewerage and solid waste collection and disposal.

Ministry of Community Development - Land and Infrastructure Division :

The Land and Infrastructure Division exerts various important environment-related responsibilities:

- It is responsible for land use planning, and implementation of the `Plan d'Amenagement du Territoire' project.

- It exerts control on building construction and land development through the Planning Authority.

- It is in charge of controlling quarrying activities and delivering permits for sand abstractions under the Sand and Gravel Act', 1982.

- It is responsible for implementing structural works, including environmental engineering projects such as coastal protection structures, retaining walls, urban drainage and flood control projects.

For these reasons, a permanent dialogue and cooperation has been established, between DOE and MCD, and this collaboration will need to be consolidated and further strengthened over the Plan Period.

Seychelles Bureau of Standards (SBS) :

The Bureau of Standards will be responsible, in close collaboration with the DOE, for the establishment of environmental standards such as standards for air and water quality and emissions.

It will in addition provide laboratory facilities for analysis of samples in the framework of pollution monitoring activities to be established within the DOE.

Seychelles Fishing Authority (SFA) :

The SFA is responsible for the control and development of fisheries and, as such, for the enforcement of the Fisheries Act, which provides for the protection of marine species such as coral, shells and turtles.

Another area of collaboration between the DOE and the SFA, especially its Research Division, concerns stock assessments and resource management, in addition to research activities on marine and coastal environment.

Ministry of Tourism and Transport (MTT) :

The Port and Marine Services Division of the MTT is responsible for the control of polluting discharges from ships in the harbour and neighbouring waters. It will also have a leading role, under the planned oil spill contingency plan, for responding to accidental oil pollution.

The Tourism Division of the MTT is responsible for the cleaning of beaches, and for the creation and maintenance of nature trails.

Another major area of collaboration between the DOE and the Tourism Division is the touristic valorization of Seychelles' wildlife and natural parks.

Ministry of Health (MOH) :

The Environmental Health Division of the Ministry of Health is responsible for controlling the spread of diseases vectors such as rats or mosquitoes, for the control of the quality of potable water supplied by PUC, for controlling the quality of food products, and for controlling the conditions of hygiene in food-processing industries, restaurants and retailers in food products.

1.13 Inter-Agency Consultation and Cooperation :

There are two principal bodies with responsibilities for inter-Ministerial consultation, coordination and cooperation on environment.

- The Seychelles National Environment Commission (SNEC) is an inter-Ministerial advisory body on national environmental policies and the management of nature reserves.

  In the course of the revision of environmental legislation, and notably the 1969 National Parks and Nature Conservancy Ordinance which established the SNEC, and in the light of the new creation of the DOE, the role and functions of the SNEC will have to be reviewed.

- The project Appraisal Committee (PAC) is an inter-Ministerial committee of senior government officials under the chairmanship of the Minister for Planning and External Relations. It is responsible for the appraisal of development project proposals, the review of sector strategy and policy papers and the monitoring of project implementation.

  The PAC makes recommendations on these activities to the Council of Ministers. Projects are submitted for PAC consideration on a standard "Project Appraisal Form". That form now includes a section on environmental impact assessment supplied by DOE.

  The Principal Secretary of the Department of Environment is a PAC member.

In addition, there are three other bodies which also carry out project appraisal and licensing functions for activities which frequently have environmental implications which, at present, are largely unassessed :

- The Planning Authority for housing and construction activities.

- The Tourism Coordinating Committee (TCC) on tourism projects;

- The Licensing Authority which issues licenses and permits for a wide variety of activities and functions.

A major asset of the institutional arrangements in Seychelles is that a lot of inter-agency consultations and cooperation are carried out more directly, informally and efficiently through ad hoc meetings and occasional task forces rather than formal inter-agency structures.

One of the best and most recent examples of the efficiency and effectiveness of these less formal arrangements was the series of ad hoc workshops held in November 1989 to assess the state of environment and discuss priorities for action. Those meetings laid a solid and common foundation for the various contributions of all agencies for the 1990-94 National Development Plan and the EMPS-90.

Any new institutional arrangements for implementing the EMPS-90 should recognize and retain this exceptional institutional flexibility and capacity to cooperate on common problems.

1.2 Strengthening Institutional Arrangements for Implementing the EMPS-90 :

The government's commitment to improving environmental protection and achieving sustainable development by the year 2000 will require a strengthening of the present institutional arrangements and the related policy, planning and decision-making processes.

1.21 Strengthening the Department of Environment :

The DOE will have the lead role in implementing many EMPS-90 projects and the overall responsibility for coordinating the implementation of the other EMPS-90 projects. To do this effectively, both its staff and budget will need to be increased.

To better reflect and discharge its previous and new functions with regard to the EMPS-90, the DOE's work will be carried out by three main services :

- **The Forestry Service** (Division) consisting of the Forestry Unit and the Public Parks and Gardens Unit
- **The Environmental Assessment and Inspection Service** (Division) consisting of the Pollution Control and Inspection Unit and the Environmental Assessment Unit.
- **The National Parks and Conservation Service** (Division) consisting of the National Parks Unit and the Conservation Unit.

In addition to the advisory staff (2 Technical Advisers and an environmental economist), there would be three additional Units also reporting directly to the Principal Secretary :

- **The Finance and Personnel Section.**

- **The Environmental Law Unit.**

- **The Information and Education Unit.**

This proposed new organizational structure is depicted in Figure IV-1. The principal functions of the three services and other units are briefly described below.

Environmental Assessment and Inspection Service (Division) :

Pollution Control and Inspection Unit

- Provide technical advice and assistance to SBS in setting ambient and emission standards for air, water, marine and noise pollution.

- Conduct and coordinate monitoring, and collect samples (for testing at SBS lab) and data on air, water, marine and noise pollution emissions and ambient quality.

- Control and monitor refuse disposal.

- Identify and evaluate options for pollution abatement and with DOI/Technical Support Services and PUC-Sewerage Section, provide technical advice to other agencies and enterprises on pollution control technologies and practices.

- Make regular inspections to ensure that emission standards are respected, and collect and submit appropriate evidence on violations of the law.

