

EXECUTIVE SUMMARY

This is the final report of the regional project RLA/93/G41 "Planning and Management of Heavily Contaminated Bays and Coastal Areas in the Wider Caribbean" . The participating countries in the project were Colombia (Cartagena Bay), Costa Rica (Puerto Limon), Cuba (Havana Bay) and Jamaica (Kingston Harbor). Figure 1 presents a map of the Caribbean showing the location of the four project sites.

The project had three main objectives as follows:

1. Develop Integrated Investment Action Plans for the rehabilitation and management of the bays and surrounding coastal areas.
2. Formulate Institutional Strengthening Proposals to improve the operational capacities of those institutions responsible for bay management.
3. Identify Sources of Financing for the implementation of proposed remedial action plans.

The project is the largest pre-investment grant financed by the Global Environmental Facility (GEF) under its concluded pilot phase program. The project has been implemented by the United Nations Development Program (UNDP) and executed by the United Nations Office for Project Services (UNOPS) from November 1995 to May 1998.

The project achieved the following results:

- The present environmental conditions of the bays and coastal zones were identified including the impact on their biodiversity and their regenerative capacity.
- Inventories of point and non-point sources of pollution were brought up to date including sewage, agricultural discharges, industrial and solid waste.
- A proposal to restructure the institutions responsible for bay management and to improve the legislative framework guiding economic activity to sustain remedial actions was issued.
- An integrated investment action plan for the rehabilitation of the bays and coastal areas was formulated to be implemented in the next 5, 10 and 15 years.
- An integrated inter-institutional management plan aimed at increasing the coordinative, managerial, planning and enforceable capacities of the institutions responsible for bay and coastal zone management was developed.
- A capacity building program to further develop the technical and scientific capacities of the research institutions involved in environmental studies of bays and coastal areas was developed.
- Regional and national workshops were carried out to promote exchange of information, institutional cooperation and replicate project-related experiences in the Caribbean.
- The countries environmental institutions were equipped and strengthened. Scientific equipment, modern office and communication systems and vehicles were provided.

Integrated Investment Action Plans were developed and Tables 1, 2, 3 and 4 present a summary of the proposed investments at 1998 constant price levels.

CARTAGENA BAY

Table 1

INVESTMENT ACTION PLAN

INVESTMENTS	Short term 0-5 years	Medium term 5-15 years	Long term + 15 years	Cost M USD 1998
Action Plan to Complete the Rehabilitation of the Sewer and Storm Drainage Systems				117.5
Action Plan and Strategies for the Mitigation/ Elimination of the Main Sources of Industrial Contamination.				13.2
Action Plan for the management of Urban and Industrial solid waste.				2.7
Action Plan to create the Marine-Port Cleaning System				6.9
Action Plan for the reduction of the contamination produced by the Canal del Dique.				8.2
Action Plan to Create the Environmental Surveillance Permanent System.				5.2
Action Plan for Institutional strengthening.				0.5
TOTAL INVESTMENT REQUIRED MILLIONS US \$				154.2

NOTES:

1. The total amount has been rounded off.
2. The overall estimate to rehabilitate the bay is estimated in excess of USD 154 million. However, Cartagena Bay has projects in execution or financing committed for about USD 137 million, that is, about 89% of the total is already financed. Therefore, only 11% of the total amount estimated needs to be financed. Details of the investment plans are presented in the National Coordinator's country report and in Output 1.4.

PUERTO LIMON

Table 2

INVESTMENT ACTION PLAN

INVESTMENTS	Short term 0-5 years	Medium term 5-15 years	Long term + 15 years	Cost M USD 1998
Center for Environmental Coordination				0.6
Integrated Solid Waste Management and Control				3.3
Waste Management generated by Maritime-Port Activities				0.4
Mitigation-Alleviation of pollutants of industrial origin				0.12
Control-reduction of the effects of agrochemical waste				0.15
Environmental monitoring program for Puerto Limon				1.6
Pollution reduction from domestic liquid waste				9.1
Control-reduction-mitigation of hospital solid and liquid waste				0.6
Inventory of small, medium and large informal enterprises				0.03
Research program for the integrated management of the maritime-coastal area				3.5
Rehabilitation of the sanitary infrastructure of Puerto Limon				9.9
Submarine outfall for Puerto Limon				2.2
Blue Flag program				1.3
TOTAL INVESTMENT REQUIRED MILLION US \$				32.7

NOTES:

1. The total estimated amount has been rounded off.
2. The largest investments including the outfall and up to 50% of the new sewer system for Puerto Limon have financing commitments from the Inter American Development Bank.

HAVANA BAY

Table 3

INVESTMENT ACTION PLAN

INVESTMENTS	Short term 0-5 years	Medium term 5-15 years	Long term + 15 years	Cost M USD 1998
Treatment and disposal of the pollution from tributaries to the bay.				22.6
Dredging and disposal of contaminated sediments				14.9
Strengthening of maritime-port activities				4.8
Solid waste management that affect Havana bay and the Luyano river				1.2
Environmental monitoring program for Havana bay .				0.04
TOTAL INVESTMENT REQUIRED MILLION US \$				43.5

NOTES:

1. The total amount has been rounded off.
2. The total amount estimated for the rehabilitation of Havana Bay does not include investments for improving the environmental conditions in the surrounding coastal areas.
3. The criteria utilized has been to focus on the Havana Bay basin as its direct zone of influence from the Havana City. None of the above estimated investment has financing assured.

KINGSTON HARBOR

Table 4

INVESTMENT ACTION PLAN

INVESTMENTS	Short term 0-5 years	Medium term 5-15 years	Long term 15 years	Cost M USD 1998
Sewage Collection, Treatment and Disposal				163.6
Program to deal with Sedimentation				34.0
Capacity Building and Institutional Strengthening				5.8
Public Education Program				4.5
Facilities & Systems for Ship Waste Management				3.0
Solid Waste Management				0.4
Rio Cobre Watershed Management.				0.3
TOTAL INVESTMENT REQUIRED MILLION US \$				211.6

NOTES:

1. The total estimated amount has been rounded off.
2. To rehabilitate Kingston Harbor USD 211 has been estimated. It includes the construction of all the sewer system of the city of Kingston that impacts in the Harbor. No financing has been secured so far.

In addition to the above the project formulated a follow up phase for short term pilot or demonstration projects to initiate a gradual process of control and rehabilitation of the bays and coastal areas. Tables 5, 6, 7 and 8 presents a summary of the proposed actions for the immediate follow up phase.

The project has identified in each country weaknesses to the adoption of best practices that limit contamination of the international waters environment. These weaknesses are barriers that need to be removed if progress is to made towards rehabilitating the bays and coastal areas and impacting in the global environment.

The increasing eutrophication of Havana Bay, Cartagena Bay and Kingston Harbor demand immediate action to arrest transboundary contaminants such as nitrates and phosphorous from untreated or poorly treated sewage and from agrochemical runoff or pesticides. The latter being the case for Puerto Limon.

Consequently, the second phase project to be financed under the Contaminant-Based Operational Program briefly described below, includes projects that help demonstrate ways of overcoming barriers by solving the contamination problem by nutrients in the Wider Caribbean. Removal of other barriers are also the backbone of the pilot projects, not only

technological barriers but also financial and institutional. Lack of information, lack of training, and lack of access to sources of financing have also been identified. Legal, regulatory and sector policy adjustments are also needed. Innovative technologies that can be applied elsewhere in the region characterize the projects.

PROPOSED IMMEDIATE FOLLOW UP PHASE

Table 5 Colombia Case

COLOMBIA (Cartagena Bay)				
<ul style="list-style-type: none"> • Institutional Strengthening 				
<ul style="list-style-type: none"> • Improvement and strengthening of the incentive framework for environmental policy in Colombia and establishment of the basis for the use of innovative instruments for environmental management. 				
<ul style="list-style-type: none"> • Integrating Development and Conservation (Clean Technology Program). 				
<ul style="list-style-type: none"> • Environmental Management Tools. 				
	Baseline	Alternative	GEF Increment	Co-financing
Amount in USD	136,500,000	139,600,000	2,500,000	600,000

Table 6 Costa Rica Case

COSTA RICA (Puerto Limon)				
<ul style="list-style-type: none"> • Hazardous Waste Management Program 				
<ul style="list-style-type: none"> • Pesticides Management Improvement Program 				
	Baseline	Alternative	GEF Increment	Co-financing
Amount in USD	23,125,000	26,295,000	2,500,000	650,000

Table 7 Cuba Case

CUBA (Havana Bay)				
<ul style="list-style-type: none"> • Luyano river basin sewage treatment plants 				
<ul style="list-style-type: none"> • Demonstrations projects focusing on innovative better practices for recycling of nutrients and energy from waste water 				
<ul style="list-style-type: none"> • transferring project experiences across the region 				
	Baseline	Alternative	GEF Increment	Co-financing
Amount in USD	12,265,000	28,925,000	2,500,000	16,660,000

Table 8 Jamaica Case

JAMAICA (Kingston Harbor)				
<ul style="list-style-type: none"> • Develop an institutional entity responsible for the rehabilitation and environmental management of Kingston Harbour. 				
<ul style="list-style-type: none"> • Design and construct a pilot wastewater treatment facility for the Kingston metropolitan area. 				
<ul style="list-style-type: none"> • Operation and maintenance of the treatment facility. 				
	Baseline	Alternative	GEF Increment	Co-financing
Amount in USD	30,000,000	43,700,000	2,500,000	11,200,000



Figure 1. Project's Study Areas in the Wider Caribbean

PLANNING AND MANAGEMENT OF HEAVILY CONTAMINATED BAYS AND COASTAL AREAS IN THE WIDER CARIBBEAN

CHAPTER 1. INTRODUCTION

1.1 Purpose

The main purpose of this report is to present a synthesis of the results and accomplishments of the regional project RLA/93/G41, titled: "Planning and Management of Heavily Contaminated Bays and Coastal Areas in the Wider Caribbean" (hereafter referred to as Caribbean Contaminated Bays or CC Bays). This is a project of the Governments of Colombia, Costa Rica, Cuba and Jamaica and was executed from November 1995 to May 1998.

In addition to synthesizing project activities, this document attempts to present an objective assessment of the results herein reported and to give the funding agencies a perspective as to where and how the countries wish to go next after this collective effort, taking into account its very limited resources and development constraints, towards achieving gradual environmental rehabilitation of the bays and coastal zones and thus contributing to a general betterment of the environmental conditions in the Caribbean region.

1.2 Background

Oceans are vital for life on Earth and the Caribbean sea is one of the world's most threatened marine ecosystems. Increasing economic development activities such as tourism, industrial and agricultural expansion, oil exploration and extraction, fisheries and population growth in coastal cities without adequate sanitation systems, have severely affected the coastal and marine environment, impacting the biodiversity of the region and human health. Weak regulatory mechanisms to enforce environmental laws, poor management systems, uncontrolled urbanization, industrial growth and inappropriate land use have contributed to further environmental degradation in the Caribbean coastal waters.

In 1976, under the auspices of the United Nations Environmental Program (UNEP), the Caribbean Environmental Program (CEP) was initiated. As part of the 1990-1991 CEP work plan, a regional program called Integrated Planning and Institutional Development for the management of the Marine and Coastal Resources of the Wider Caribbean (IPID) was initiated. As a product of this program, project RLA/93/G41 CC Bays was conceived in 1992 and a project document was formulated in 1993.

The project was approved in 1995 under the pilot phase of the Global Environment Facility (GEF) and the United Nations Development Program (UNDP) was selected as the implementing agency, the United Nations Office for Project Services (UNOPS) was contracted to execute overall project activities. It should be pointed out that CC Bays is the largest project for pre-investment activities in terms of budget in the GEF pilot phase. The UNEP/CEP was expected to participate in a coordinating capacity through its IPID program and a limited direct participation of the other implementing agency -the World Bank- was contemplated.

A Regional Project Coordinator was selected and contracted by UNOPS and initiated project activities in November of 1995, Havana based. National Project Coordinators were also selected and contracted by UNOPS with the assistance of the Regional Project Coordinator in Cuba, Jamaica and Costa Rica in the following months. It was mid 1996 however, until the National Coordinator for Colombia was selected and contracted.

The project had an original schedule of 2 years, from November 1995 to October 1997 but actual execution took longer than anticipated and the project was extended until May 1998. Chapter 7 of the present document presents an analysis of the causes of the extension in more detail. The approved budget for the project was US\$ 2,500,000 from GEF sources. A Government Counterpart Contribution (GCC) in kind was expected from participating governments of approximately US\$ 535,000 but the real amount which the Governments contributed turned out to be higher. Chapter 8, Financial Management presents the use of funds in more detail and the estimated real GCC.

The document draws heavily on information available in the technical reports developed by the sub-contracting institutions and in the country reports prepared by the National Coordinators. The most important sources consulted in the preparation of this document are listed in the Bibliography.

1.3 Project Scope

It is unfortunate that over the years development in the Caribbean region has been accompanied by environmental degradation and today it has many rivers, lakes, bays, estuaries and coastal zones that are severely affected by heavy contamination (as described in some detail in Chapter 2, Section 2.2), and more than 30 countries in the region are in dire need for improved environmental planning, management policies and facilities to control land-based and ship-based sources of pollution.

The CC Bays project is limited geographically however, to only four specific sites: Cartagena Bay in Colombia; Puerto Limon in Costa Rica; Havana Bay in Cuba and Kingston Harbor in Jamaica. The locations selected for the project are such that they will ensure project replicability in other locations in the Wider Caribbean and will encourage successful experiences to be used as a model for efforts elsewhere. In the course of project activities many other countries in the region became aware of the GEF support to the Caribbean and very soon expressed interest in participating in activities but unfortunately it was not possible to accommodate their requests. Panama, Mexico, Venezuela, the Dominican Republic and Trinidad and Tobago were invited to participate in regional workshops along with the IPID countries.

On the work plan, the scope of the project is limited to developing integrated investment plans for the rehabilitation of the bays, inter-institutional management plans and capacity building programs, to identify potential sources of financing and finally to provide technical assistance to the countries in preparing project proposals for future investments. As a typical pre-investment project, it is limited to desk studies and no attempt has been made to impact directly in the environmental conditions of the bays and coastal zones. The implementation of badly needed facilities for sewage treatment and disposal, solid waste handling, pesticide control, etc. is clearly beyond the scope and funding of the present project.

Project start up was met with a credibility problem because of the limited scope of work which in turn created a fair degree of skepticism on the part of the national authorities and the general public at large. This required an effort to justify the need, motivate, create a sense of trust and support on the part of the national governments, the press and the general public at large. Although no direct actions were attempted by the project, in time it was remarkable its catalytic effect in generating and motivating direct parallel actions by the governments which made an impact in the physical conditions of the bays which otherwise would not have occurred.

A number of substantive documents have been developed by sub-contracting government institutions, NGO's, consulting firms and private consultants during the life of the project. These reports have been completed and are available for review. Also, a list of publications is presented in detail in Annex 1.

1.4 Report Format

This final report builds upon the 24 sub-contractor's outputs and presents a synthesis of the work carried out by the National Coordinators and sub-contractors, it contains information pertaining to each country's outputs as laid out in the Project Document.

The report is divided in ten Chapters and Annexes. **Chapter 1 - Introduction** presents a brief account of the project. **Chapter 2 - Background and Overview** presents a brief description of the pollution problem in international waters and in the Caribbean. **Chapter 3 - Description of the Study Areas**, gives a description of the sites under study for the benefit of the reader not too familiar with the selected Caribbean sites. **Chapter 4 - Project Objectives** draws heavily on the description of the Project Documents with some interpretation by the author. **Chapter 5 - Project Approach and Methodology** presents the approach, the methodology and the strategy used to execute the work. **Chapter 6 - Inputs** deals with the sources of funding for the project, including the government's counterpart contribution in kind, the human resources utilized, the equipment furnished to each government and the cooperation from other UN agencies both in kind and in cash. **Chapter 7 - Outputs and Results** covers in a synthesis the project's achievements in all four countries in accordance to the Terms of Reference of the Project Document. **Chapter 8 - Financial Management** presents a detailed account of the funds used by each country and by support personnel. **Chapter 9 - The Second Phase Project** presents a synthesis of the pilot investment or demonstration projects identified for a follow up phase and finally; **Chapter 10 - Conclusions and Recommendations** completes the document with a summary of the main conclusions and recommendations for further actions. **Chapter 11 - Bibliography** presents the list of the documents consulted for the preparation of this report.

Annex 1 presents a list of the documents prepared by the sub-contractors and **Annex 2** presents a proposal for a continuation of the project to through a so called "bridging" period.