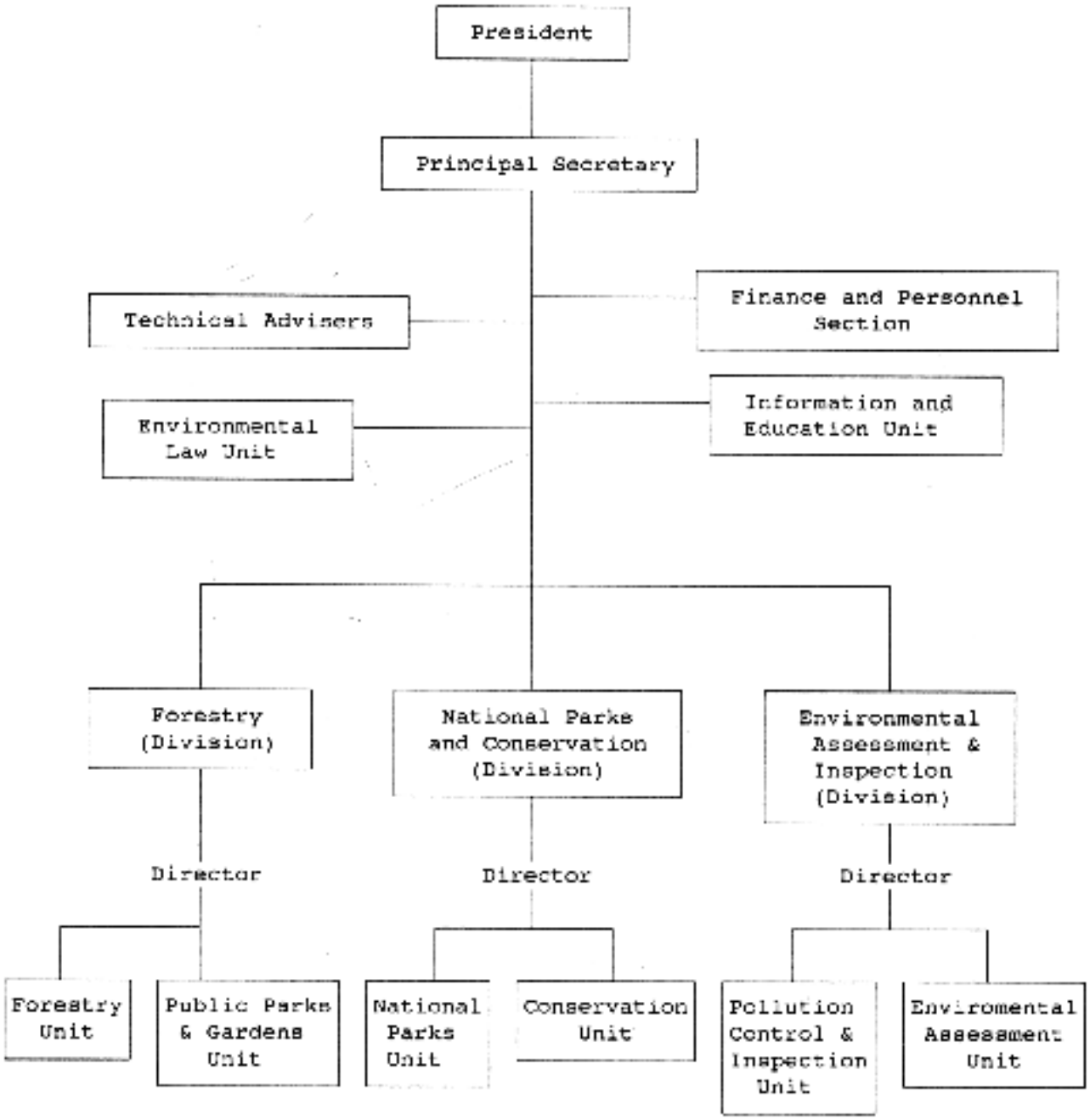
Environmental Assessment Unit

- Collect and assess data on the state of the environment and physical natural resources.

- Carry out or supervise assessments of the likely environmental impact of proposed economic and sectoral policies and development projects.

- Carry out and coordinate research and monitoring programmes on environmental and natural resource management issues (e.g. water resources management in land and coastal erosion, sand and granite quarrying).

Figure IV-1 : Proposed Organization for the Department of Environment



- Prepare and assist other economic and sectoral agencies in formulating appropriate environmental guidelines for development activities.

- Prepare and assist in disseminating public information on environment and natural resources management.

National Parks and Conservation Service (Division)

National Parks Unit

- Prepare and implement management plans for the national parks and nature reserves.

- Ensure routine maintenance and management of national parks (other than Morne Seychellois and Praslin) and nature reserves.

- Prepare and implement programmes and projects for improving and managing the national parks and nature reserves and making them more accessible (e.g. nature trails) and informative for the public.

- Prepare and assist in disseminating public information and education programmes on the national parks and nature conservation.

Conservation Unit

- Survey, monitor and protect endangered terrestrial and marine species and critical habitats.

- Evaluate the likely impact of development projects and activities on terrestrial and marine species, living resources and habitats.

- Ensure that laws concerning the protection of wildlife are respected and enforced.

- Implement and coordinate research, species and population inventories and other projects concerning the conservation and management of terrestrial and marine species, living resources and habitats.

- Monitor, assist, and where necessary coordinate foreign expeditions and research activities having an impact on terrestrial and marine species, living resources and critical habitats.

- Monitor and control the import and spread of exotic species and the export of endangered species and other wildlife.

- Prepare and assist in disseminating public information and provide advice and support to special education and training programmes on nature conservation.

Forestry Service (Division)

Forestry Unit

- Undertake and monitor all reafforestation programmes.

- Provide tree-felling services when dangerous trees are involved.

- Control and monitor all trees protected by law.

- Control the burning of wood for charcoal.

- Prevent and suppress forest fires.

- Ensure routine maintenance and management of the Morne Seychellois and Praslin National Parks.

Public Parks and Gardens Unit

- Provide flower planting and landscaping services.

- Maintain public parks and gardens, including the National Botanical Garden.

Advisory Staff

(Advisory staff have no line responsibilities and are directly attached to the Principal Secretary)

- Coordinate, monitor and report regularly on the implementation of the EMPS.

- Assist in formulating and reviewing policies and strategies for environmental protection and natural resource management.

- Carry out research on specific issues as assigned.

- Responsible for special projects and reports which cut across different levels of the organization.

- Assist in the preparation and formulation of project proposals and memoranda; liaise with PAC, and other government organizations as requested.

- Exert overall control on and liaison with dependent parastatals.

- Advise various DOE executive officers on matters pertaining to the performance of their duties.

Environmental Law Unit

- Provide advice and assistance to review and strengthen the legislation for environmental protection and natural resources management.

- Provide advice and assistance to the DOE and other inspectors on collecting and presenting evidence of non-compliance with environmental standards and laws.

- Review and provide all necessary evidence to the appropriate authorities for taking action on violations of environmental standards and laws.

- Provide advice and assistance to DOE and other agencies in applying environmental policies and laws.

Information and Education Unit

- Establish and maintain documentation centre, reference library and information system on environment and natural resources.

- Prepare and publish periodic reports on the state of environment and emerging trends and assist other agencies in the preparation of annual environmental audits.

- Coordinate and organize environmental training programmes in collaboration with MAM and other Government agencies.

- Encourage, advise and assist other Government agencies in carrying out environmental education and public information programmes.

Finance and Personnel Section

- Prepare, control and manage the annual budget.

- Recruit, help train, and manage personnel.

- Purchase and maintain inventory of supplies and equipment.

The Staffing requirements will be examined in Section 2 "Manpower implications".

Necessary equipment and facilities which will be required by the DOE for implementing the Plan are catered for under various EMPS projects, notably project B2 (pollution control equipment), projects G4 to G10 (equipment for the National Parks and Conservation Service and facilities for the national parks), H2 (forest fire fighting equipment) and L1 (documentation and information system).

1.22 Strengthening Environment Related Functions of Other Government Agencies :

Unlike in the DOE, there is no apparent need for any significant organizational change in other Government agencies for the implementation of the EMPS except, to some extent, in PUC Water and Sewerage Division.

The PUC Water and Sewerage Division is already implementing in a phased manner the recommendations formulated by the Gibb report on the `Mahe Integrated Water Supply Plan' concerning institutional arrangements, which mainly involve the Water Distribution and Water Supply Sections. The implementation of the various sewerage projects foreseen in the EMPS will obviously put a strain on the limited resources of the Sewerage Division, which will have to be reinforced. To this end, an organizational consultancy mission is planned under the on-going GVSP-phase I project, with a view to formulating recommendations on the organizational, staffing and training requirements of the PUC Sewerage Section. This mission, financed by the CCCE, is tentatively scheduled for August 1990.

Additional facilities and equipment required by other Government agencies for the implementation of the Plan are catered for under various EMPS projects. In particular, it is foreseen to expand the laboratory facilities at the SBS (project B2), to provide the Land Transport Division of the MTT with vehicle testing equipment (project B3), the PUC Solid Waste Section with additional vehicles and facilities for the collection of solid waste (project C8), and the Port and Marine Services of the MTT with equipment for fighting marine pollution from ships (project B5).

The staffing requirements of the other agencies are examined in Section 2 below.

1.23 Strengthen Inter-Agency Cooperation on Environment :

The successful implementation of the EMPS-90 will require close and regular consultations, coordination and cooperation among all government agencies.

There are several key factors which must be taken into account in considering how best to strengthen inter-Ministerial coordination and cooperation :

- The DOE will have the lead responsibility for many EMPS-90 projects and should take the lead in monitoring and coordinating many others.

- The EMPS is not a separate programme but is already an integral part of the 1990-94 National Development Plan.

- Different Departments and Ministries worked closely and successfully in both formal committees and informal workshops to prepare the National Development Plan and the EMPS and can continue to do so to implement both plans effectively.

- All agencies have limited staff resources which can readily be consumed by meetings.

It is therefore proposed to make effective use of existing inter-Ministerial mechanisms instead of creating additional systems.

It is proposed that the terms of reference of the existing inter-Ministerial Project Appraisal Committee (PAC) be extended to include monitoring and assessing progress on the implementation of the EMPS as well as the National Development Plan. In order not to confuse the two functions, the PAC could periodically be convened and meet in special sessions exclusively on the EMPS-90.

These PAC meetings might be followed, as suggested during the Technical Seminar, by special sessions of the Council of Ministers to ensure an appropriate coordination between all concerned agencies.

These meetings on overall progress in implementing the EMPS-90 would be supplemented by periodic ad hoc meetings or possibly even task forces focussing on specific issues or projects and involving only those officials and experts from the Departments and Ministries directly concerned.

In addition, two coordinating committees have been recently established with mandate to ensure proper inter-agency coordination in specific environment-related matters. These are :

- The "Coordinating Committee for Environmental Education and Training" (Re projects L2, L3 and L4).

- The "Technical Committee on Chemicals Management" (Re project B4).

One of the key objectives of the project A3 "Environmental Assessment Procedures" will be to assess the role and responsibilities of the DOE with regard to the approval procedures of other Government bodies which carry out project appraisal and licensing functions for activities which frequently have environmental implications, notably the Tourism Coordinating Committee, the Planning Authority and the Licensing Authority.

The expected outcome from this project will be to devise suitable liaison and coordination procedures for ensuring that environmental considerations are timely and properly taken into account in the corresponding approval or licensing processes.

In addition, it is proposed that the DOE be represented as a permanent member in the TCC and the Planning Authority.

Furthermore, it is suggested that senior DOE officials be appointed to the Board of Directors of parastatals whose activities have a direct impact on the environment, such as PUC, SFA, SHDC, SNOC.

2. Manpower Implications :

The effective implementation of the EMPS will, in the short term, put a strain on the limited resources of the concerned organizations in professional and skilled manpower. The recruitment of additional qualified personnel will clearly be required, notably within the DOE.

In the long term, it will be necessary to enhance both the environmental awareness and environmental management capability of a significant part of the working population of Seychelles.

2.1 Short-term Manpower Requirements :

2.11 Manpower Requirements for the Department of Environment :

In order to make fully operational the proposed new organization for the DOE, which is presented above in chapter 1" Institutional Implications", the appointment of the following key personnel is foreseen :

National Parks and Conservation Division

A qualified Director has been appointed in May 1990. It is foreseen to recruit and train :

- 1 Assistant Director (EP 44);

- 1 Park officer (EP 39) to Head the National Parks Unit;

- 1 administrative officer (EP 30);

- 2 field inspectors for the Conservation Unit (EP30)/ (Re project G1, G8 and J1);

- 7 additional park rangers for the National Parks Unit / (Re project G4 and G9);

- 1 Secretary.

The above positions would be filled by local personnel.

In addition the Division is expected to benefit from the assistance of two expatriate volunteers to assist the Director in i) the routine supervision and guidance of the marine park rangers and ii) the implementation of the project G4 (Rehabilitation of Curieuse National Park).

Environmental Assessment and Inspection Division

This service, which will to a large extent perform functions which did not exist previously will need to be particularly strengthened. Available personnel at present consist of one professional (presently Assistant Director for Environment) and 3 Environment Inspectors. It is necessary to recruit:

- 1 Director (EP 52), preferably with a profile of environmental engineer;

- 2 technicians (EP 36) for the environmental assessment Unit with a background in environmental engineering and/or urban planning;

- 1 administrative assistant (EP 30);

- 1 chemist (EP 44) and 1 additional Environment Inspector (EP30) to ensure pollution monitoring (Re project B2);

- 1 Secretary (EP 17).

Information and Education Unit

This Unit should be composed of 1 head of Unit (EP 44), 1 Documentalist (EP 30) and 2 Secretaries. One Secretary is available. The appointment of a qualified Documentation officer is required in priority.

Environmental Law Unit

The provision of one Technical Assistant for 18 months is foreseen under project K1. The recruitment of a counterpart lawyer (EP 48) and one Secretary is foreseen.

The Forestry Division, and the Finance and Personnel Section appear adequately staffed at present.