CHAPTER 2. OVERVIEW OF THE CONTAMINATION PROBLEM

2.1 The Problem of Contamination in International Waters.

The term “International Waters” as used for the purposes of the GEF Operational Strategy, includes the oceans, large marine ecosystems, enclosed or semi-enclosed seas and estuaries as well as rivers, lakes, groundwater systems, and wetlands with transboundary drainage basins or common borders.

Water covers over 70% of the Earth’s surface in the form of oceans which provide a major contribution of food for man, contain untold mineral wealth and attract millions of tourists every year to their shores. Unfortunately, most of the world’s wastes are discharged into the seas and remain trapped in coastal waters, poisoning marine life.

The environment has an undeniable capacity to absorb certain quantities and types of wastes without major effect on the integrity of its ecosystems, but this capacity is not limitless. The waste-receiving capacity of the environment, if wisely used, is a considerable renewable economic asset, but when the amount of waste surpasses this capacity, serious environmental degradation may occur. The response of ecosystems to pressure caused by pollution is not linear, and therefore whenever the pollution load is at the limit of the capacity, collapse of the system may be caused by small increments of pollution.

Aside from physical and ecological degradation of the coastal and marine environment, pollution from land-based sources is at present the single most important threat to the marine environment and impediment to the use and sustainable development of the coastal zones and their resources.

In the world, 44% of marine pollution is via rivers (sewage and urban and agricultural runoff), 12% by shipping, 10% by dumping in oceans, 1% by offshore oil and gas exploitation and the balance by fallout air pollution.

Marine pollution has been defined in 1969 by the International Joint Group of Experts and the Scientific Aspects of Marine Pollution as the “anthropogenic input of substances into the marine environment resulting in harm to marine life, human health, marine activities and a reduction in the quality and usefulness of seawater”. The main source of pollution in the marine environment does not come from oil spills from ships and tankers but rather from land-based sources, according to the United Nations Environmental Program (UNEP Regional Seas Reports and Studies No. 115).

Rivers, particularly in developing countries, have shown marked falls in levels of dissolved oxygen thus indicating increased levels of pollution by sewage. An estimated 90 % of sewage in developing countries is discharged into rivers, lakes and seas without any treatment. Sewage is the biggest cause of water pollution in developing countries and its most important effect is on human health. Each year, according to the World Health Organization, 900m people suffer from diarrhea or diseases spread by contaminated water such as typhoid and cholera, and at least as many from diseases caused by intestinal worms.

Many species of fish depend on mangroves, seagrasses and coral reefs at critical stages in their life cycles but these important fish nurseries, coastal barriers and pollution filters are

being degraded and destroyed at unprecedented rates by pollution, over-exploitation and over-development for the tourist industry.

The Earth's total biological diversity, currently estimated at between 5 and 80 million species by UNESCO-UNEP, is currently being destroyed by pollution and over-exploitation at a rate up to 100 species to become extinct per day.

It is quite evident that pollution risk in coastal end in international waters can be minimized if countries adopt the necessary national legislation to implement international conventions and protocols such as those developed through the International Maritime Organization (IMO), the United Nations Environmental Program (UNEP) and the ones resulting from the implementation of the United Nations Convention on the Law of the Sea (UNCLOS).

There have been serious attempts at controlling the perverse effects of pollution and over the last two decades many protocols and conventions have been signed relevant to marine pollution, among the most noteworthy are:

- International Convention for the Prevention of Pollution from Ships (MARPOL 73/78)
- Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matters (London Convention 1972)
- Protocol Relating to Intervention in the High Seas in Cases of Oil Pollution Casualties (Intervention)
- International Convention on Oil Pollution Preparedness, Response and Cooperation (OPRC Convention 1990)
- International Convention on Civil Liability for Oil Pollution Damage (CLC)
- International Oil Pollution Compensation Fund (IOPC FUND)
- The Cartagena Convention signed in 1986. It has provided the framework for fostering regional cooperation in the Wider Caribbean. Under this convention, the countries in general agreed to prevent, reduce, and control pollution from ships, land-based sources, air-borne sources and sea-bed activities.

2.2 The Regional Problem in the Wider Caribbean

THE CARIBBEAN, A SEA OF LOVE

Outstandingly beautiful, the Caribbean Sea is one of nature's gifts to mankind for its sandy beaches and warm blue and clear waters but; as the century draws to a close, its magnificent coastal waters are increasingly showing dangerous signs of deterioration and pollution by human activity. The most urgent thing we have to do today is to save this precious resource called - the environment.

The increase in pollution of coastal areas from land-based sources is accelerating in the Wider Caribbean Region at an alarming pace. The often dramatic and irreversible alteration of natural coastal ecosystems impacting the biodiversity and the extensive pollution of the sea and inland waters are primarily caused by the rapid growth of coastal population centers without adequate sanitation facilities. The expansion of inappropriate agricultural practices, and industrial development in coastal zones, accompanied by inadequate environmental, technological and economic policies, contributes to aggravate the pollution of precious coastal waters.

In the Wider Caribbean, as in other regions of the world, the major sources of coastal and marine contamination originating from land-based sources vary from country to country, depending on the nature of the development activities. Sewage has been identified as one of the most significant pollutants affecting the coastal environment of the Wider Caribbean. The ecological and health problems associated with untreated sewage poses a major threat and a solution needs to be found in the short and in the long-term for its mitigation and eventual control. The population on the coast continues to grow steadily thus increasing the amounts of untreated sewage being discharged into the coastal marine environment. The potential for public health problems via primary contact with coastal waters is a matter of great concern and a social time bomb for the populations affected.

In the case of Kingston Harbor, Havana Bay and Cartagena Bay, intense development activities and large concentrations of population affect the water quality of the rivers discharging into the bays. In these sites major pollutants are the rio Cobre, the Luyano river and the Canal del Dique, respectively. In the case of Puerto Limon, agricultural activities releasing pesticides have been identified as major contributors to the pollutant loads reaching the coastal zone and marine waters.

In the Wider Caribbean region current economic activity focuses on the expansion of tourism, agriculture and extractive industries which are directly or indirectly linked to the resources from coastal and marine environments. The absence of a functional environmental strategy in this pattern of development has resulted in severe stresses on these essential ecosystems with negative consequences for fisheries and human health. A paramount example is the severe pollution of coastal waters due to unmanaged industrialization, urbanization and tourism expansion. With growing populations and increasing emphasis on tourism and extractive industries, the productive potential and stability of the region's coastal and marine ecosystems have been severely strained.

Diversification and intensification of economic activities to meet the growing demand for food, employment and shelter of the expanding populations have placed tremendous pressures on the coastal and marine environments. Pollution is one of the manifestation of such pressures; the coastal waters of the region are contaminated predominantly by untreated sewage, solid waste, sediments, oils, pesticides and agricultural run-off mainly from land-based sources.

CHAPTER 3. DESCRIPTION OF THE STUDY AREAS

The following sections in this chapter describe the physical characteristics of the selected study sites in general and the boundaries of action. A more detailed morphological description is beyond the scope of this report. A table with significant data is presented at the end of the chapter for each selected site.

3.1 The Wider Caribbean

The four countries and selected study sites of the CC Bays project belong to the general region called the Wider Caribbean and a brief description of this area and its components follows.

The Caribbean Sea, an arm of the Atlantic Ocean, is partially enclosed on the north and east by the islands of the West Indies, and bounded on the south by South America and Panama, and on the west by Central America. The Wider Caribbean area comprises the marine environment of the Gulf of Mexico, the Caribbean Sea, the 200 mile zone of the Atlantic Ocean adjacent to the countries in the region, as well as their internal waters and the terrestrial environment up to the limit of the watersheds.

The Caribbean Sea is approximately 2415 km long east and west and between about 640 and 1450 km wide. It has an area of about 1,942,500 km². With this area the Caribbean Sea is a little shorter than the Mediterranean Sea and around three or four times bigger than some seas such as the Black Sea, Baltic Sea, North Sea and White Sea.

At the northwestern extremity it is connected with the Gulf of Mexico by the Yucatán Channel, a passage about 193 km wide between Cuba and the Yucatán Peninsula. The Windward Passage between Cuba and Haiti is a major shipping route between the United States and the Panama Canal. Many gulfs and bays indent the coastline of South America, notably the Gulf of Venezuela, which carries tidal waters to Lake Maracaibo in Venezuela. With a few exceptions the entire Caribbean Basin is more than 1830 m deep.

Navigation is open and clear, making the Caribbean a major trade route for Latin American countries. The main oceanic current in the Caribbean Sea is an extension of the North Equatorial and South Equatorial currents, which enter the sea at the southeastern extremity and flow in a generally northwestern direction.

An analysis of sea current circulation shows that in the Caribbean a general movement of the waters exists toward the northwest, which penetrates in the Gulf of Mexico through the Yucatán Channel and moves out to the North Atlantic Ocean by the Strait of Florida with the name of Florida Current, denominated Gulf Stream afterwards. In all the straits and canals in the south end of the Antilles arch the currents are strong, especially between the islands of Barbados and Trinidad & Tobago, in the coast of Venezuela, as well as in the Strait of Florida. It can be considered, in general terms, that in the whole Caribbean Sea (sometimes referred to as the American Mediterranean) currents travel with appreciable velocities. For example, in July of 1976 at the entrance of Nuevitas Bay, current velocity was registered up to 125 cm/ s.

The marine currents in the platform originate, mainly, as a consequence of the wind and tide action. The currents are affected by the topography of the sea bottom and the configuration of the coastline as well as the presence of natural obstacles such as keys and islands. In

general terms it can be stated that water circulation on the platform is primarily a function of the predominating winds in the region.

The existence of high velocity water currents throughout the Caribbean contributes significantly to the dispersion of contaminants generated in any one site to the rest of the region, creating a transboundary pollution effect. Pollutants, including persistent organic pollutants (POP's), have no political borders and travel in the region causing a global environmental impact.

The following Figure presents a view of the Wider Caribbean and its system of currents.

Nota Para Andy Hudson y Pierre Jullien

En este punto va una figura del mar caribe identificando los sitios de estudio y las corrientes en el mar caribe. No se incluye en este envio por correo electronico debido a que la memoria que utiliza no es aceptada por el email.

Figure 3.1 Wider Caribbean and its system of currents

3.2 Cartagena Bay - Colombia

It is located in the central part of the Colombian Caribbean and has a surface area of approximately 85 Km² with an average depth of 26 m. Although Cartagena Bay is a typical large pouch bay by geomorphologic definition, today it behaves as an estuarine system with a mix of ocean with fresh waters, the latter coming from the "Canal del Dique".

Over time, the overload of particles in suspension have caused the death of coral formations in the interior of the bay and the influence of fresh continental waters. The Mamonal zone, a long perimeter along the main bay, represents one of the most important industrial complexes of the Caribbean; 73 industries and 57 ports facilities are in this area discharging their residuals into the bay. The industries include pharmaceutical complexes, petrochemical factories, a petroleum refinery, food plants, electronic plants among others.

The main contaminants that affect the bay are: sewage, industrial discharges, sedimentation from the Canal del Dique, ship wastes, leached from garbage and solid waste.

3.3 Puerto Limon - Costa Rica

The city of Limón was built in 1871, with a population of 73 000 inhabitants, is the most important port of Costa Rica and its main exports are bananas, coffee, cocoa, and coconuts. The zone of study under CC Bays project comprises 12 kilometers of coast approximately, from the port of Moín to the Puerto Limon airport.

Puerto Limón is not strictly a bay, according to scientific definition, it is an open zone and it is exposed to the Caribbean waters such that contaminants are in direct contact with the coastal currents of this region. As a result, untreated sewage discharges from the city are dispersed rather quickly by the currents. The area of Puerto Limón suffered a severe earthquake in 1991 which virtually destroyed the drainage and sewer system in the city. The sea floor rose 1.5 meters, creating the need to dredge the port, discharges of sewage were totally exposed which caused the disappearance of the Portete beach and severe degradation of up to 50% of the coral life in the area.

The contamination problem in Puerto Limón could be considered moderate as compared to the other study sites in the CC Bays project. Nevertheless, if no immediate actions are taken this situation could worsen as a result of increasing environmental concerns such as: lack of a sanitary land fill, poor handling practices of solid waste, absence of an efficient disposition system of hospital waste and discharges to the coast of industrial and domestic sewage without any treatment at all.

The following Figure presents a view of Puerto Limon and its coastal zone.



Figure 3.3 Puerto Limon

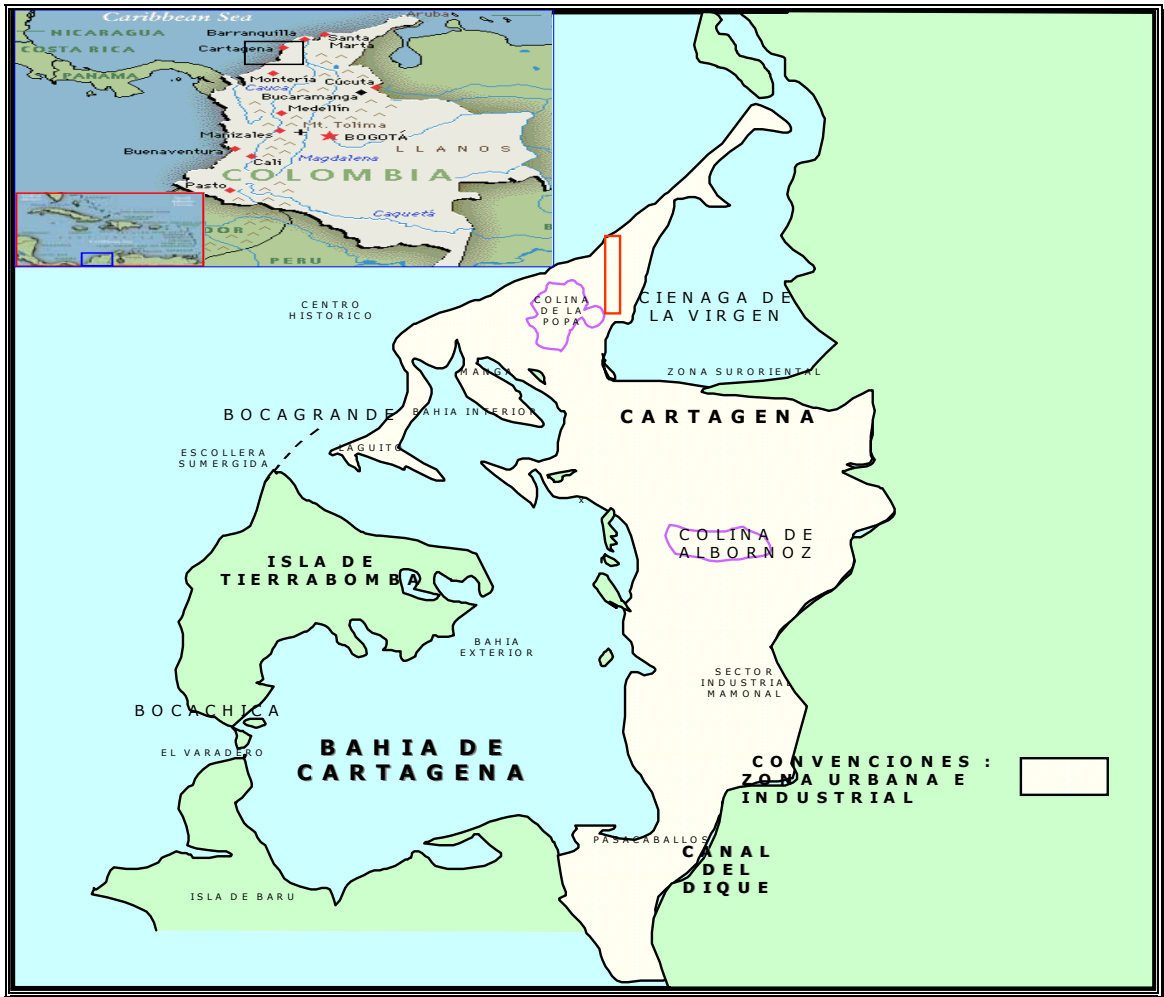


Figure 3. 2 Cartagena Bay

3.4 Havana Bay - Cuba

Havana Bay is located in the North coast of Cuba, in the Eastern Region of the Country. It is a typical small pouch-shaped bay with a surface of 5.2 Km² , an average depth of 9 m. and contains 47 millions of m³ of water.

The bay has three inlets: Marimelena, at the Northeast, Guasabacoa at the Southeast and Atarés at the Southwest, where three small streams (Luyanó, Martín Pérez and Arroyo Tadeo Rivers) discharge their water. The bay receives inflows from highly polluted water from the streams, from storm drainage systems and from industries. The hydrodynamic characteristics of the bay are such that a limited exchange of waters with the ocean occurs only every 5 to 6 days due to the long and narrow channel at the mouth.