The above appointments should enable the DOE to face adequately the increased workload resulting from the implementation of the Plan, and to establish a nucleus of operational services for environmental protection and natural resource management. However, the proposed staffing will be reviewed and adjusted if needed in the course of implementation of the EMPS.

In order to fill the newly created positions, priority will be given to recruitment of available local personnel. However, it will probably be necessary to resort to expatriate staff under local contract or from technical assistance schemes for some of these posts, notably the chemist, the Documentation officer, the lawyer and one of the environmental technicians.

2.22 Manpower Requirements for Other Organizations :

Public Utility Corporation

The implementation of the sewerage and solid waste component of the EMPS will necessitate the appointment of additional staff in the Sewerage and Solid Waste sections of PUC Water and Sewerage Division.

At present, the Sewerage Section comprises one engineer, one technician and 8 to 10 field personnel for the network operation and maintenance. A French Technical Adviser to the Water Manager provides part time assistance to the section.

Following the organizational consultancy planned to take place soon in the framework of the GVSP project, the precise staffing requirements of this Section, notably in technical staff for the operation and maintenance of the treatment and collection facilities, will be precisely identified, and the section reinforced accordingly.

The Solid Waste Section comprises some 40 people, viz 1 superintendent, 2 assistants, 4 foremen, 6 drivers and 30 workers. The implementation of project C8 will require the appointment of a few additional drivers and workers for the improvement of the collection system and of 12 to 15 people for the operation of the solid waste treatment plant and compost distribution.

Other Organizations

The manpower implications of the implementation of the EMPS will be insignificant for other concerned organizations. Limited staff will have to be appointed at the Land Transport Division for operating the vehicle testing station (project B3), at the Department of Industry for implementation of the Energy Conservation programme (project F1) and, within the Craft Section, for the control of trade in turtle shell (project J1). One coordinator will have to be recruited by the Ministry of Education for implementing the environmental education programme (L3).

2.23 Consultancy Services and Technical Assistance :

In addition to the appointment of new staff, as explained above, it is foreseen to make significant use of external expertise and technical assistance to ensure the implementation of the EMPS.

310 man months of external consultants for short term expertise (from 2 weeks to 6 months) or scientific research are foreseen over the ten years Plan period.

In addition, mid or long-term technical assistance is foreseen in the following critical areas :

- Hydrology and Water Management : 2 years (E6)

- Energy Conservation : 10 months (F1)

- Preparation of Marine Resource Management Plans : 2 years (J3)

- Revision of Environmental Law : 18 months (K1)

- Environmental Education : 2 years (L3).

Finally, the Plan provides for SR 11.2 million for design studies of sewerage works to be executed by engineering consultancy firms, a further SR 19.2 million for consultancy services for work supervision, and 5.5 million for baseline research studies to be executed by foreign research institutions.

2.2 Long-term Manpower Requirements :

A total amount of SR 2.5 million has been foreseen for training expenses into various projects of the EMPS. Furthermore, in virtually all cases, it is intended to build a significant local counterpart training component into most consulting contracts as well as special requirements in key contracts for giving public lectures in schools and adult education programmes.

In addition, it is envisaged to provide special incentives for retaining qualified Seychellois in environmentally related disciplines and professions. In particular, the possibility of upgrading the recruitment level, pay scale and scheme of service for park rangers, which at present appears to low to ensure their proper qualification and motivation, will be thoroughly examined with the Ministry of Administration and Manpower.

For the longer term, the projects L3 and L4 of this Plan are designed to expand and strengthen environmental education in schools, and to increase local awareness and capacity in environment management amongst various professions and decision-makers.

Through these and other measures we aim to increase local technical capacity to implement the EMPS 90 and gradually reduce by and after the mid - 1990's the country's requirements for external expertise.

3. Financial Implications

3.1 Costs of the Investment Programme :

The Investment Programme of the EMPS comprises 51 projects, of which six are regional in scope, or include a regional component which is to be implemented simultaneously in Seychelles and other participating countries.

The total capital cost of the national component of the Investment Programme is SR 262.075 million, of which 77.6 % is designated for sewerage, water supply or solid waste treatment works (incl. engineering studies), 5 % for equipment and buildings, 10.2 % for consultancies, and 7.2 % for other items (Refer to figure IV-2).

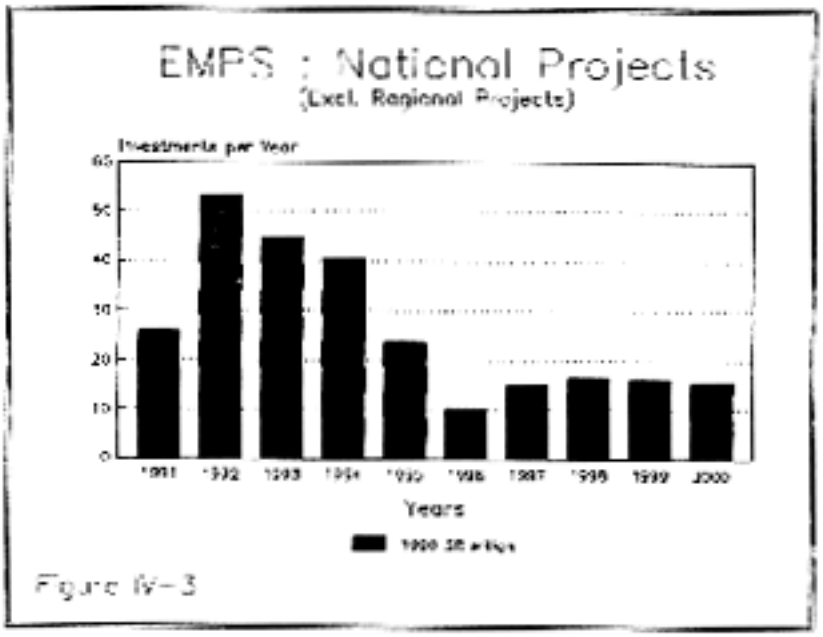


Figure IV-3

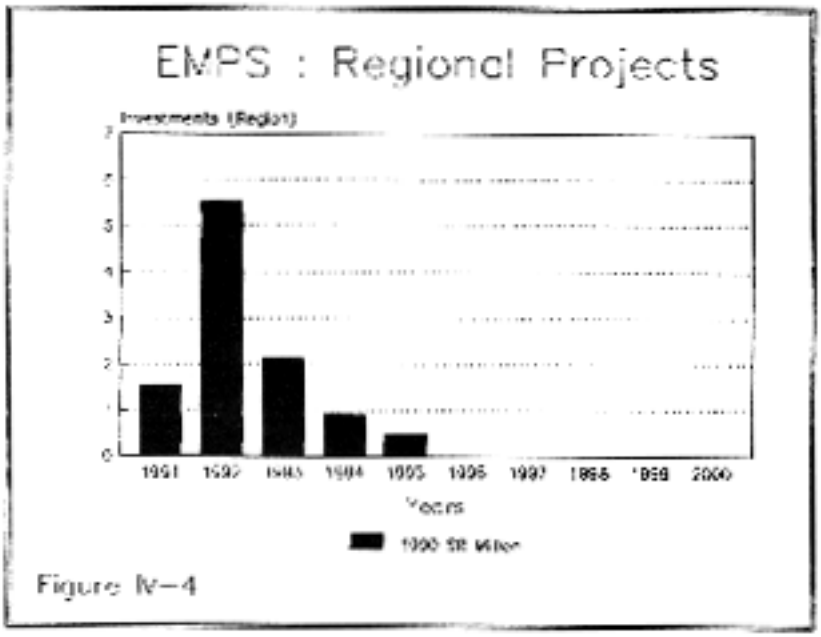


Figure IV-4

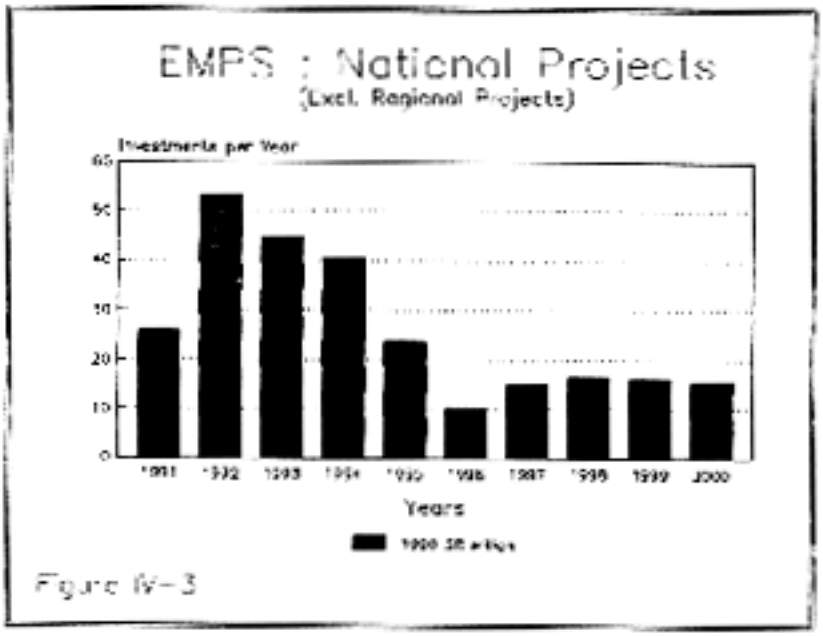


Figure IV-3

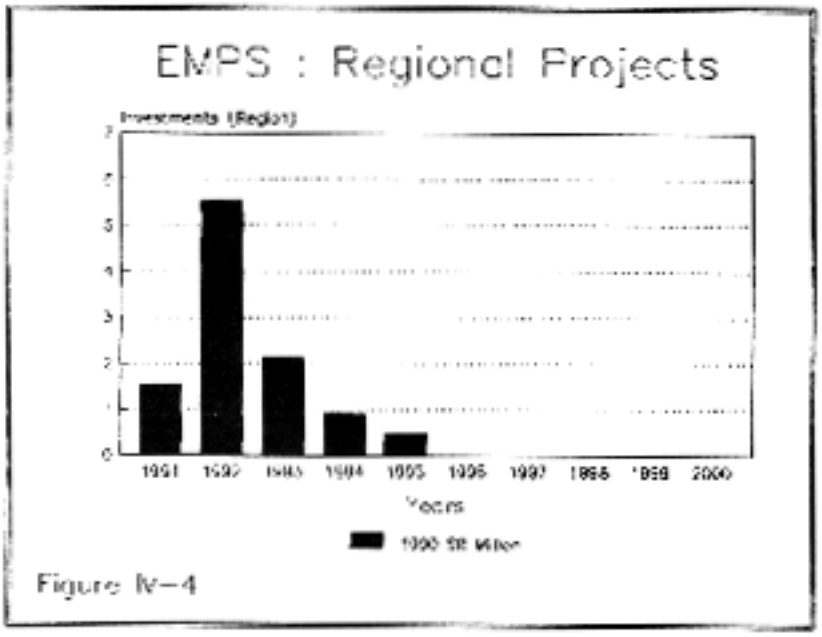


Figure IV-4

3.2 Implications on the Seychelles' Capital Budget :

It is important to examine the implications of the investment programme on the overall economy and financial balance of the country. While it is necessary to invest today to protect the country's environment and resource base essential for future development and welfare of later generations, it must also be ensured that present investments do not pass on an unsustainable debt-servicing burden to future generations.

3.2.1 Impact on Public Investments :

One basis for comparison for the EMPS expenditures is provided by the Macroeconomic Framework in the 1990-94 National Development Plan (Chapter 6 of the NDP).

It is argued there that total fixed capital formation of the order of SR 355 million per year (in constant 1989 SR) would be sustainable for the Seychelles economy, on the basis of reasonable assumptions about overall financing conditions. Of this, some SR 150 million to SR 200 million per year could be expected to be in public sector (Parastatal plus Government), based on past patterns.

This implies that total expenditures under the EMPS would average 13.1 % to 17.4 % of total public sector capital formation. Given that the EMPS includes a number of large infrastructure projects for water and sewerage, this does not seem unreasonable or unmanageable, in the light of past experience. For instance, in 1989, out of some SR 160 million of public investments, some of SR 113 million, i.e. 70 % have been devoted to non directly productive expenses in the field of transport, infrastructure, utilities, education, health and housing.

3.2.2 Impact on Debt Servicing :

The implementation of the EMPS will require a total expenditure of SR 262 075 million over the 10 year period to the year 2000, excluding the SR 10.57 million of regional projects. The full financial implications of implementing this program are difficult to estimate however in advance of the donors meeting, without knowing the terms on which the program can be financed.

Nevertheless, informed estimates can be made concerning which components might be financed by grants, and which by concessionary loans. In addition, further assumptions can be made concerning the terms on which concessionary financing would reasonably be available. The financial impacts discussed in this section are, therefore, based on the following assumptions :

- The entire regional component of the Investment Programme as well as a minimum amount of SR 60.975 million of the national component would be financed either from local budgetary resources or through grants.

- The remaining part of the programme, i.e SR 201.1 million, which correspond to the major infrastructure projects related to sewerage, water supply and solid waste treatment facilities, would be financed through loans.

Figure IV-5 below summarize the source of financing of the EMPS, based on the above assumptions.