The most important pollutant source to Havana Bay is the Luyanó River, which carries about 30 % of the organic pollutant load to the bay. Also, important sources of pollution are the oil refinery (the main responsible of oil pollution), and the large volume of untreated wastewater discharged by the Arroyo Matadero.

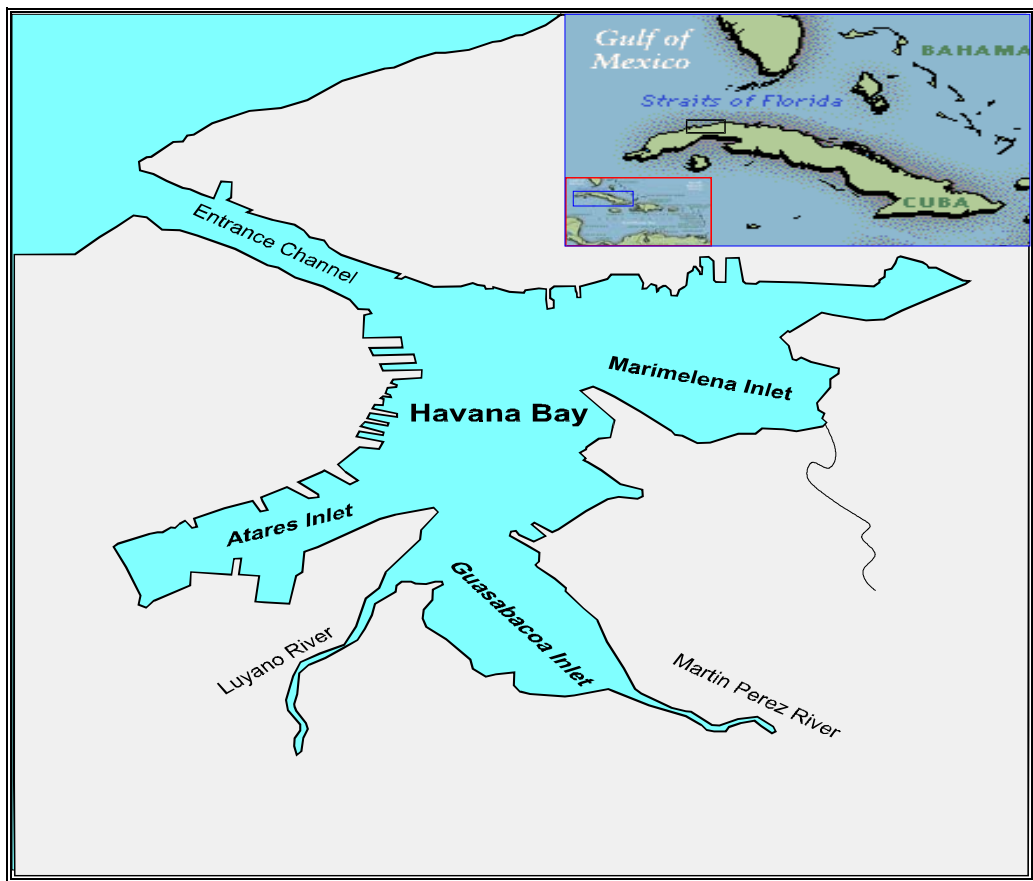


Figure 3.4 Havana Bay

3.5 Kingston Harbour - Jamaica

Kingston Harbor is situated on the south coast of Jamaica. It forms an extensive natural Harbor of approximately 50 Km². It is bounded on the north, east and west by the mainland coast, and on the south by a narrow spit of land, the Palisadoes; the entrance to the open sea is by a channel at the southwest corner. It also has very limited exchange of waters with the ocean.

Three different regions may be defined in Kingston Harbor. These are the Upper Basin, the Inner Harbor and the Outer Harbor. At the northwestern end is Hunt's Bay, a shallow area, 2-3 m deep, separated from the main body of the Harbor by a causeway. Communication between the two bodies of water is afforded by a narrow gap in the causeway.

The Harbor has the reputation of being ranked as the seventh largest natural Harbor in the world and has assumed the role of Jamaica's premier port located only 52 Km from the mayor east-west arterial trade route via Panama Canal, the Harbor has develop into a leading regional transshipment center for both the Caribbean and the Central America.

Fresh water enters Hunt's bay via Rio Cobre, the Duhaney river and the Sandy Gully, the last being part of the storm drainage system for Kingston. Several others smaller drainage gullies on the northern shore of the Harbor contribute to the fresh water input.

The following Figure presents a description of the harbor.



Figure 3.5 Kingston Harbour .

CHAPTER 4. PROJECT OBJECTIVES

4.1 Development Objective

The project development objective as stated in the Project Document is “the rehabilitation of international waters in the four areas in the Caribbean Sea to minimize the future environmental impact of development and economic activities along the Wider Caribbean region, through institutional strengthening and fostering horizontal cooperation”.

This is a very general statement that merits some further elaboration to actually establish a clearer goal. As stated in the earlier parts of the report, the scope of the CC Bays project is limited to pre-investment activities and no attempt has been made to bring about a direct physical impact in the environmental conditions of the bays and coastal areas.

The development objective will not only include aspects of institutional strengthening but also updating of national environmental policies including legislation for preventing the discharge of pollutants in the rivers and coastal waters. This general development objective is expected to be accomplished by assisting the countries in becoming self sufficient in developing sound environmental policies through a series of pre-feasibility studies as detailed in the following section.

4.2 Immediate Project Objectives

The pre-feasibility studies to be undertaken in each of the project sites are designed to develop an integrated investment action plan, addressing the major technical, institutional, legislative, regulatory, economic and policy related factors that have contributed to the present environmental degradation in each of the selected project sites.

The CC Bays project’s three Immediate Objectives for each site as extracted from the Project Document , are the following:

1. Develop Integrated Investment Action Plans for the rehabilitation and management of the bays and surrounding coastal areas.
2. Formulate Institutional Strengthening Proposals to improve the operational capacities of those institutions responsible for bay management.
3. Identify Sources of Financing for the implementation of proposed remedial action plans.

Each immediate objective has specific Outputs.

4.3 Project Outputs

The Project's eight Outputs for each site, as extracted and summarized from the Project Document are the following:

(The numbering system of the outputs below stated corresponds to the Project Document for easy reference. The same output numbering system has been used by UNOPS agreements with sub-contractors and it is maintained throughout for consistency).

Output 1.1 Studies of Bay Characterization and Diagnostic
Output 1.2 Study of Sources of Pollution and Mitigation Strategies
Output 1.3 A Study of The Legal Framework
Output 1.4 Integrated Investment Action Plan for Bay Rehabilitation
Output 2.1 Integrated Inter-Institutional Management Plans
Output 2.2 Capacity Building Programs
Output 2.3 Technical Regional Workshops
Output 3.1 Investment Financing Workshops

One of the most important actions of the studies carried out in the CC Bays Project has been the identification of barriers to the adoption of best practices that contribute to contamination of the international waters in the selected countries.

An output from the studies, within the context of Output 1.4 - Integrated Investment Action Plans for Bay Rehabilitation - has been the identification of demonstration projects for short-term implementation to show ways of overcoming barriers to the use of best practices for limiting releases of contaminants from land-based activities causing priority concerns in international waters. Also, the studies have looked at the possibility of involving the private sector in utilizing technological advances for resolving identified transboundary priority concerns.

As for the global toxic contaminants existing in the selected sites, the project's efforts has been directed towards attempting to develop pollution mitigation strategies in which prevention is stressed over remediation for being a more cost-effective strategy and to assess the possibility of implementing measures such as waste minimization, technology transfer and information exchange.

4.4 Expected Results at the End of the Project

The present report reviews in detail the results of the project and, the following sections show that the primary objective has been accomplished which is the development of short, medium and long-term viable investment alternatives for the gradual rehabilitation of the bays and adjacent coastal areas. Also, as a result of the work, further knowledge has been generated in the following fields:

- Bay Diagnostic and Characterization
- Sources of Pollution and Coastal Degradation
- The Legislative Framework
- Policies of Regulatory Infrastructure
- Improvement of Institutional Capabilities

- Investment Plans for Bay Rehabilitation

Due to lack of time and budget the project has not been able to make substantial progress in the following areas:

- Horizontal Cooperation
- Community Participation
- Identification of Potential Investors

It is widely recognized that the future sustainability of these accomplishments will depend on the continued support for improvement and development of these body of knowledge. For that, Chapter 9 refer to the importance of a follow up project.

CHAPTER 5. PROJECT APPROACH AND METHODOLOGY

5.1 Project Strategy

The CC Bays project was conceived and designed on the basis of recommendations endorsed in the United Nations Conference on Environment and Development (UNCED), Agenda 21, in Rio de Janeiro, June 1992 for the protection of internationally shared water resources and biodiversity. As such, the project is very much in line with GEF objectives, namely: protection of international waters through improved management of bays and coastal areas and protection of biodiversity through rehabilitation of environmentally degraded areas.

The CC Bays project promotes the rehabilitation and management of heavily polluted bays and coastal areas of the Caribbean Region to ensure the protection of neighboring reefs and mangroves and the sustainable development of marine and coastal resources. This goal has been achieved through the strengthening of local institutions and the development of regionally based expertise capable of taking direct action to reduce and control pollution as well as to remedy associated socioeconomic problems.

The studies have given local and regional scientists and administrators an opportunity to improve their technical and scientific capabilities while providing governments with recommendations and guidelines for the actions required to control and correct the specific pollution problems.

The project has an ideal demonstration value, and replicability throughout the region is assured since local people involved in investigating and administering marine and coastal ecosystems have acquired ample expertise in a wide variety of scientific techniques and methods.

5.2 Implementation Arrangements

To carry out project activities of a project of such degree of diversity and complexity, the program was institutionally designed around a Regional Coordination Office (RCO) supported on administrative and financial matters by UNOPS in New York in the Division of Environmental Services with a Project Management Officer (PMO) and by UNDP Country Officers in the field. Since the project was based in Havana, the most important field office became UNDP Cuba.

National Steering Committees were established in each country to oversee project implementation, made of representatives from government, implementing agencies, UNDP, sub-contractors and representatives from donor agencies. The composition of these committees varied in each country according to their respective programs and organizational priorities.

From the outset, it was agreed that the most cost-effective way to accomplish project outputs would be to sub-contract national agencies and institutions capable of carrying out the work. If no institution was found capable of taking on the work, then Universities, NGO's, consulting firms and private consultants were invited to submit proposals albeit at a higher cost. Request for Proposals (RFP's) were sent to institutions capable of conducting the studies on the

basis of the Terms of Reference developed for each project Output by the Regional Coordination.

Further to the approval of the proposals, work agreements were signed between sub-contractors and UNOPS for the execution of the study. Contracts with government institutions were awarded on a sole source basis and contracts with non-governmental organizations were awarded on a competitive basis observing and adhering strictly to UNDP and UNOPS established procurement procedures.

The United Nations Development Program (UNDP) was the funding agency and the Office of Project Services (UNOPS) was the executing agency. UNOPS was responsible for day-to-day administration of the program, and facilitated the recruitment of short-term and long-term consultants and drafted the contractual agreements with the sub-contractors. It provided the necessary support for preparing budget revisions, contract negotiations, and payment authorizations. UNOPS also organized the international procurement and delivery of project equipment (vehicles, scientific instrumentation and office equipment) and supervised local procurement when the conditions so indicated.

The UNOPS Copenhagen office was instrumental in securing additional financing from the Nordic Trust Fund to hire Norwegian consultants to develop the project brief and the project document for the "second phase" project which will be described in more detail in subsequent sections.

National Counterpart Agencies or Ministries were designated by the governments to collaborate in project implementation as follows:

1. Colombia. Corporacion Regional del Canal del Dique (CARDIQUE) in Cartagena.
2. Costa Rica. Ministry of Energy and the Environment in San Jose
3. Cuba. Ministry of Science, Technology and the Environment in Havana
4. Jamaica. Natural Resources Conservation Authority (NRCA) in Kingston.

Cuba's Center for Engineering and Environmental Management of Bays and Coastal Zones (CIMAB) was used as the main support for the regional coordination. The RCO was housed in the premises of the CIMAB free of charge as GCC in kind. Two CIMAB executives served as international consultants to the project with support missions throughout the Caribbean and other CIMAB staff personnel participated in project activities at various times.

The agencies or ministries would become the center of competence in their respective countries. The design of project implementation follows the principle that responsibility for the management of project outputs and quality control is to be shared with the national coordinators in the participating countries and with the National Steering Committees. The list of government institutions, NGO's, private consulting firms and individual consultants who participated in project outputs as sub-contractors is presented in Annex 1. Also, the composition of the National Steering Committees is presented in this same Annex.

The National Coordinator's offices in the field vary considerably in size and support from one country to other. In the case of Cuba, the NC was assisted by a driver, a secretary, an accountant and a systems analyst on a near permanent basis. In contrast, in all other countries NC's received only office space and very limited amount of staff support. UNDP field offices provided administrative and financial backstopping and UNOPS also supported the field activities of all National Coordinators. The direct line of communications between the RCO and the National Coordinator's offices enabled a fluid and constructive dialogue and

supervision of project activities. Full access to the Internet and electronic mail further improved communications among the project's country offices and the regional coordination.

With the institutional arrangement in place, the whole project moved rigorously towards its ultimate objective, i.e. the development of integrated investment action plans for bay rehabilitation.

CHAPTER 6. PROJECT INPUTS

6.1 GEF Funding

A detailed financial analysis of the project is presented in Chapter 8. Financial Management of this report. This section attempts to show the general use of GEF funds throughout the project life. Figure 6 presents the composition of the budget and its distribution across the years from the original project budgets and the final expenditures.

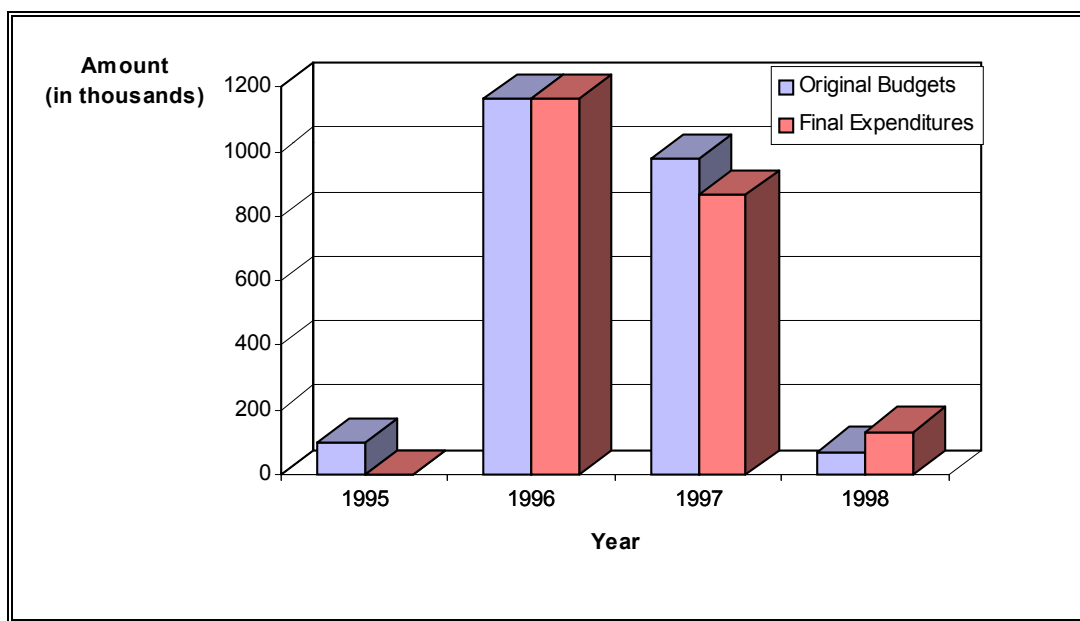


Figure 6.1 Original Budgets vs Final Expenditures

Final expenditures are distributed across the years in similar fashion to the original budget. It should be pointed out that the original budget called for equal amounts in terms of subcontracts for all countries an assumption which proved unrealistic. At the beginning of the project, the first missions of the regional coordination to the countries served to update the activities that needed to be executed in order to obtain the results specified in the Project Document and at the same time, to update the financial requirements for subcontracts and equipment needs for each country. A Figure showing the original budget and final expenditures by different budget lines is presented in Chapter 8. Financial Management.