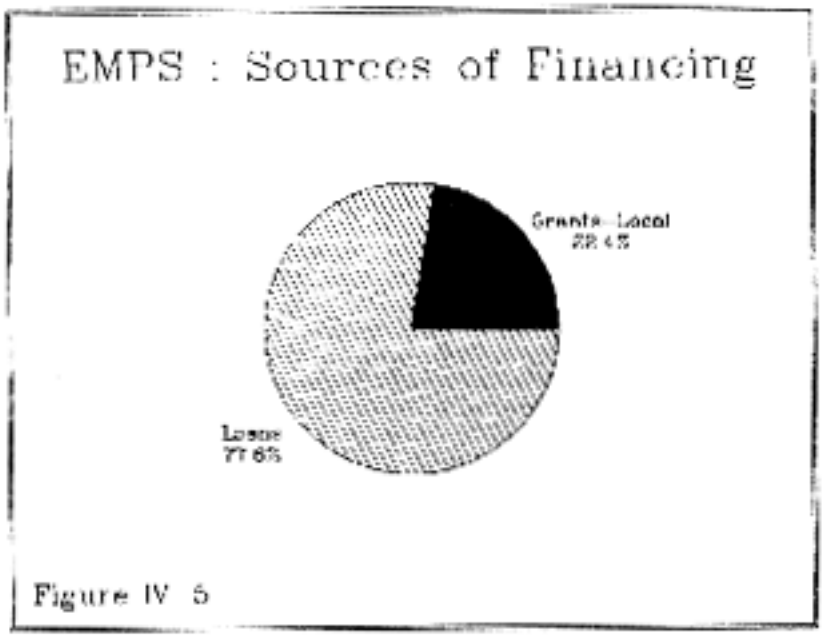


Figure IV 5

Average capital expenditure for the EMPS component financed by loans would amount to 20.11 million per year, with a peak planned to occur in 1993 when EMPS loan disbursements would reach SR 36.35 million (refer to table IV-1 and IV-2 below).

It should be noted that the first version of the EMPS was reviewed and extensively discussed at the International Technical Seminar held in Seychelles (September 1990).

As a result of this Seminar, some of the major investment projects in the EMPS were re-scheduled in order to reconcile financial with technical constraints and priorities. The revised present investment programme reflects a consensus between technical and financial experts.

Two hypothesis have been made with regard to the borrowing terms and conditions :

Hypothesis 1 corresponds to very concessional loans : 5% interest rate, 5 years grace period with respect to repayment of principal, 15 years to maturity.

Hypothesis 2 corresponds to the "8.5% credit conditions" assumed in chapter 6 (The Macroeconomic Framework) of the NDP, i.e to a realistic mix of concessionary and commercial borrowing (8.5% interest rate; 3 years grace period, 9 years maturity).

The debt service implications of expenditures of this magnitude are summarized in Tables IV-1 and IV-2 using the two hypothesis set out above regarding borrowing terms and conditions.

With hypothesis 1, the debt servicing induced by the implementation of the EMPS would reach the range of SR 20 to 25 million in year 2000, for 7 consecutive years.

If we refer to the "total foreign debt servicing capacity of the country", defined by the Ministry of Finance as 15 % of Seychelles foreign exchange earnings, the foreign debt burden induced by the EMPS would represent, at its highest level, less than 8% of this capacity, which appears affordable (Refer to Figure IV-6, which also displays the impact on foreign debt servicing capacity of the "initial" investment programme before the revision by the Technical Seminar).

With Hypothesis 2, the debt servicing would reach SR 30 to 35 million by 1998 and remain at a comparable level for 4 consecutive years. This peak period of repayment, would represent about 13% of foreign debt servicing capacity of the country (see figure IV-7).

Given the investments planned in other economic sectors under the NDP, it appears unlikely that the Seychelles economy could reasonably afford such a high level of investment in the environmental sector. In this case, the implementation of some 'priority 3' projects would have to be delayed beyond the next decade.

It clearly appears that the implementation of the EMPS 90 as per schedule will depend to a great extent on the ability of Seychelles to mobilize sufficient grant and concessionary funding.

Table IV-1 : Simulation of Debt Servicing, Hypothesis 1 (*)

(SR 000's)

Year	1991	1992	1993	1994	1995
Disbursement	9570	35000	36350	34880	20750
Repayment :					
of Interest		479	2229	4046	5790
of Principal		0	0	0	0
Total Repayment		479	2229	4046	5790
Year	1996	1997	1998	1999	2000
Disbursement	7750	13350	14850	14350	14250
Repayment :					
of Interest	6828	7215	7835	8354	8667
of Principal	0	957	4457	8092	11580
Total Repayment	6828	8172	12292	16446	20247
Year	2001	2002	2003	2004	2005
Repayment :					
of Interest	8801	8118	7396	6608	5746
of Principal	13655	14430	15765	17250	18685
Total Repayment	22456	22548	23161	23858	24431
Year	2006	2007	2008	2009	2010
Repayment :					
of Interest	4811	3806	2848	2066	1465
of Principal	20110	19153	15653	12018	8530
Total Repayment	24921	22959	18501	14084	9995
Year	2011	2012	2013	2014	2015
Repayment :					
of Interest	1038	716	432	214	71
of Principal	6455	5680	4345	2860	1425
Total Repayment	7493	6396	4777	3074	1496

(*) : Interest Rate : 5 %, Grace Period : 5 Years, Duration : 15 Years.

Table IV-2 : Simulation of Debt Servicing, Hypothesis 2 (*).

(SR 000's)

Year	1991	1992	1993	1994	1995
Disbursement	9570	35000	36350	34880	20750
Repayment :					
of Interest		814	3789	6878	9843
of Principal		0	0	0	1595
Total Repayment		814	3789	6878	11438
Year	1996	1997	1998	1999	2000
Disbursement	7750	13350	14850	14350	14250
Repayment :					
of Interest	11471	11499	11487	11109	10394
of Principal	7428	13487	19300	22758	24050
Total Repayment	18899	24985	30787	33867	34444
Year	2001	2002	2003	2004	2005
Repayment :					
of Interest	9560	7463	5651	4150	2942
of Principal	24680	21322	17655	14217	10758
Total Repayment	34241	28785	23306	18367	13700
Year	2006	2007	2008	2009	
Repayment :					
of Interest	2027	1223	607	202	
of Principal	9467	7242	4767	2375	
Total Repayment	11494	8464	5374	2577	

(*) : Interest Rate : 8.5 %, Grace Period : 3 Years,
Duration : 9 Years.