A successful negotiation was conducted with each country to establish on a realistic basis the country's financial needs for sub-contracts and for equipment purchases. The basis of the negotiation was agreed to be a *need* concept rather than an equal distribution of funds. In that sense, each country was awarded funds as financial proposals for executing subcontracts arrived to the office of the regional coordination. Proposals for equipment purchases also were submitted justifying the need for such purchases for conducting project activities and the unavailability to satisfy the need locally. A revised project budget was developed and approved which is presented also in Chapter 8. It should be pointed out that no complaints were expressed after the redistribution of funds and that all countries

demonstrated a great degree of solidarity to the project aims even though some of them turned out to receive less resources than others.

Financial management of the project was centralized with UNOPS in New York. No parallel system of accounting was set up at the Regional Coordination Office (RCO) for lack of budget which in hindsight proved to be limiting. The RCO was most of the time without adequate control of the budget particularly with amounts left to be spent toward the final months of the project life in which there was an extension of time but not an extension of the GEF budget.

A precise amount of the balance of the budget was often times difficult to estimate because UNOPS budgetary system works by obligated amounts which are often debited by the real expenditures figures when these are recorded in the system. The latter can take at least three months and closing an obligation would take a whole budget year. Since UNOPS accounting does not operate in real costs but in obligated amounts and since the obligated (requested) amounts are usually very conservative, balances of the budget were always difficult to estimate and expenditure approvals sometimes waited until the last minute.

A parallel system of accounting in regional offices is highly recommended for future projects in which the same accounting system is utilized at headquarters.

6.2 Regional Coordination

The project had a wide variety of outputs and it is technically very diversified, has complex multi-disciplinary interactions and as such, requires different levels of coordination and management at the regional, national and local levels, in order to fulfill its objectives and accomplish the expected outputs.

A Regional Coordinating Office (RCO) was set up based in Havana, Cuba, charged with the overall responsibility for general project coordination. The Regional Coordinator was responsible for scope and evaluation and monitoring of work plans and activities implemented by selected agencies and institutions at the country level. National Coordinators were selected in each country with the responsibility to oversee project implementation in each project area, under the coordination of the Regional Project Coordinator. The National Coordinators were the natural link with the National Steering Committees.

The RCO was composed of four permanent staff members, assisted at times by individual consultants from Cuba's Center for Engineering and Environmental Management of Bays and Coastal Zones (CIMAB). The office was actually located at the premises of the CIMAB as a government contribution in kind, no costs in rental services or utilities were incurred by the project. The permanent staff of the RCO was composed of the following staff members:

Table 6.1 Regional Coordination Office Staffing in Havana

Title	Discipline	Period of Service	Type of Activity
Regional Coordinator	Project Management	11/1995 - 05/1998	Permanent staff
Engineer Assistant	Chemical Engineering	02/1996 - 05/1998	Permanent staff
Oceanographer	Oceanography	as needed	Part time consultant
Environmental Specialist	Environment	as needed	Part time consultant
Geographer	Geography	as needed	Part time consultant
Sanitary Engineer	Engineering	as needed	Part time consultant
Executive Secretary	Secretarial duties	02/1996 - 04/1998	Permanent staff
Driver		06/1996 - 04/1998	Permanent staff

The RCO was able to maintain direct contact with field offices staffed by the National Coordinators and by the National Counterpart Agencies or Ministries. It also helped coordinate donor support as was the case with the CEPIS office in Lima, Peru of the Panamerican Health Organization (PAHO) and with the Norwegian Trust Fund in Norway. This coordinating role proved valuable in terms of mobilizing parallel financing and harmonizing donor assistance. It also helped to forge credibility on the project objectives in a somewhat early skeptical regional sentiment toward final project objectives and goals.

The RCO provided guidance in the preparation of the terms of reference, the drafting of scope of work for the sub-contractors, NGO's, consulting firms and individual consultants. The principal role of the RCO was in the constant monitoring of work progress, budget expenditures and general coordination of the implementation of project activities. Negotiations were also carried out in the field with sub-contractors less than willing to assume project responsibilities because of lack of commitment.

6.3 Technical Expertise

The project made extensive use of regional expertise, contracting altogether ... institutions and experts from the region. A total of contracts were established between UNOPS, institutions and local experts. Individuals were contracted out through recruitment of consultants under national project personnel service contracts (NPPPS). The following Figures shows the rather homogeneous geographic distribution of contracts in the region, in terms of numbers of contracts issued and in terms of dollars awarded.

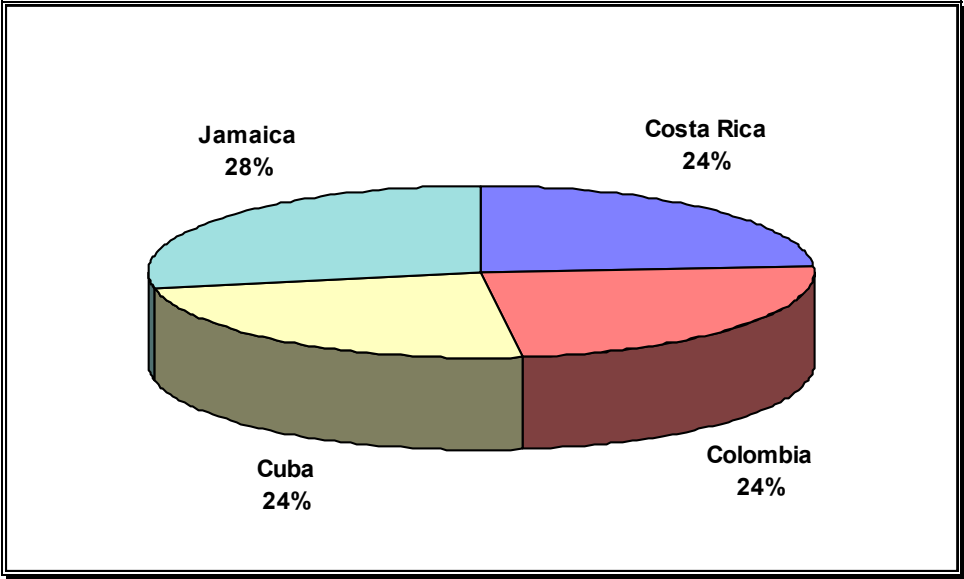


Figure 6.2 Regional Distribution of Contracts as Percentages of the Total

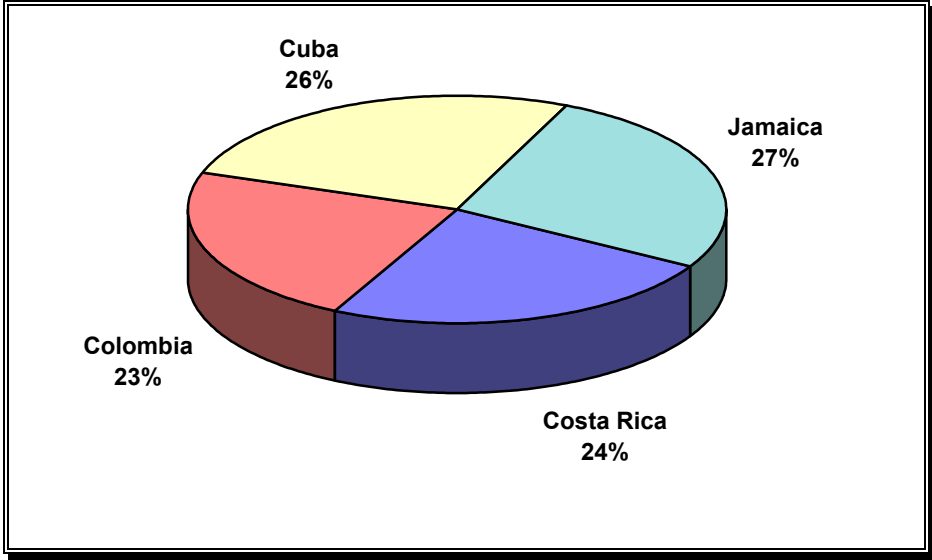


Figure 6.3 Regional Distribution of Contracts as percentages of total Dollars awarded

Contracts were awarded to a wide range of organizations. These included research institutes, non-governmental organizations, universities, individual consultants and private companies. The following Figure depicts the distribution of regional contracts in percentages of dollar amounts.

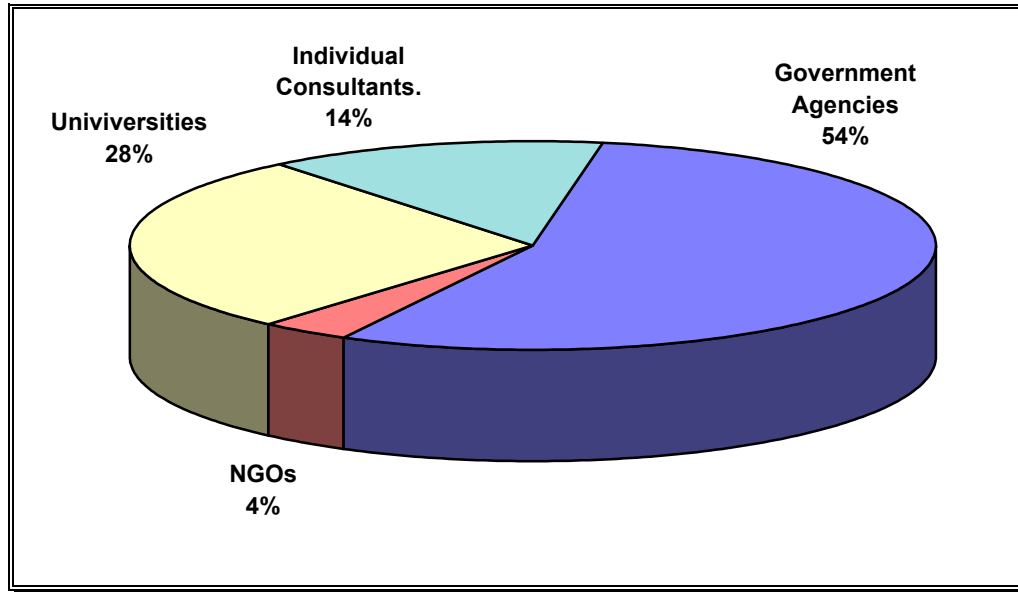


Figure 6.4 Distribution of Regional Contracts

6.4 UN Agencies and Parallel Support from the Donor Community

The GEF is a trust fund managed by three parties: the UNEP, the World Bank and UNDP. In the following paragraphs some comments on the role of the agencies is presented.

UNDP played a critical role in project implementation. The UNDP/GEF coordinator and the GEF Chief Technical Adviser for International Waters, both New York based, participated in regional workshops and worked closely with the Regional Coordinating Office and the UNDP field offices. The role that the GEF CTA for International Waters played turned out to be critical in developing strategy for the follow up phase of the project. Furthermore, it should be pointed out that the GEF CTA for IW has showed genuine interest in the progress of the project and in the formulation of the implementation phase, making himself available for consultations at all times.

Four UNDP field offices in Havana, San Jose, Kingston and Bogota provided administrative support to the project and general backstopping. The most active office has been the Havana office with a Country Office person assigned to the project on a full time basis. Financial support was also given and in general, being the headquarters for the Regional Coordination, UNDP Havana proved to be immensely useful for project implementation.

UNEP provided support in conducting a joint IPID/RLA/93/G41 regional workshop at the end of 1996. Its coordinating role in conducting a series of workshops and seminars in

accordance of the TOR unfortunately due to lack of time and budget was not able to fulfill. UNEP through the CEP was able to provide support to the RCO sending valuable documentation which contributed to the rich bibliography of the project. In general, a very good disposition to the project was always found at UNEP.

UNOPS played a critical role in project implementation as was mentioned in the preceding paragraphs. A Project Management Officer New York based provided all logistical support and backstopping for the RCO. UNOPS maintained project budgets and schedules and assisted in the contracting of individual consultants, international experts, research centers and universities, national government agencies and others. UNOPS assisted in the procurement of equipment for all participating countries. The Copenhagen office was instrumental in applying successfully for a \$300,000 grant from the Nordic Trust Fund particularly from the government of Norway, for the formulation of the follow up phase.

The World Bank, in this project, did not play a major role for the characteristics of the program that is - typical pre-investment activities. Normally, the World Bank plays a major role on GEF financed projects where large investments are realized. The Bank participated in the first joint regional workshop together with the IPID program and was very useful in providing documentation of past experiences to the RCO. The lack of a more direct role of the World Bank in project implementation proved to be a significant drawback in terms of gaining credibility in the countries and in raising co-financing for other project activities not originally budgeted.

The United States Environmental Protection Agency (EPA) provided valuable support to the RCO by submitting materials and documentation of past successful experiences of bay and coastal zone rehabilitation and management in the U.S. As always, documentation regarding practices in the developed world is very useful in designing programs of pollution control in the Caribbean. The Gulf of Mexico is heavily damaged by nutrients in the mouth of the Mississippi river and much has been learned from that experience as well as others, including the rehabilitation of Chesapeake Bay and the Boston Harbor.

The Pan American Health Organization (PAHO), Washington based, through its sanitary engineering unit based in Lima, Peru and called the CEPIS, provided valuable support to the project in financing a team of experts to Cartagena, at the request of the National Coordinator from Colombia, to assess and formulate recommendations of proposed action plans to design alternative treatment and sanitary systems for rural communities that contribute to bay pollution by discharging raw sewage to Cartagena bay.

6.5 Government Support

The commitment of the governments is reflected in the willingness to work jointly for the benefit of the Caribbean Sea by signing the original Project Document back in 1993. Also, it is reflected in the appointing of the National Coordinators in a timely fashion as well as in the organizing the National Steering Committees and selecting the counterpart Focal Point institutions.

During the implementation phase, the support of the governments is shown in the dollar equivalent amounts of GCC in kind and in the political will to move ahead with a second phase of the project committing a strong baseline as GEF requirement. It is fair to point out that support was in general strong, some governments contributed more than others because

the impact of the GEF funds was different in every country. Generally, those who did not receive other sources of international assistance supported the project the most.

In general, the selection of the National Coordinators proved to be wise because all coordinators contributed and supported the project in a professional and efficient manner that it is only fair to praise. Counterpart Focal Point agencies on the other hand, gave a different degree of support to the project, some were fully committed to achieving project objectives and others were less than willing to give their best to the project. It is conceivably that lack of institutional strength contributed to loose focus on the project aims and perspective and at times a great deal of confusion was created to the frustration of the National Coordinator close to the action.

In general, it was notably the inability of government agencies, to keep schedules and to enforce time commitments. All agreements signed by UNOPS and public agencies entrusted with project outputs were unable to keep their schedules as planned principally because of weakness in their ability to execute the studies. The need for institutional strengthening at all levels became more than evident.

It is important to mention however that during project implementation, all governments at the highest levels of authority reflected a sense of extreme urgency for taking concrete, bold and decisive environmental actions to impact in the physical conditions of the bays and coastal zones. The RCO was under tremendous pressure continuously to justify the need for the studies subject of the CC Bays project vis a vis using the funds for actions.

Results were achieved and the following section presents a synthesis of them with a discussion at the end of each category. Annex ... presents a list of the documents and publications that were developed in the context of the project for those who wish more detailed information. A great deal of up to date information was obtained as can be seen from the following sections.

CHAPTER 7. PROJECT OUTPUTS AND RESULTS

The following is a synthesis of the main project outputs. A more complete and quantitative description of the results can be found in the final report for Output 1.4 and in the country report prepared by each National Coordinator.

This chapter is organized in three major sections according to the immediate objectives of the project as stated in the Project Document. Section 7.1 presents the integrated investment plan and the outputs that led to the plan. Section 7.2 deals with the outputs that were carried out to propose institutional strengthening measures. Section 7.3 presents a discussion of the immediate objective 3 - efforts to secure project financing. A fourth section has been added which presents the equipment purchased for the countries. This is also considered to be an output from the project.

The numbering system of the outputs below stated corresponds to the Project Document for easy reference. The same output numbering system has been used by UNOPS agreements with sub-contractors and it is maintained throughout for consistency.

7.1 IMMEDIATE OBJECTIVE 1. INTEGRATED INVESTMENT ACTION PLANS

The Project Document calls for “the development of an Integrated Investment Action Plan for the management and rehabilitation of the bays and surrounding coastal areas”.

7.1.1 COLOMBIA

The main findings from the subcontracted studies are summarized below.

Output 1.1 Studies of Bay Characterization.

This Output was executed by the Cartagena based Center of Oceanographic and Hydrographic Research (CIOH), a scientific unit of the Colombian Navy, under contract number C-96685.