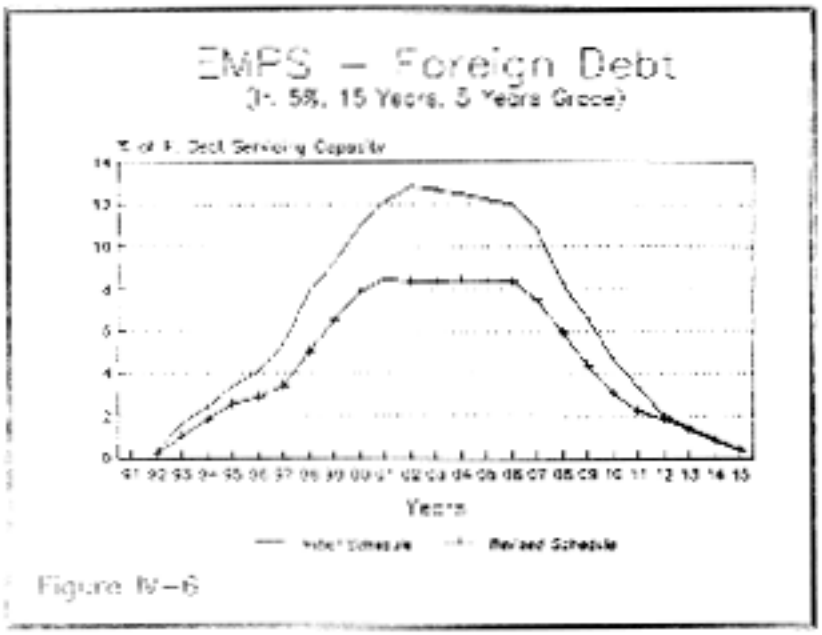


Figure IV–6

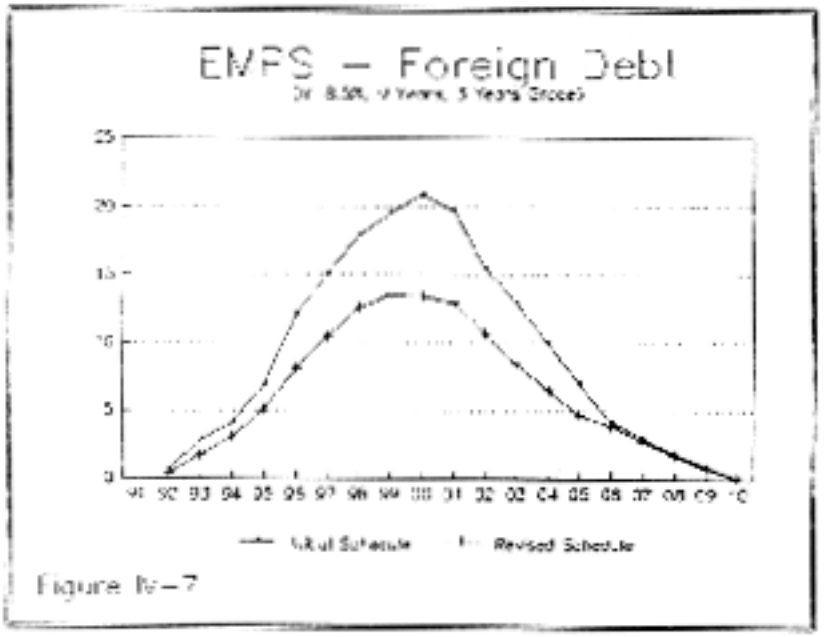


Figure IV–7

3.3 Implications on the Recurrent Budget of the Implementing Agencies :

3.31 Department of Environment :

The new appointments foreseen within the DOE (see "Manpower implications above) would incur incremental salary charges of some SR 862 000 per year. Taking into account the charges induced on other budgetary headings, such as administration costs, travel allowances, consumable materials, transportation and vehicle maintenance, the total incidence of the implementation of the EMPS on DOE recurrent expenditures budget are estimated at SR 1.4 million per year.

This would represent an increase by 21% of the present annual recurrent budget of the Department.

Owing to the fact that the 1990 budget of the DOE was a tentative budget for a newly created administrative department, and to the negligeable weight of such an amount in the overall current budget of the Government, the proposed budgetary increase appears quite reasonable and affordable.

3.32 PUC :

The present financial guidelines for the PUC Water Division require that the revenues derived from the charges for water supply and sewerage services should meet the total operating costs of the Division.

The sizeable sewerage and solid waste projects foreseen in the EMPS, which represent about three quarters of its total value, will induce important recurrent charges on the PUC budget for the operation and maintenance of the collection and treatment facilities.

Moreover, the development of costly water-borne sewerage systems will lead the Government to review and streamline its policy on cost recovery . By precautions, it has therefore been assumed that the capital costs of the new projects will also have be recovered through the water tariff, and will appear in PUC budget in the form of depreciation charges.

As a consequence, the incremental charges induced by the implementation of the sewerage and water component of the EMPS will have to be matched by increased revenues from the water tariffs. The question which arises is whether the recurrent costs induced by the implementation of the planned sewerage and solid waste projects won't lead to an increase in the water tariffs which would be socially or politically unacceptable. An attempt has been made to examine this question below.

Incremental Charges From Sewerage and Solid Waste Projects :

Accurate estimates of the operation and maintenance charges of the sewerage projects will not be available until the corresponding feasibility studies are completed, and will also depend on the treatment options (oxydization plants, stabilization ponds or long sea outfalls) which will be chosen in each case.

At present, only tentative rough estimates can be made on the basis of the results of the feasibility study for the Beau Vallon Bay Sewerage project, and of the prefeasibility study done by SOGREAH on the treatment and disposal facilities for the Greater Victoria area.

Estimates of operation costs for the planned Solid waste treatment plant are based on the ANRED study.

Depreciation charges have been based on estimates of the useful life of each category of fixed assets and levied on a straight line basis.

Depreciation periods used are:

- Pipelines and associated civil works : 50 years;

- Mechanical and electrical equipment (i.e treatment plants and pumping stations) :

  Major items : 15 years; Others : 5 years.

Projections will be made for the year 1995, by which time the Greater Victoria sewage treatment plant, the first phase of the Beau Vallon and the Anse Volbert sewerage systems will be operational, as well as for the year 2000, by which time 50% of the Greater Victoria network extensions as well as the Beau Vallon network extensions will be completed.

Estimates of recurrent charges by year 1995 and 2000 are displayed in Table IV 3. Only incremental costs as compared to the present situation are taken into consideration and all computations are done at 1990 prices.

Incremental Revenues and Savings :

Four categories of incremental revenues or savings can be expected from the implementation of the sewerage and solid waste projects.

a) Savings in Charges for Maintenance of Septic Tanks :

PUC has mandate to maintain septic tanks free of charges. The corresponding cost to PUC budget is estimated at SR 915,000 per year.

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Table IV - 3 (Continued)

Estimate of Incremental Recurrent Charges on Sewerage and Solid Wastes Projects (SR Million, Year 2000)

Project/Cost Item	Operation and Maintenance	Depreciation	Total Recurrent Charges
Victoria network	0.7	-	0.7
GVSP treatment	3.0	2.17	4.74
GVSP-network extensions (C2)	0.8	1.31	2.11
Beau Vallon Sewerage	0.45	1.84	2.29
Anse Volbert Sewerage	0.2	0.48	0.68
Solid waste projects	2.6 (1)	-	2.6
Common charges	0.6	-	0.6
Total	8.35	5.8	14.15

(1) Includes Depreciation Charges

The connection of number of habitations to public sewerage system will decrease accordingly the number of septic tanks to be maintained, and induce savings on this cost item.

b) Sales of Compost :

The solid waste treatment plant is expected to produce 4,000 tonnes of compost a year. It is assumed that the net sale price of this compost, after deduction of distribution charges would be about SR 100 per tonne at the project outset, and, once the consumers get used to the product, could increase progressively to SR 200 per tonne, which compares favorably with the present price of manure.

c) Revenues from Solid Waste Collection Contracts :

The present revenue (1989) from contracts for door-to-door solid waste collection services amounts to SR 1.15 million.

The ANRED study showed that the present contract prices do not recover the actual cost of this service. Significant increases in the contract prices can therefore be planned, as a good managerial measure. Since the suscribers are mainly hotels, trade and office premises, such increase is not likely to have any significant social impact.

d) Revenues from Sewerage Charges :

The existing water tariff, set in April 1987, comprises additional sewerage charges, based on water consumption, and levied on consumers connected to a public sewerage system.

The present water tariff is displayed in Table IV-4.

At present, the revenue levied in Victoria are nominal (SR 110,000 per year) given the very few premises connected to the sewerage system. These revenues are expected to increase in proportion to the expansion of the public sewerage systems.

Estimates of these incremental revenues are computed in Table IV-5.

Table IV-4

Water Tariff (April 1987)

Water Charges and Sewerage Supplement Inclusive of 5% Trade Tax	Water Charge SR	Sewerage Charge SR
Trade Premises		
In respect of monthly consumption of water :		
Not exceeding 5 M3, a fixed charge of	42.10	11.25
Between 5 M3 and 100 M3	8.42/M3	2.37/M3
Exceeding 100 M3	13.16/M3	3.68/M3
Plus a fixed monthly charge of :	5.26	
Premises Other than Trade Premises		
In respect of monthly consumption of water :		
Not exceeding 5 M3 a fixed charge of	10.55	3.75
Between 5 and 15 M3	2.11/M3	0.75/M3
Between 15 M3 and 50 M3	6.31/M3	1.84/M3
Exceeding 50 M3 and 100M3	7.37/M3	2.10/M3
Exceeding 100 M3	9.47/M3	2.90/M3
Plus a fixed monthly charge of :	5.26	

Table IV-5

Estimate of Incremental Revenues from Sewerage and Solid Waste Projects

1. Computation of Revenues from Sewerage Charges :

Year	1995		2000	
Sewerage System	Estimated Waste Water Flows (M3/day)	Annual Sewerage Charges (*)	Estimated Waste Water Flows (M3/day)	Annual Sewerage Charges (*)
Greater Victoria				
Domestic	1670	) 6.85	2920	) 11.47
Large consumers	3600	)	6000	)
Beau Vallon				
Domestic	200	) 0.38	630	) 0.88
Large consumers	290	)	350	)
Anse Volbert				
Domestic	92	) 0.69	351	) 0.78
Large consumers	400	)	450	)
Domestic	-	-	900	) 0.75
Large consumers			200	)
Total		8.12		13.13

* in SR Million

Table IV-5 (Continued)

The computation of revenue estimates is based on estimated sewage flows with the following assumptions :

- Household connections :

  Average water consumption : 140 l pcd x 5 = 700 l pcd
  i.e 21 M3 per month.
  Corresponding sewerage charges : SR 22.3 per month
  Average revenue : SR 1.06/M3 of water consumed.
  Discharge factor - 0.85
  Average revenue = SR 1.25/M3 of discharged effluents.

- Large consumers (trade premises) :

  Sewerage charges for a monthly consumption of 300 M3 = SR 972
  Average revenue = SR 3.24/M3 of water consumed
  Discharge factor - 0.7
  Average revenue = SR 4.63 SR/M3 of discharged effluents
  (for larger consumers, average revenue would increase up to SR 5.25/M3 of effluent)

2. Incremental Revenues from Sewerage and Solid Waste Projects :

Revenue Item	Year 1995 *	Year 2000 *
Sewerage charges	8.1	13.1
Savings on septic tank maintenance	0.3	0.4
Sales of Compost	0.4	0.9
Price increases in solid waste collection contracts	0.6	1.2
Total	9.4	15.6

* in SR Million

Overall Impact of the EMPS on PUC Budget :

The results of the computation of incremental recurrent charges and revenues induced by the EMPS sewerage and solid waste projects are summarized below (in SR million) :

	1995	2000
Incremental Recurrent Charges	9.99	14.15
Incremental Recurrent Revenues	9.40	15.60
Net surplus/deficit	+ 0.54	- 1.45

Given the approximation of the above calculations, it appears that incremental revenues would globally meet the incremental recurrent charges induced by the EMPS sewerage and solid wastes projects, without necessitating a revision of the sewerage charges under the general tariff.

3.33 Other Agencies :

The recurrent charges induced by the implementation of EMPS projects for other agencies are nominal and can be easily absorbed by normal budgetary increases in the concerned organizations.

Finally, it is worth mentioning that it is envisaged to mobilize locally additional resources through the introduction of an environmental tax levied on hotel nights. At a modest rate of SR 5 per night, such a tax would be rather painless once included in hotel rates, and would generate some SR 4.6 million per year (total visitor nights amounted to 921,000 in 1989).

This additional resource would enable to cover both capital and recurrent expenditures of various porjects which are of mutual interest for tourism and environment, such as the cleaning of beaches or remarkable natural sites, the editing of books and informative brochures on natural life, the creation of amenities for visitors in the national parks.

4. Towards Sustainable Development :

The 1990-94 National Development Plan and this Environmental Management Plan for 1991-2000 represents Seychelles' first comprehensive attempt to consider and integrate environmental protection and natural resource implications into all the major economic sectoral policies and strategies. With both Plans the nation commits itself throughout the 1990's and beyond to a sustainable development path.

A great deal of the time, thought and energy of some of our best people and advisers has been invested in preparing this Plan. The challenge is now to convert the many proposals in this EMPS into practical, timely and effective action.

In doing so we will invevitably learn a great deal more about what could and should be done further. Seychelles intends to share that experience with other interested countries through, for example, the UNEP-led inter-agency project on integrating environmental considerations into development policy and planning.

Our own experience and that of other countries will help to prepare and implement an even more fully integrated and sustainable National Development Plan for 1995-99.

Seychelles wants to be able to look forward to the 21st Century with the knowledge and security that this generation did put the country firmly on a sustainable development path and thus fulfilled its principal obligations to the youth and future generations of Seychellois.