Cartagena bay receives approximately 90 per cent of all industrial and domestic waste discharged along the Colombian Caribbean coastline. Iron and steel mills generate contaminated effluents and the food processing industries (breweries, dairies, canneries, rum distilleries, fish processing plants, etc.) generate residual products rich in organic waste.

Sewage from Cartagena city (population 800,000) reach an estimated volume of 120,000 m³/day (ACUACAR, 1997) of which 60% is discharged to the Ciénaga de la Virgen and the other 40% is discharged to the bay through a submarine outfall. This is the main source of organic material discharged to the bay, it contains nutrients, especially nitrogen and phosphorus. The impact of these discharges in the water body have been devastating, leading to the eutrophication of the waters, high levels of bacterial pollution and widespread environmental degradation.

Industrial Discharges. According to 1996 data of the Cartagena Chamber of Commerce there are about 620 businesses of which, 29 are producers of liquid effluents in significant volumes. In accordance with CARDIQUE's studies (1997), industry contributes with nutrients and significant amounts of oils and fertilizers mostly from industrial discharges containing carbonates, ammoniac, phenols and warm waters.

Canal del Dique. It has changed dramatically the whole aquatic system of Cartagena Bay transforming it from a bay of coral reefs with clear sea waters, to an estuary with fresh water and suspended materials which has altered the salinity, the oxygenation and numerous physical and biological conditions of the Bay.

Ships Spills and Dock Operations. Cartagena is one of the most important ports of the Colombian Caribbean. With such an extensive maritime traffic it has severe pollution problems due to ship spills and dock operations.

Indirect Sources. The sludge deposited at the bottom of the Bay during long periods of time constitutes an indirect source of pollution. There are other smaller sources of pollution to the bay such as agrochemicals which arrive through a series of canals laid out across agricultural zones. Likewise, Canal del Dique contributes with a significant load of agrochemicals.

Solid Waste. Approximately 50-100 tons per day of garbage is dumped into the water. Leachage from the sanitary landfill of Cartagena constitutes an important source of pollution to the bay and to the canals and lagoons.

Other Sources. The eutrophication processes that frequently occur in the Bay due to nutrient contamination generate accelerated processes of phytoplankton production and algae in significant quantities which die rapidly and are deposited at the bottom. This is later converted into organic matter which added to incoming pollution from other sources, further depletes the scarce oxygen available. As a result, zones without oxygen are possible to find at the bottom of the bay.

One of the most significant outputs of the study conducted by the CIOH has been the development and implementation of a numeric model of the ecosystem of Cartagena bay, whose foundations are established on a hydrodynamic sub-model coupled with a chemical-biological one. The theoretical basis of the mathematical model is well described in reports and articles, basically it consists of mass balance equations that describe the behavior and transformation of the several physical-chemical and biological parameters.

The information reviewed complemented by the sampling and testing program conducted during project execution and the outputs of the ecosystem model, indicate the following:

- a maximum state of degradation exists due to the predominant anoxic ecosystem conditions at the bottom of the bay.
- an increase in eutrophication due to the excess of nutrients from human activities and the presence of toxic materials including heavy metals and hydrocarbons and pesticides.
- the presence of contaminants has been found in organisms of commercial value subject to human consumption, such as some fish species and bivalves.

Output 1.2 Sources of Pollution and Mitigation Strategies.

This Output was executed by the Corporacion Regional del Canal del Dique (CARDIQUE) under contract number C-96686.

In accordance with the objectives, the investigation included update of current inventories of point and non-point sources of pollution including industrial discharges, sewage, waste from maritime-port activities and urban development.

DIRECT AND INDIRECT INDUSTRIAL DISCHARGES

Since its establishment in 1994, CARDIQUE has controlled point and non-point sources of pollution through the evaluation and discharge characterizations gathered at industries and at mobile sources that discharge to the Bay of Cartagena.

The Clean Production Agreement signed in September 29, 1995 between the FOUNDATION MAMONAL, the MINISTRY OF THE ENVIRONMENT, CARDIQUE and DAMARENA represents a step forward in the process of improvement of the environmental protection system. The FOUNDATION MAMONAL, created in 1989, is an NGO that groups almost 50 companies of the 73 operating at Mamonal sector, located to the East of the bay between Cartagena city and the Canal del Dique outlet.

POLLUTION SOURCES OF WASTE WATERS

Cartagena currently has a sewer system covering some 65% of the urban area. The system discharges 60% of the effluent to the Ciénaga de la Virgen and the other 40% goes directly into Cartagena Bay without the benefit of any type of treatment.

In general terms the waste water discharged into Cartagena Bay comes from the following sources:

The bay receives some 48,000 m³/day of waste waters through the submarine outlet and other discharge points of the city sewer system. The canals contribute an estimated 12,500 m³/ day and the Industrial Zone of Mamonal, taking in consideration the data supplied, produces some 35,000 m³/ day of residual waters.

POLLUTION SOURCES DUE TO MARITIME-PORT ACTIVITY

Cartagena is one of the most important ports of the Colombian Caribbean; currently, according to studies of the CIOH (Garay, 1995), the port has 56 docks, public and private. Many of them are oil docks and others with facilities for loading and discharging fuels and chemical products. There are also docks for handling general cargo and containers, coastal traffic, chemicals, fishing, tourism, recreation, bulk cargoes, services and marinas and for multi-purpose activities.

RECOMMENDATIONS FOR MITIGATION

To eliminate the causes of eutrophication, anoxic and the high concentrations of toxic materials in the bay, it is necessary to implement a number of mitigating actions:

- Construction of treatment plants, oxidation ponds or a submarine outfall for sewage disposal into the open sea, and a significant and progressive decrease of the industrial discharges down to permissible levels;

- Total or partial closing of the Canal del Dique outlet to Cartagena Bay, by means of sealocks. Implementation of hydraulic works in the sector of the access channels for the improvement of the hydrodynamic ventilation of the bottom of the bay, for the purpose of decreasing sedimentation as a secondary source of pollution.
- To enforce at industrial enterprises the Plans for Environmental Management included in their respective management operations so as to ensure the compliance of environmental norms.
- To conduct regular monitoring activities of waste water discharges of each industry and conduct checks using CARDIQUE's laboratory facilities. To guarantee that follow-up and control visits are increased at each industry. To conduct studies of the biological conditions in the waters of the bay and include a larger number of parameters into the studies, especially those of public health interest.
- Mitigation strategies should be linked to on-site management installations and other facilities for the final disposal of solid, oil and ship waste as specified in the MARPOL agreement 73/ 78, in which Colombia has ratified annexes, I, II, IV and V.
- Implement a comprehensive program with the local authorities (Port, DAMARENA and CARDIQUE) for the strict control and prevention of waste discharges into the bay's waters.
- Implement management plans for the reception, handling and final disposal of solid waste, oily substances and ship discharges at the docks. Encourage the establishment of firms for sewage treatment and appropriate disposal of the previously described wastes. At the chemical docks, to demand the installation of adequate facilities for the cleaning of ship containers.
- Taking into consideration the reduced processing capacity at the City's sanitary landfill and of the facilities for treating harbor discharges, to promote recycling and enhanced treatment facilities at those installations, mainly those linked to the handling of ships at the harbor.
- To implement strict programs at the docks handling coastal traffic, taking legal and environmental measures in the Harbor.

Output 1.3 Institutional and Legal Framework

This Output and Output 2.1 were jointly executed by the University of Cartagena under contract number C-96687.

This meant submitting a general report on the institutional and judicial framework that guide the economic activity and administration in Cartagena as well as design an integrated, inter-institutional management plan for the bay aimed at increasing the capacities for coordination, management, planning and execution by institutions in charge of coastal administration at the local, regional and national levels.

The specific studies were aimed at generating, gathering and analyzing existing information to determine the institutional, legislative, political foundations that guide development activities in the bay and the responsibilities of the institutions in charge of the environmental management in the coastal zone, especially those identified with the environmental problems. The following activities were conducted:

- A review of the economic development trends, national strategies and plans related to the coastal, industrial, tourist and urban development of Cartagena. Investigation of the development lines and policies at the National, Regional and Local levels.
- A study and analysis of the legal competence of the institutions in charge of the development and management of the studied area.
- A study of the institutions in charge of environmental protection and recovery in order to assess their legal and administrative viability, evaluating the institutional and legal structures that guide management and coastal planning.
- An evaluation of existing levels of inter-institutional collaboration in the management and planning of the bay coastal activities, including the degree of community and NGO participation.

Cartagena has shown sustained economic growth as a result of its natural condition in the Colombian Caribbean and development tendencies were studied in four key sectors of activity : tourism, port, industry and urban growth.

STUDY AND EVALUATION OF THE INSTITUTIONS WITH LEGAL COMPETENCE IN THE MANAGEMENT OF THE BAY.

The evaluation of internal institutional capacity was conducted on the basis of information supplied from participating institutions, complemented by workshops.

Indicators were established according to the different components that define the management capacity of the institutions, human resources, planning, coordination, organization, impact, equipment and infrastructure, community participation and environmental education.

The impact of CARDIQUE and DAMARENA in environmental management is considered to be of “maximum capacity”. The Port Authority, Edurbe and the Attorney General’s Office were evaluated as having medium impact, while INPA and Superpuertos were evaluated as deficient in bay management.

In response to the need to improve the management capacity at the institutions responsible for the management of Cartagena Bay, general and specific strategies were set up for the development and strengthening of all the institutions involved.

PROPOSAL FOR INSTITUTIONAL DEVELOPMENT

The organizational and institutional complexity of the bay require the training of the institutions that respond for their management. This training is centered in three main questions: what the organization stands for?, what can it do? and how will it do it? .

These changes should begin inside the institutions, thus requiring the training of their human resources, the improvement of their structures and the streamlining of their processes of administration, management, execution, evaluation and coordination. The concepts of modern management are fundamental to address public affairs in the specific cases of DAMARENA, INPA, CARDIQUE, DIMAR, SUPERPUERTOS, Environmental and Agrarian Attorney’s Office, allowing them to address with speed and efficiency the environmental problems of the bay.

The objectives of the institutional development plan are:

- To increase the capacity of the staff through professional and personal training that results in more efficient work and optimize output.
- Strengthen the internal capacity of the institutions by means of an effective process of organizational re-engineering.
- To streamline the internal procedures of the institutions to consolidate a quality management system for the solution of environmental problems.
- Design a system of permanent monitoring for the execution of the institutional strengthening plan so as to enable to carry out adjustments as needed.

Output 1.4 Integrated Investment Action Plan.

This Output was executed by the Municipality of Cartagena through its environmental unit called - DAMARENA under contract number C-970076.

It assumed responsibility for the preparation of the integrated investment proposal for the rehabilitation of Cartagena Bay. The plan was developed addressing the technical, institutional, legislative and financial factors that have contributed to the contamination and to the environmental deterioration of the bay.

The specific objectives are:

- To prepare a plan for the rehabilitation of the *sewer and storm drainage* system of the city, taking into consideration the final disposal of the effluent and the environmental impact.
- To prepare a plan and a strategy for the mitigation and/or elimination of the main sources of pollution of *industrial* origin.
- To prepare a plan for the management of the *solid waste* from industry sources.
- To prepare a plan for the establishment of a *marine/port cleaning system*.
- To prepare a plan for the control of contamination produced by the *Canal del Dique*
- To prepare a plan to create a permanent system of *environmental surveillance*.
- To prepare an *Integrated Investment Plan* for the management and environmental rehabilitation of Cartagena Bay taking into account all mentioned plans.

An analysis of the final reports presented by the different sub-contracting institutions with UNOPS yields the following summary of the main problems resulting from the contamination of the bay:

- Contamination by organic matter from sewage discharges from the city, without previous treatment.
- Contamination produced by industrial waste discharged either without any treatment or with faulty treatment.
- Contamination by sediments coming from the Magdalena river flowing into the bay through the Canal del Dique.
- Contamination produced by the marine/port activity, caused mainly by coastal maritime traffic, fishing and tourism (boats and yachts) which don't have appropriate areas for the disposal of their residual (liquids and solids), and are discharged to the bay.
- Contamination caused by solid waste (urban and industrial) dumped into the water. Also, the garbage flows and the sanitary landfill of Cartagena.

Table 3 Depicts a list of the present projects under implementation or in the pipeline aimed at mitigating and/or eliminating pollution sources. In terms of GEF strategy this is considered to be the baseline for the Cartagena case.

Table 7.1 Summary of Current Investments (disbursed or committed)

ACTIONS	COST (USD)
Action Plan to complete the rehabilitation of the Sewer and Storm Drainage System of the City	110,500,000.
Action Plan and Strategies for the Mitigation/ Elimination of the Main Sources of Industrial pollution.	12,128,540.
Action Plan for the management of the Urban and Industrial solid waste.	NIA
Action Plan to create a Marine - Port Cleaning System.	6,545,296.
Action Plan for the control/alleviation of contamination produced by the Canal del Dique.	6,682,000.
Action Plan to create the Environmental Quality Permanent Surveillance System.	1,200,782.
Action Plan for institutional strengthening.	NIA
PARTIAL TOTAL	137,056,618.

NIA= No information available

A total baseline of approximately USD 137 million is estimated for the Cartagena bay case.

After evaluating the outputs and as a result of agreements with officials of different institutions responsible for the environmental control of Cartagena bay, the following table shows a summary of the proposed action plan :

Table 7.2 INTEGRATED INVESTMENT PLAN for REHABILITATION & MANAGEMENT OF CARTAGENA BAY

Summary of Investment Categories, Implementation Time Frames, and Investment Funds Required.

COLOMBIA	Short term 0-5 years	Medium term 5-15 years	Long term + 15 years	Cost (US) 1998
Action Plan to Complete the Rehabilitation of the Sewer and Storm Drainage Systems				7,000,000
Action Plan and Strategies for the Mitigation/ Elimination of the Main Sources of Industrial Contamination.				1,000,000
Action Plan for the management of Urban and Industrial solid waste.				2,700,000
Action Plan to create the Marine-Port Cleaning System				400,000
Action Plan for the reduction of the contamination produced by				1,500,000

the Canal del Dique.				
Action Plan to Create the Environmental Surveillance Permanent System.				3,975,000
Action Plan for Institutional strengthening.				534,314
TOTAL INVESTMENT REQUIRED US \$				17,109,314

The total amount estimated in the plan at constant 1998 price levels is then approximately USD 17 million. In the case of Cartagena, the baseline is so large that the action plan turns out to be relatively small as a comparison. It is a fact that a number of international financial organizations along side the GEF are participating in funding environmental projects for the rehabilitation of Cartagena bay.

7.1.2 COSTA RICA

The main findings from the subcontracted studies are summarized below.

Output 1.1 Studies of Bay Characterization.

This Output was executed by the University of Costa Rica jointly with the Center for Research on Marine Sciences and Limnology (CIMAR) under contract number C-96613.

To achieve this goal a program was designed for sampling of the Bay, involving observations on coastal platforms and adjacent waters.

Puerto Limón although not strictly a bay, it is an open coastal zone, thus directly exposed to the Caribbean waters and influenced by coastal currents. These currents bring into Puerto Limon pollutants from other Caribbean regions in addition to those generated locally.

Compared to the other project sites, Puerto Limon is the least contaminated of all by far because of the high dilution and dispersion characteristics of the contaminated effluents in the open seas, and because of the relatively small population (approximately 62,000) impacting the area.

The main results of the study indicate that:

- The diversity of invertebrates found in the coasts of Limon Bay is relatively high for an area adjacent to an urban concentration thus indicating relatively good water quality conditions.
- It was noted, however, the adverse impact of sediments in the mouth of the rivers and of the sewage system.
- The majority of the algae communities identified are typical of rich organic material environments.
- The composition of zooplankton indicates some impact from organic material.
- Physical and chemical analysis show that nutrient concentration did not reflect a major antropogenic pollution.
- The studies showed minimal impact by hydrocarbons.

Output 1.2 Sources of Pollution and Mitigation Strategies.

This Output was executed by the consulting firm Q. TEC SA of Costa Rica under contract number C-96612.

The study updated the inventory of point and non-point sources of pollution through inspections and analysis of various sources, as a result the main sources of pollution in the area were identified.

One of the most important sources is related to the inefficient operation and handling of the city's solid waste as well as the non-existence of a suitable land fill.

A subject of major importance also is the discharge of untreated sewage, which has led to the closing of certain beaches to the public.

Also, some industries contribute to the pollution of coastal waters with high concentrations of organic material through direct discharges or inefficient treatment systems.

Priority actions to mitigate the contamination of the coastal waters of Puerto Limon include:

- Technical and economic studies for the siting and development of a land-fill for domestic and hospital waste.
- The installation of collection centers for the recycling of waste materials, including used lubricants and oils.
- Implementing oceanographic and hydrographic studies to determine the feasibility of a submarine outfall.
- Technical and economic feasibility studies of a waste treatment plant for the industries in the lower basin of the Limoncito River.
- Information on pesticides in the water suggests that future studies must concentrate on the sediments in the currents.

Output 1.3 Institutional and Legal Frameworks.

This Output was executed by Fundacion AMBIO of Costa Rica, a local NGO, under contract number C-96611.

The purpose of the study was to elaborate a general report on the institutional and legal framework in the central area of Limon province. This analysis was carried out within the environmental legal framework of Costa Rica with emphasis on the regulations proper to Limon province.

This study has examined the Limon administrative framework and its weak points, seeking to adjust it to the commitments for sustainable development.

Costa Rica has signed international agreements with a strong commitment for the protection, rehabilitation and vigilance of natural resources. Main agreements related to the protection of the marine environment and involving public institutions in environmental management include:

- The United Nations Convention on the Law of the Sea
- Agreement on the prevention of waste pollution and other pollutants
- Protocol on cooperation to prevent oil spills in the Great Caribbean basin
- Agreement on the protection and sustainable development of the marine environment in the Great Caribbean basin.
- International agreement to prevent maritime pollution by ships, also known as MARPOL 73/78. Although it has not been signed by Costa Rica, this agreement is of great importance for the prevention of maritime pollution by vessels.

The study examined the key institutions for the development of Puerto Limon according to their bylaws, mandates and functions. Recommendations were issued as to how they should be restructured to conduct the proposed corrective actions successfully.

The need for better institutional coordination mechanisms was evidenced stemming from diverse economic, social and technical factors.

Output 1.4 Integrated Investment Action Plan.

This Output was executed by the Costa Rican Institute of Water and Sanitation (hereinafter referred to as Acueductos y Alcantarillado or A y A) under contract number C-970490.

All aspects contributing to contamination of Limon's coastal zone including institutional, technical, financial, and legal were examined in order to develop a proposal for an Investment Action Plan for the Rehabilitation of Puerto Limon. The Plan is a basic tool for environmental management, and it constitutes a serious effort to identify all pertinent actors that play a role in Puerto Limon.

To achieve environmental rehabilitation, the basic actions include institutional strengthening, the active participation of NGOs and community groups as well as private enterprise. Also needed are training programs, environmental education, a legal environmental framework and scientific and technical research.

Environmental activities proposed in the Integral Investment plan are specific in the critical issues identified in the diagnosis. A description of the main objectives of each proposal follows:

1- Centro de Cooperación Ambiental (CECO)

It is proposed to establish a center at the local level prepared to face in an integral manner those environmental problems of today and tomorrow. It should be open to participation and to any contribution of the community.

- To cooperate in activities leading to a decrease of pollution in the Caribbean sea.
- To link environmental programs developed by the Limon community with those by NGOs, international cooperation agencies and organized local groups.
- To speed up the process leading to the Integrated Processing of solid waste in Puerto Limón.
- To channel initiatives for the reduction and recycling of sold waste.
- To strengthen campaigns for environmental education of the population in cooperation with local institutions.

2- Integrated Solid Waste Management

The solid waste generated by the City of Limon are collected and discharged in uncontrolled sites. Thus, this proposal aims at:

- Reduce pollution by solid waste in streets, sites and rivers of Puerto Limón, Estero Cieneguita and the Caribbean sea.
- Alleviate the negative effects on the population's health.
- Decrease the amount of solid waste and attain the home classification of the waste.

3. Handling of waste generated by Maritime-Port activities

Maritime and port waste create in some cases serious problems of contamination of the Caribbean sea. Costa Rica proposes to:

- Reduce the contamination of the Caribbean Sea by waste generated by maritime and port operations.
- Create the facilities for the handling of oil waste from commercial and tourist vessels.
- Recycle oil waste into fuel
- Call for the signing of the MARPOL Agreement.

4- Alleviation-Elimination of polluting of industrial origin.

Although industrial pollution does not represent a serious problem in the case of Limon, the city has some industries with deficient treatment centers. The objectives of this proposal are to:

- Watch and timely notice any environmental problem in order to notify the pertinent authorities.
- Support and promote any action toward the integrated handling of waste.
- To encourage industries to handle their own waste through measures leading the prevention and alleviation of environmental impact.
- Improve environmental conditions in those areas with problems caused by the inadequate disposal of industrial waste.
- Promote recognition of industries fulfilling current environmental rules.

5- Control-reduction-mitigation of the effects of agrochemical waste.

The use of agrochemical components, especially plaguicides, does not have a significant impact on the area. It is necessary, however, to establish rules for the control and use of those types of contaminants. The plan proposes in this connection to:

- Support and promote any action towards the integrated management of solid waste polluted by agrochemical substances.
- Encourage banana industries to conduct adequate preventive and alleviation measures.
- Promote the improved use of plaguicides
- Support the promotion of new agricultural systems of organic production

6- Environmental Vigilance Program for Puerto Limon and adjacent areas:

The main goals of this program are:

- To obtain updated results on the quality of the waters of rivers and streams flowing into the Caribbean Sea.
- Study the tendencies of contamination, both in time and space, in the main areas of impact.
- Evaluate the changes in the pollution levels in the recipient waters.
- Detect the main actors and factors contributing to contamination, the main obstacles and resulting problems, and recommend possible solutions.
- Coordinate immediate actions with the institutions and organizations involved, both public and private.
- Increase the number of sites for testing used by current programs conducted by ICAA, CIMAR and UNA, adding new types of tests in order to enhance the number of direct indicators of the sanitary problems in Puerto Limón.

7- Reduce pollution by domestic liquid waste.

This plan contemplates the construction of sewage systems in order to improve the environmental conditions in those areas affected by problems created by the inadequate disposal of domestic waste water. This will lead not only to improving the health standards of the population but will also reduce the contamination of rivers, streams and the Caribbean sea.

8- Control-reduction-alleviation of the effects by solid and liquid waste generated by hospitals.

To achieve that all waste from hospitals and health centers be adequately processed in a cost-effective and permanent manner, it is proposed to

- Include Hospital Tony Facio within the general framework established by environmental and health policies and the plan for the management of dangerous waste.
- Create a system of vigilance and control of the sanitary handling of the hospital solid and liquid waste.

9- Inventory of large, medium, small and informal enterprises

The immediate objective is identifying current industries, their activities, the amount and quality of waste they generate and their final destination.

10 - Research Program for the Integrated Management of the Caribbean maritime-coastal area.

The integrated management of coastal areas is a necessary and important step in the search for environmental solutions towards the sustainable development of the area. This program proposes to

- Develop applied research in the maritime-coastal areas in interaction with the pollution sources from all sources.
- To generate biophysical, environmental, biological, social, legal and institutional information allowing for the establishment of institutional arrangements leading to an integrated and adequate maritime-coastal handling.
- To evaluate the evolution of integrated management considering phases of low awareness, increasing awareness, studies and research conducted, recommendations proposed and applied, creation of other new programs as well as of their development, implementation and evaluation.
- Strengthen the environmental management by local institutions, set up strategies for the development and conservation of coastal resources as well as solving conflicts stemming from the use and contamination of coasts.

11 - Rehabilitation of the sanitary infrastructure of Puerto Limon.

This project is underway with funds received through loans, attempting to:

- Improve, through main works, the levels of health and sanitary infrastructure.
- Improve environmental conditions in priority areas and in marginal and low income neighborhoods.

12. - Submarine outfall for Puerto Limon

This plan includes the design and construction of a submarine discharge coupled with a pre-treatment plant, as well as research on the environmental impact associated to this construction, which is currently being executed by the University of Costa Rica Foundation for Research with funds provided by the Inter American Development Bank. It proposes to

- Adequately dispose of waste water collected through main and secondary pipes of the sewage system through a submarine discharge efficient and safe, capable of guaranteeing quality of water and minimize the adverse impact on the environment and public health.

13. - Environmental Blue Flag program.

This program is being implemented with the following main objectives:

- Provide Hotel operators, Tourist Chambers of Commerce and Coastal communities with incentives to protect the beaches of Costa Rica in an integral manner.
- To organize coastal communities to manage and safeguard the sanitary condition of the beaches.
- To contribute to the establishment of water systems servicing coastal areas.
- To prevent and eliminate the disposal of inorganic origin in the beaches.
- To control and promote the treatment of industrial and domestic sewage discharged into the sea.
- To promote environmental education.
- To improve the quality of life of residents and visitors in coastal areas.

Table 5 presents a summary of the proposed Integrated Investment Action Plan

Table 7.3 INTEGRATED INVESTMENT PLAN for REHABILITATION & MANAGEMENT OF PUERTO LIMON

Summary of Investment Categories, Implementation Time Frames, and Investment Funds Required.

COSTA RICA	Short term 0-5 years	Medium term 5-15 years	Long term + 15 years	Cost (US\$) 1998
Center for Environmental Coordination				600,000
Integrated Solid Waste Management and Control				3,300,000
Waste Management generated by Maritime-Port Activities				380,000
Mitigation-Alleviation of pollutants of industrial origin				125,000
Control-reduction of the effects of agrochemical waste				150,000
Environmental monitoring program for Puerto Limon				1,600,000
Pollution reduction from domestic liquid waste				9,100,000
Control-reduction-mitigation of hospital solid and liquid waste				600,000
Inventory of small, medium and large informal enterprises				35,000
Research program for the integrated management of the maritime-coastal area				3,500,000
Rehabilitation of the sanitary infrastructure of Puerto Limon				9,825,000
Submarine outfall for Puerto Limon				2,156,456
Blue Flag program				1,300,000
TOTAL INVESTMENT REQUIRED US \$				32,701,456

The full investment cost to conduct the environmental activities proposed in the Integral Investment Plan are estimated at US\$32.7 million.

7.1.3 CUBA

The main findings from the subcontracted studies are summarized below.

Output 1.1 Studies of Bay Characterization

This Output was executed by the Center for Engineering and Environmental Management of Bays and Coastal Areas (CIMAB) under contract number C-96509.

To this end, a monitoring and sampling program was designed and executed which comprised the whole bay and adjoining coastal areas. A thorough review of existing studies since 1981 was performed.

The results indicated that the environmental quality of the bay and adjoining coastal areas continues to be unfavorable. However, the study of natural animal communities showed that the regenerative capacity potential of the area is high. The water quality of the bay will not improve if corrective measures are not adopted to eliminate contamination at the sources at levels which could be assimilated by the ecosystem.

The main study results have demonstrated that raw sewage entering into the bay have higher than normal concentrations of nutrients, nitrogen and phosphorus. The concentration of these compounds exceed the permissible limits posing a risk to human health. The result of this studies shows clearly that the waters of Havana Bay are strongly affected by the dumping of organic matter and some zones of the bay present a phenomenon called eutrophication.

An increase in the concentrations of solid waste has been found which affects the process of mixing, dilution and dispersion that should occur in the bay. Furthermore, tests have shown the presence of high levels of fecal coliforms which does not allow use of the bay waters even for secondary purposes.

The hydrocarbons founded in the surface of the bay present a homogenous distribution. From a qualitative point of view, the analysis demonstrate an obvious petrogenic contamination that comes from the past. That means that the bay has been contaminated by petroleum products many years ago. Quantitatively, these concentrations are very high and they can be comparable only with highly polluted coastal zones with petroleum products in other parts of the world.

The Atares cove was found to be the most polluted because it receives important discharges of domestic sewage and industrial waste which results in the accumulation of large amounts of organic matter with a marked impact on BOD and high concentrations of heavy metals in its sediments.

Output 1.2 Sources of Pollution and Mitigation Strategies.

This Output was also executed by the CIMAB along with the Provincial Water and Sanitation Department of the City of Havana (DPAA) under contract number C-96509.

It included a revision of available information on the bay's pollution sources since 1981 and the updating of point and non-point sources of pollution , as well as specific mitigation strategies.

The study's main results showed that the strongest pollution sources are the Luyano river (main sources of organic material, nutrients and solid waste pollution), the Gas plant , the Regla and Hacendados fish factories, the oil refinery and the fishing port.

Alleviation strategies for the environmental rehabilitation of Havana bay at the short, medium and long terms include:

- Cleaning of the Luyano and Martin Perez rivers through the installation of zonal treatment plants.
- Corrective measures at the polluting sources, including the introduction of clean technologies at the Gas plant and the closing of contaminating industries.
- Closing the illegal connections of industries and sewage system outlets into the storm water system and the rehabilitation and extension of the submarine outfall at the Chivo beach (east of the bay).
- Strengthening maritime and port activities towards the rational management of port waste.
- Implementation of an environmental monitoring programme at the polluting sources and the bay to watch the evolution of environmental quality of the ecosystem and the effectiveness of the alleviation measures adopted.

Output 1.3 Institutional and Legal Frameworks.

This study was executed by the Delegation of the Ministry for Science, Technology and the Environment in Havana City (CITMA) under contract number C-96511.

The study purpose was to analyze the current institutional and legal framework for the environmental preservation and protection of Havana bay. The analysis included a review of current regulations in the period 1880-1997 relative to ports and bays, maritime transport, navigation, Customs, arbitration, maritime police and the environment.

The study found that current laws are not only outdated, but are also dispersed and are not enforceable.

In the institutional framework, the following conclusions were reached:

- Absence of a Port Authority
- Insufficient integration between Central and Sectoral organizations
- Tendency to decentralization
- Presence of medium and small enterprises
- Multiplication of economic actors.

Taking into account the opinions of the main actors, a proposal has been elaborated with rules and regulations for the use and protection of Havana Bay. The rules also define the use of the bay in terms of maritime/port, industrial, cultural and tourist actions and the treatment of waste; it also includes aspects on the prevention of technological, maritime, aerial and natural disasters, environmental monitoring of the bay and waste sources, environmental education and public information plans and the creation of a monetary fund for the cleaning and sustainable development of the bay.

The elaboration of the draft rules for the use and protection of the Bay is an important output as it concentrates regulation measures now dispersed, adequating them to national and international activities. Once approved, the rules would be integrated to Law 81

(Environment) since its uses are aimed at the protection of the ecosystem through an environmental rationality that establishes educational and coercitive measures.

Furthermore, Cuba's adherence to several international agreements (Cartagena, MARPOL 73/78 and Basle Agreements) has established an interrelation between the national legislative framework and international regulations.

Output 1.4 Integrated Investment Action Plan.

This Output was executed by the Provincial Delegation of the Water and Sanitation Department in Havana (DPAA) under contract number C- 96872. The DPAA was assisted by the CIMAB, the Economic Organization for Maritime and Port Sanitation, the Provincial Department of Physical Planning and Architecture and the Provincial Direction of Community Services and the Transport Project Enterprise (GEOPROY).

The study purpose was the elaboration of an Integrated Investment Action Plan for the environmental rehabilitation of Havana bay.

The environmental diagnosis of Havana bay and its emission sources resulting from studies led to the elaboration of preinvestment projects for the gradual decontamination of the ecosystem. Projects include the following options for solutions:

1.- Treatment and disposal of pollution from the main tributaries to the bay. This plan basically proposes the construction of a waste treatment plant on the Martin Perez river and three waste treatment plants on the Luyano River with their respective pumping and appurtenant systems. These plants will treat sewage generated by more than 100,000 persons.

2. Rehabilitation and extension of the submarine outfall flowing into the Chivo beach (east of the port's entrance), so as to allow the proper dilution in the sea of sewage generated in Central Havana and preventing the contamination of adjoining areas to the port and the Caribbean sea.

3.- Dredging and disposal of polluted sediments. Sediments in Havana bay contain high levels of organic materials, hydrocarbons and heavy metals. Since they are not stabilized they are a high source of oxygen consumption. Thus, 3 million tons of sediments must be dredged and disposed of safely.

4.- Strengthening of port/maritime clean up activities. The increasing inputs of solid and hydrocarbon waste in the waters presents a major threat that has awakened world attention. The marine and coastal environments, especially port areas, are important sources of contamination that negatively affect the biota and such related activities such as navigation and tourism. Proposals for the enhancement of the maritime and port sanitation activities in the bay are based on:

- Improvement of the contingency plan for the Port of Havana
- Selective handling of ship waste, its treatment and final disposal
- Handling and separation of oil mixtures from ships and their final disposal
- Handling of floating solid waste at the river mouths and bay waters, and their safe disposal at covered waste sites.
- Systematic handling of floating oil in the bay and final disposal.

5.- Solid waste management affecting the Havana bay and the Luyano River. The increase in the amount of solid waste and its input in the marine and coastal environments represents a global threat. The project proposes viable environmental solutions at the Cayo Cruz waste disposal site and the creation of two other sites for the handling of urban solid waste generated by areas surrounding the bay. Alleviation measures included the closing of the Cayo Cruz waste disposal site are considered and its current use as a transfer station for the processing of waste generated by two Havana counties.

6.- Environmental Monitoring Program in Havana Bay.

This program aims at updating the control and evolution of the ecosystem's environmental quality and of the mitigation measures to be adopted. Its concrete aims are:

- Identifying the substances introduced, their amount, source and distribution
- Evaluating the effects of those substances on human beings, the marine environment and the ecosystem.
- Identifying any tendency generated by the concentration of these substances within a time frame.
- To show the need for legislative control of pollutant emissions and ensure the fulfillment of current regulations.
- Activate emergency plans in high risk areas
- Rehabilitate the quality of the marine environment for the proposed uses.

This demands the periodic characterization of the bay and of its waste sources as well as the revision and control of investments to control pollution sources.

Table 6 presents a summary of the proposed integrated investment action plan for Havana bay.

Table 7.4 INTEGRATED INVESTMENT PLAN for REHABILITATION & MANAGEMENT OF HAVANA BAY

Summary of Investment Categories, Implementation Time Frames, and Investment Funds Required.

CUBA	Short term 0-5 years	Medium term 5-15 years	Long term + 15 years	Cost (US\$) 1998
Treatment and disposal of the pollution from tributaries to the bay.				22,610,400
Dredging and disposal of contaminated sediments				14,900,000
Strengthening of maritime-port activities				4,800,000
Solid waste management that affect Havana bay and the Luyano river				1,150,000
Environmental monitoring program for Havana bay .				36,000
TOTAL INVESTMENT REQUIRED US \$				43,496,400

The estimated cost of investments needed for the environmental rehabilitation of Havana bay is US\$ 43.5 million. Investments in Cuban currency (pesos) are estimated at 26.8 million.

7.1.4 JAMAICA

The main findings from the subcontracted studies are summarized below.

Output 1.1 Studies of Bay Characterization.

This Output was executed by the University of the West Indies' Center for Marine Sciences (hereinafter referred to as UWI) under contract number C-96599.

It is reported that the deterioration of Kingston Harbor begun to attract public attention more than 30 years ago. Since 1970 serious studies were carried out by university scientists and disturbing reports were published concerning changing ecological conditions in the harbor. Between 1976 and 1992, other studies have been done, and proposals for remedial actions submitted to government were presented. So far, very little progress has been made towards implementation of appropriate works to achieve reversal of the deteriorating conditions.

At the end of 1993 SENTAR Consultants from Canada presented one of the most important studies at the request of the National Resources Conservation Authority (NRCA) and the National Water Commission (NWC), and financed by CIDA and the World Bank. The University of the West Indies (UWI) Center for Marine Sciences assisted SENTAR with their program of investigations concerning ecological conditions in the harbor.

The two most noteworthy findings of the 1996-97 UWI's investigations in the context of the present project objectives are as follows:

- Eutrophication in the harbor is worsening. The water quality parameters such as BOD, N, P, and Coliform content all show further deterioration, compared to those reported by SENTAR in 1992/93.
- Sedimentation from Rio Cobre and Sandy Gully continuous to cause severe degradation of Hunts Bay. Lyn quotes Dr. Dale Webber of the UWI on the subject, "biologically there is not enough left there (in Hunts Bay) that is worth saving. And furthermore, even if you were to shut off all the pollutants currently flowing into Hunts Bay, the sediments which are already accumulated there (especially at 3M corner) would now begin to release their contaminants into the water column. And therefore the sediments themselves must now be considered as sources of pollution."

The characterization of the harbor was done by UWI with disturbing conclusions for the degree of contamination requiring immediate actions.

Output 1.2 Sources of Pollution and Mitigation Strategies.

This Output was executed also by the University of the West Indies' Center for Marine Sciences under contract number C-96599.

Sewage is by far the most serious cause of the continuing eutrophication of Kingston Harbor. The polluted effluent is being discharged into the harbor through the outfall pipes of the malfunctioning Western and Greenwich sewage treatment plants; and also via the Rio Cobre, Sandy Gully, Portmore canals, and some other drainage channels. There is also continuing subterranean seepage into the harbor from the polluted groundwater of the Liguanea aquifer.

The Rio Cobre, industrial effluents, agrochemicals, solid waste, and ship waste, are the other significant sources of pollution of the harbor.

The mitigating strategies proposed for the short term (1-5 years) by the National Steering Committee are as follows:

- Set up the proposed Kingston Harbor Executive Committee, (KHEC), and the Project Management Unit, (PMU).
- Commence the proposed Capacity Building program.
- Refurbish the existing Western, Greenwich, Independence City and Bridgeport sewage treatment plants
- Design and construct 5mgd AIPS Soapberry Pilot Plant and do the necessary modifications to divert the existing Nance Pen and Sea-view flows into the pilot plant.
- Carry out the proposed Sedimentation Action Plan.
- Carry out the proposed Rio Cobre Watershed Action Plan.
- Commence the proposed Solid Waste Management program
- Carry out the proposed Public Education program.

For the medium term (5-15yrs) , the following actions are recommended:

- Construct suitable municipal sewage treatment facilities at Soapberry to handle the additional 15mgd of domestic effluent that is collected by existing sewerage systems in the Kingston Metropolitan Area.
- Do the necessary modifications to transmit the current flows that are delivered to Western and Greenwich, from these existing stations, into the proposed new 15mgd municipal treatment works at Soapberry.
- Construct a further 15 mgd sewage treatment facilities at Soapberry.
- Install collector sewers in existing high priority KMA localities and transmit the collection to the new treatment facilities at Soapberry.

For the long term (beyond 15yrs.), the following actions are recommended:

-
- Construct additional 30mgd treatment facilities, sewer the rest of the KMA, and transmit to Soapberry.

Output 1.3 Institutional and Legal Frameworks.

This Output was executed by two local consultants Witter and Pereira through NPPPS contracts.

A combined synthesis of the studies regarding the Institutional and Legal Framework (Output 1.3) and the Integrated Inter-Institutional Management Plan (Output 2.1) is presented herein. The work of Output 2.1 was a continuation of the work of Output 1.3, and the findings of both teams of subcontractors have helped to develop the organizational structure that will be proposed later on in this section for overseeing and managing the rehabilitation of Kingston Harbor:

The NRCA Act provides a sound and sufficient legislative framework for the rehabilitation of Kingston Harbor. The NWC Act is inadequate in its coverage of sewage. Clear management responsibility for water and sewage must be assigned to NWC in the context of an integrated sewerage, sewage treatment and wastewater disposal system for the KMA. The Act should be amended and should incorporate the provisions of the Kingston Improvements Act applicable to sewage.

The institutional arrangement with respect to the management of solid waste is fractured among too many agencies, and the locus of responsibility often seems unclear. Legislation relating to solid waste is fragmented and existing penalties for infringement of statutory prescriptions are extremely low. Consideration should be given to the promulgation of a comprehensive law on Solid Waste Management and realistic penalties for infringement need to be provided.

Environmental laws and standards are not very rigorously enforced, and some public agencies e.g. NWC, often flout the law and are themselves significant polluters.

The absence of supporting regulations is a noticeable deficiency in the legislative framework for environmental management. This weakens the regulatory regime.

Responsibility for Kingston Harbor as a natural resource has never been assigned or assumed. A new management framework for Kingston Harbor needs to be instituted. This should be a joint public and private sector body.

Output 1.4 Integrated Investment Action Plan.

This Output was executed by the Natural Resource Conservation Authority (NRCA) assisted by a team of two local consultants, Dr. David Lee and Mr. Leo Lawson.

The process of preparation of the Integrated Investment Action Plan involved collection, consolidation, synthesis, and detailed analysis, of all the issues that were raised, and the implementation costs that were estimated, for the various Remedial Action Plans generated under this project.

The main conclusions of Output 1.4 were very succinctly stated in the Consultants' report, and, for emphasis, some of them are repeated below:

1. The present value of Kingston Harbor as a natural resource has been estimated, (very conservatively), to be around US \$510M *per annum*.
2. Significant rehabilitation of the harbor can be effected over the next fifteen years with expenditures of around USD 212M to deal with sewage, sedimentation, capacity building, public education, ship waste and solid waste, as well as implementation of some essential institutional strengthening initiatives.

3. Any delay in effecting rehabilitation will have two obvious effects: Firstly, rehabilitation costs will escalate; and secondly, the value of the harbor will continue to diminish.
4. If pollution is discontinued, water quality will improve, the natural ecosystems will regenerate, and the value of the harbor will increase.
5. Financial analysis has shown, that if US \$ 212M is spent on Kingston Harbor rehabilitation works, over the next fifteen years, the Internal Rate of Return (IRR) on that investment will be of the order of 55%.
6. Furthermore, it is shown in Output 1.4, that the amount of expenditure required for the first fifteen years of rehabilitation efforts, is only around US \$ 212M, whereas Kingston Harbor itself, as a productive resource, has a value of around US \$ 510M *per annum* to the economy of Jamaica.

Table 7 presents the integrated investment plan for the rehabilitation and management of Kingston Harbor.

Table 7.5 INTEGRATED INVESTMENT PLAN for REHABILITATION & MANAGEMENT OF KGN. HARBOUR

Summary of Investment Categories, Implementation Time Frames, and Investment Funds Required.

JAMAICA	Short term 0-5 years	Medium term 5-15 years	Long term 15 years	Cost (US\$) 1998
Sewage Collection, Treatment and Disposal				163,600,000
Program to deal with Sedimentation				34,000,000
Capacity Building and Institutional Strengthening				5,800,000
Public Education Program				4,500,000
Facilities & Systems for Ship Waste Management				3,000,000
Solid Waste Management				400,000
Rio Cobre Watershed Management.				300,000
TOTAL INVESTMENT REQUIRED US \$				211,600,000

The total amount estimated to rehabilitate the harbor is approximately USD 211 million.

7.1.5 Discussion and Assessment

General Discussion

All outputs dealing with Immediate Objective 1 - Integrated Investment Action Plans - have been executed by the subcontracting institutions in the countries.

From the summary tables of Output 1.4 it is possible to observe that the costs to solve the problem of contamination are in the order of several million dollars. The benefits derived however, and the value of damaged ecosystems and resources at risk (including public health, fisheries, tourism, etc.) in most cases far outstrip these costs. These bays have an economic value to the countries as has been estimated in the case of Kingston Harbor, which justify the investments needed to recover the ecosystems.

The knowledge and insight accumulated as a result of the project's outputs about the magnitude and the main causes of the environmental problems of the region is considerable and generally sufficient for meaningful action to be taken without delay. The technological solutions to most of these problems are also quite well known and are available, at a price.

It is no surprise that the investments needed to control and to rehabilitate highly polluted bays and coastal areas are staggering. Experience in the developed world as in the case of Boston Harbor in the United States shows that not less than ten years of work and more than US\$ 3.4 billion in investments were needed to recover the harbor.

Havana Bay, Kingston Harbor and Cartagena Bay are examples of highly polluted areas in the Caribbean impacting in the global environment. Although Puerto Limon is less polluted than the other sites it still severely impacts in the Caribbean Sea by transporting persistent organic pollutants (PCP's) through sea currents.

From the standpoint of public health protection, *sewage* is the main problem but also the most significant pollutant entering the marine environment. Sewage production consists mainly of nutrient rich water which carries a variety of pathogenic microorganisms (e.g. viruses, bacteria) excreted by the carriers of various diseases in the population. Nutrients travel through sea currents contaminating the global environment.

The *industries* along the shores as is the case in Cartagena bay for example, are the second major source of pollution. Industrial effluent are treated adequately only in exceptional cases before their release into the nearest water body. They may contain a variety of toxic, oxygen consuming and non-biodegradable substances.

The mayor pollution loads in the region are created by chemicals (including petrochemicals and petroleum refining, food processing (particularly in sugar producing countries), metallurgical (iron and steel production, non ferrous metal refining), textile, and pulp and paper industries. Petroleum exploration, exploitation, and transportation is the region's major permanent source of operational and accidental releases of industrial wastes.

Puerto Limon has a specific contaminant which is *pesticides*. During the 1980s in Costa Rica the average pesticide consumption was about 195 kg per km² of land, nearly double the average consumption for Central America as a whole, and almost 10 times the estimated 20 kg per km² for the land surface of the entire earth. Accidents from pesticide poisoning, mainly due to their inappropriate application by ill-informed users, are not rare and are probably considerably more frequent than shown in official statistics.

Solid waste is a growing problem in the countries, with particular emphasis in Puerto Limon, Cartagena and Kingston, not only as an aesthetic nuisance but also as a mounting source of

pollution. Typically, its collection and disposal is poorly organized. Inappropriately selected sites for landfill are a permanent and dangerous source of various pollutants leaching and seeping into the surface and bay waters, and thus degrading the quality of these waters frequently to a dangerous level. Non-biodegradable or slowly degradable materials (plastics, metals) are a widespread nuisance for many recreational beaches of the region.

The characterization of the bays in all cases show a marked degree of contamination where *sewage* is confirmed to be the major contaminant. Sources of contamination have been identified and mitigation strategies proposed. A report of the legal framework has been issued and on the basis of the above mentioned studies, integrated investment action plans to rehabilitate the bays and coastal areas in the short, medium and long-term have been presented.

Assessment

A special problem that has been presented in all project sites merits particular attention, that is the process of increasing eutrophication in the bays and coastal zones.

As for the global toxic contaminants existing in the selected sites, the project has clearly identified nutrients as the principal cause of eutrophication, that is the presence of nitrogen and phosphorous in the waters. The source of the nutrients is in the raw sewage that enters these bodies of water which changes the water chemistry.

In Havana bay, Cartagena bay and Kingston harbor oxygen concentrations in the lower part of the water column are extremely low reaching undetectable levels. The bottom sediment turns black and the lack of oxygen sometimes called hypoxic condition kills or drives away fish or most bottom dwellers, such as shrimp, snails and crabs.

The cause of the phenomenon is no mystery. Studies of water samples, sediments from the bay floor and other data show that the amount of dissolved nitrogen in the outflow of the sewer outfalls have increased as well as the levels of phosphorus. These elements, present in forms on which single-celled organisms can feed, stimulate the growth of phytoplankton near the sea surface, which provide food for unicellular animals. The planktonic remains and fecal matter then fall to the ocean floor, where bacteria devour them, consuming oxygen as they do so. The process is known as eutrophication.

Similar episodes have been recorded in partially enclosed seas and basins around the globe: the Chesapeake Bay, the Baltic Sea, the Black Sea and the Adriatic Sea, among others. The Gulf of Mexico has a "dead zone" of approximately 5,500 square miles under the influence of the Mississippi River. Scientists have demonstrated a direct link between dissolved nutrients, principally nitrogen, the hypoxia in the lower water column and the ecological changes.

The bays hypoxic zones represents a grand challenge for environmental policy. The potential for an extension of this phenomenon in time beyond the natural borders of the bays and into the open Caribbean Sea is there.

7.2 IMMEDIATE OBJECTIVE 2. INSTITUTIONAL STRENGTHENING PLANS

The Project Document calls for “the strengthening of the operational capacities of those institutions entrusted with the planning and management of the bays and coastal areas through increased horizontal cooperation at the regional, national and local level”.

7.2.1 COLOMBIA

Output 2.1 Integrated Inter- Institutional Management Plan.

This Output was executed by the University of Cartagena and it has been presented jointly with Output 1.3 - Section 7.1.1.

Output 2.2 Capacity Building Program

This Output was executed by the University of Cartagena under contract number C-96687.

The University of Cartagena developed a program for the enhancement and additional development of the technical and scientific capacities of the institutions currently involved in environmental studies and management of Cartagena bay and adjacent coastal areas.

The institutional strengthening program is expected to last well beyond the duration of the project, achieving an increased improvement in the administrative capacity of the participating institutions.

Several institutions at the national, regional and local levels intervene in the environmental management of the bay and the coastal zones. Six research institutions were identified: CARDIQUE, C.I.O.H., INPA, INGEOMINAS, University of Cartagena and INVEMAR. The report includes an analysis of the institution’s technical capacities, their needs in terms of administrative, scientific and technical training, as well as proposed training programs based on their relative weaknesses and strengths.

A proposal for inter-institutional coordination, that will support the integrated actions has been developed. Activities were centered in the collection of information about the institutions taking into consideration the legal framework, research activities, human resources, infrastructure for investigation, facilities and its use in the environmental area.

TRAINING PLAN FOR HUMAN RESOURCE DEVELOPMENT

The training plan was designed in accordance with two elements:

- The need for training expressed by the institutions in the workshops carried out in order to gather valuable information for the study.
- The identification made by the study team about institutional weaknesses in several areas where the lack of an organized program was evident.

The plan was developed considering training needs for the technical and scientific strengthening of human resources, for the development of the institutional capacity and the environmental management.

A training program with the following characteristics is proposed:

- It should have a regional dimension (Cuba, Jamaica, Costa Rica and Colombia), with the purpose of unifying work approaches, reduce costs and integrate experiences.
- It should be common for all the institutions, to allow to integrate the participation in the project of recovery of the bay.

The subjects for training are:

- Environmental Investigation.
- Formulation and Administration of Projects
- Environmental Management of Coastal Zones
- Institutional Development
- Environmental Legislation.
- Environmental Education and Community Participation.
- Seminars and Workshops

The Country report developed by the national coordinator presents in a specific form the content of each seminar, the institutions in charge for execution and the estimated costs.

Output 2.3 National Workshops

1. First National Workshop. Cartagena - Colombia. September 1996 - National Coordinators met for the first time and examined initial results. Exchanges on project management procedures took place among the representatives of the different countries.
2. Second National Workshop. Cartagena - Colombia.
3. Third National Workshop. Cartagena - Colombia.
4. Fourth National Workshop. Cartagena - Colombia.

7.2.2 COSTA RICA

Output 2.1 Integrated Inter- Institutional Management Plan.

This Output was executed by the AMBIO Foundation, a local NGO under contract number C-961177.

This study was aimed at the elaboration of an Integrated Inter-Institutional Management Plan for Puerto Limon, leading to an increase in the coordination, management and planning capacities in that Caribbean area.

Regional proposals on environmental conservation and sustainable development were examined, including the Central American Commission and the Environment and Development, the Alliance for Sustainable Development, the Declaration of the Summit of the Americas, the Declaration of Santa Cruz, the Program for the Environment and Development in Central America and the Caribbean Initiative for Ship Waste, all of which provide a framework for principles and actions that should be incorporated to government management in the Caribbean area.

The administrative structure and functions of the institutions involved in the sustainable management of the area was also examined, with a view to establish a framework for coordination and cooperation between them and the Limon civil society.

The study analyzed the structure of each institution, identified its problems and limitations regarding capabilities and their potential. Lack of funds, personnel, equipment and technical capacity as well as low motivation of officials due to lack of incentives were found to be the basic problems. Cooperation and coordination mechanisms were also examined, and inter-institutional links are described as basis for a strategy for the protection of natural resources integrating the different sectors involved in the development of this area.

These studies have led to the definition of an environmental strategy for that Caribbean region based on an Inter-sector Coordination Plan.

Output 2.2 Capacity Building Program.

This Output was executed by a private consulting firm called Consultores Internacionales Ambientales under contract number C-961166.

The objective of this component was to develop a program for the improvement of the technical and scientific capacities of the institutions currently conducting environmental studies in Puerto Limon and its adjoining coastal area.

Towards this goal, information was gathered and analyzed on national maritime and coastal scientific research, emphasizing on Puerto Limon, on Costa Rica's Caribbean coast. Four methodological stages were conducted, the first being the identification of National Research Centers (NRC).

The second stage consisted in the elaboration of methods for collecting information useful for the evaluation of the technical, scientific and administrative capacities of the NRCs. The third stage included the collection of information through frequent visits and meetings at the NRCs and other institutions.

The main problems identified in the NRCs are:

1. Lack of proper maintenance, repair and renovation of equipment used by the NRC's.
2. Absence of a field station on the Caribbean coast of Costa Rica.
3. Lack of coordination among NRCs on a national and regional level.
4. Absence of a national and regional data base with information available on maritime-coastal research.
5. Insufficient training and updating of the NRC staff.

A Plan of Action on a national and regional scale has been proposed in order to foster a real increase in the capacities of the NRCs, mainly including the creation of a Cooperation Center, the enhancement of training of scientific personnel and the establishment of a Regional Cooperation Agreement.

Output 2.3 National Workshops

The exchange of experiences, with a particular and institutional view for the joint search of solutions to the main problems through national and regional workshops, has reinforced the global focus on the Caribbean environmental problems.

The CC Bays project sponsored several workshops in which the Costa Rican situation was examined

1. First National Workshop. Puerto Limon - Costa Rica. September 1996 - Meeting of researchers of the Consultant groups selected by the Project's National Committee. The project's implementation team and the Consultants defined a work plan.
2. Second National Workshop. Puerto Limon - Costa Rica. 29/30 January 1997 - Presentation of partial results with emphasis on components developed in Costa Rica, in the presence of delegates from the rest of the national projects.
3. Third National Workshop. Puerto Limon - Costa Rica, 27/28 November 1997

Presentation of partial and final results. A draft for a second GEF project on highly contaminated bays prepared by the Norwegian consulting firm NORPLAN was discussed.

7.2.3 CUBA

Output 2.1 Integrated Inter- Institutional Management Plan.

This Output was executed by the Havana City Delegation of the Ministry of Science, Technology and the Environment (CITMA) under contract number C-96974.

Experts from the subcontracted institutions prepared an Integrated Inter-institutional Management Plan for Havana bay in order to enhance the coordination, management and planning capacities in the area.

The institutional and legal structures dealing with coastal planning were evaluated. The main institutions responsible for the bay's rehabilitation were identified, as well as other levels with less responsibility.

According to the experts and the representatives of institutions consulted, the institutional strengthening of the local entities rests on strategic planning studies which should take care of the functional structure, training of inspectors, adequate management, and rational use of resources. Institutional and legal instruments must be created allowing for the agreement of actions by all participants during planning and management activities.

This concept is the basis for the creation of a Port Authority entrusted with the demands posed by environmental control and sustainable development of the Port of Havana, emphasizing on protection, preventing sector domination, avoid applying narrowly defined points of view in administration matters and reinforcing the relationship between the port and the city.

Output 2.2 Capacity Building Program

The Output was executed by the Havana Delegation of the CITMA under contract number C-96874.

The study was conducted with a view to develop a program for the enhancement of the technical and scientific capacities of the institutions related to environmental studies.

Through surveys and the help of the automated system INCATER the scientific potential and projection of the different institutions involved in the environmental structure of the bay were evaluated. The technical standards of the installations and of the field and laboratory equipment were considered as good in 90% of the cases.

Using the DAFO index, it was determined that 58% of the institutions are strong, 36% are threatened and 6% are weak. However, the general strategic problem is that the high qualifications of the personnel, nor the current capacities to assimilate GEF or other international financing could be used if the weak use of resources, low integration and insufficient certification of laboratories continue.

The Plan of Action calls for an increase in the integration of and communication among the institutions and the enhancement of information through specialized courses and exchanges. The joint use of scientific potential foreseen in the project, along with training, both domestic and overseas, could neutralize the low allocation of resources and difficulties present in the current infrastructure.

The program for the increase of technical capacities includes:

- The official creation of a group of experts entrusted with the implementation of technical control and evaluation of future projects.
- Restructure of the waste treatment team.
- Promotion of the directory of centers related to the bay and of courses of specialization
- Request research centers to present proposals for sewage treatment and nutrient removal.
- Increase the book fund of the specialized library.
- Conduct a conference at the COPES Consultancy Office in relation to Law 81 (Environment) and Havana Bay
- Support courses offered by CIMAB and recommend that the ISCTN Environment Chair create a group of assistant professors for the development of Sanitation and Bay Protection specialties.

Output 2.3 National Workshops

1. First National Workshop. Havana - Cuba.
2. Second National Workshop. Havana - Cuba
3. Third National Workshop. Havana - Cuba
4. Forth National Workshop. Havana - Cuba

7.2.4 JAMAICA

Output 2.1 Integrated Inter- Institutional Management Plan.

This Output was executed by the South Coast Conservation Foundation, a local NGO of Jamaica, under contract number C-961172. The results of this particular Output have been presented together with the results of a study of the legal framework in Output 1.3

Output 2.2 Capacity Building Program.

This Output was executed by the consulting firm Call Associates Consultancy Ltd. Of Jamaica under contract number C-961173.

The following institutions were identified as being the key government agencies that are most directly responsible for management and regulation of certain activities that seriously affect the Kingston Harbor environment:

- Natural Resources Conservation Authority, (NRCA)
- Environmental Control Division, (ECD), of the Ministry of Health
- National Water Commission, (NWC), responsible for water & sewage
- Kingston & St. Andrew Corporation, (KSAC), the Local Government Authority.
- Metropolitan Parks & Markets, (MPM), responsible for solid waste management in the KMA
- The Port Authority of Jamaica, (PAJ), responsible for harbors and shipping.

In order to be able to effectively perform their functions relating to the management and conservation of Kingston Harbor, most of the above institutions need enhancement of one or more of the following types of resources:

- * additional staff
- * increased staff training
- * additional equipment

A detailed listing of the needs of each institution in the above areas is given in the report for Output 2.2.

Output 2.3 National Workshops

1. First National Workshop. Kingston - Jamaica.
2. Second National Workshop. Kingston - Jamaica
3. Third National Workshop. Kingston - Jamaica

7.2.5 Discussion and Assessment

From the investigations performed in the framework of the above outputs and the immediate objective 2 of the CC Bays project, it can be observed that weak institutions and poor environmental management further aggravated by chronic lack of resources rather than limitations of science are the main reasons for the continued degradation of the bays and coastal areas. Sadly, it seems to be case throughout the Caribbean marine and coastal environment.

The application of environmentally sound management practices in coastal and maritime activities is the key to safeguarding and developing the marine and coastal environment and their resources. The lack of proper planning of land and sea-use practices, the irrational exploitation of natural resources, and the pollution to which they incidentally give rise, can be

avoided only by sound management practices. Management implies use, that is: rational use.

The studies in the countries and the national workshops have shown that the general public still lacks an adequate understanding of the linkages between development and environmental protection, and of the short -and long- term benefits and disadvantages of economic and environmental protection measures. This lack seriously calls for the immediate implementation of public awareness programs to educate the general public on the need for conducting activities to insure sustainable development of the marine and coastal environment and their resources.

The investment in education and public awareness building is relatively small when compared with investment in development, and is the most cost-effective contribution to sustainable development.

A major weakness of the fragmentation of government responsibility for environmental management in the countries is that it has not facilitated a comprehensive approach to solve the problems. The absence of a central authority in most cases for bay and coastal zone environmental management result in a weakness which prevents effective planning and management of environmental resources.

From the studies it can be seen that the institutional administrative framework which exists in most of the countries often results in duplication of efforts; ineffective communication and the lack of cooperation between various departments with conflicting and competing objectives; inadequate legislative mandates and the lack of a clear definition of environmental entities in development planning.

Generally, the institutional arrangements and capacities in the countries reflect the strengths and weaknesses of the legislative and regulatory framework for environmental management. It can be seen that much of the existing legislation is administered by numerous ministries and agencies. Much of the existing legislation is not being adequately enforced. The studies of environmental legislation in the countries undertaken in Output 1.3 confirm its inadequacy for efficient environmental management and for sustainable development.

7.3 IMMEDIATE OBJECTIVE 3. *PROJECT FINANCING AND IMPLEMENTATION*

The Project Document calls for the “establishment of necessary mechanisms to ensure public and private participation in the financing and implementation of proposed remedial action plans”.

7.3.1 Output 3.1. Regional Workshops

Activity 1 of this Output called for the identification in each of the selected project sites potential investors for the financing of project related activities and the formulation of a calendar of events (seminars, workshops, information sessions, conferences, symposia) geared towards the presentation of project objectives, the pre-feasibility studies conducted and the progress of project activities. Activity 2 in general called for the execution of public awareness programs.

Because of lack of time and budget none of these two activities of Output 3.1 were possible to execute during the life of the project. In spite of this, a second “follow up” project was

identified and formulated which pending approval should start early in 1999. In the mean time the present project will run out of GEF funds and a proposal for "bridging" activities has been developed for possible NORAD financing from Norway with the participation of NORPLAN consultants . The proposal for a grant of USD 200,000 called basically for executing activities 1 and 2 of the present Output and it is presented as Annex 2 of the present document. If the proposal is successful which at the time of the preparation of this final report is still uncertain, then Immediate Objective 3, Output 3.1 and activities 1 and 2 of the Project Document will be carried out in full during the second half of 1998.

During the project time two Regional Workshops were organized with the participation of the National Coordinators, GEF, UNDP, and the Governments as well as special invitations were sent to members of the international financial community such as the Inter American Development Bank , the World Bank and others. The following paragraphs describe the two workshops.

1. First Joint Regional Workshop. Havana - Cuba, December 1996 - Presentation of partial results, with emphasis on specific results in Cuba. First joint workshop with the IPID project in which participated all IPID countries. First Tripartite Meeting to review project progress. Submission of the PPER report.

2. Second Regional Workshop. Havana - Cuba -3/5 March 1998 - Presentation of final results by the participant countries and of the proposal for a second GEF project. The conclusions and recommendations focused on the mobilization of resources allowing funding to bridge the period until January 1999, when the second project is expected to commence.

7.3.2 Discussion and Assessment

A review of the country's financial situation give very different results. Although no attempt is made here to discuss in depth this subject it should be sufficient to mention that the common denominator is lack of hard currency to execute environmental projects. The case of Colombia is perhaps the least severe because the country has a strong economy with a moderate inflation rate and Cartagena bay has more than USD 100 million committed to investment. This is a strong baseline as compared to other countries. Costa Rica and Jamaica have much smaller economies and are severely limited to undertake on their own the investments called for as per Output 1.4.

The case of Cuba is markedly different. Economically damaged by the collapse of the Soviet Union and the continuing US embargo, Cuba's overriding problem is the lack of external financing and limited domestic funding. Given the high investment costs for treatment systems with low return on investment, the government is forced to intervene actively in joint ventures with foreign companies or in other innovative financing schemes to achieve its environmental objectives. A test case will be the clean up of the Luyano river a major pollutant of Havana bay.

As mentioned earlier, not much progress was made in this sector of looking for financing sources because of time and budget limitations in the project.

7.4 EQUIPMENT

UNOPS procured and delivered equipment to the countries to execute project activities on the basis of demonstrated needs. The list of mean equipment follows:

7.4.1 Colombia

Computadora 327 Note Light ACER *	Scanner
Computadora Presario 1425 COMPAQ	Scanjet 4C HP
Computadora Pentium DTK	Software HAESTED
Computadora Vectra 500 series. HP *	Destilador de agua VILAB 3300
Impresora BJC-70. CANON *	Digestores INDULAB
Impresora 692 C. HP	Rotavaporador HEIDOLPH
Impresora Laserjet 5L HP	Alphastation 255/300. Digital
Impresora 680C. HP	Correntometros . AANDARENA
Fotocopiadora 5310 XEROX	Estereoscopio

The total value for equipment purchased is USD 76,594

7.4.2 Costa Rica

Computadora Pentium
Computadora Pentium
Computadora Hewlett Packard
Impresora Epson color II S
Impresora Hewlett Packard
Impresora Laser HP 5L
pHmetro , OAKTON
Literatura

The total value for equipment purchased is USD 55,431

7.4.3 Cuba

Minibus Hyundai	TV Color Sony
Auto Peugeot 306xND	Retroproyector
Panel Hyundai Van H-100	Video VHS Sony
Computadora Rhino 6133X	Espectrómetro UV
Pentium Rhino 4133	Espectrómetro IR
Pentium 32MB	Cromatógrafo
Computadora HR-586-100	Hidrocaptoreos

Notebook 486x4	Conductímetro
Impresora	pHmetro
Impresora HP Laserjet	Oxímetro
Impresora LQ 1070	Spectrophotometer visible
Impresora 340 Deskjet	Water Bath
Fotocopiadora CANON	Rotoevaporador
Hand scanner color	GPS P/N
FAX CANON B-340	

The total value for equipment purchased is USD 192,127

7.4.4 Jamaica

Nissan Pick-up	Valeport Tide Gauge
Computadora ACER (Laptop)*	Valeport Tide Gauge
Power Paq Desktop Cpmputer	Water sampler (5L)
Hewlet Packard Laser Jet 5 Printer	Visible Spectrophotometer
Multimedia Speaker	CTX Colour Monitor
Valeport Curent meter	Pro plus Caib. Corer
Valeport Curent meter	Spare parts for Corer

The total value for equipment purchased is USD 73,590

7.4.5 Discussion and Assessment

Figure 7.1 presents a pie chart as a percentage of the dollar distribution of the equipment in the countries. It is clear that out of the total the country which needed the most assistance was Cuba with nearly half of the total and the country with the least need was Costa Rica. All equipment is in excellent condition and a detailed inventory is available in the country reports prepared by the National Coordinators.

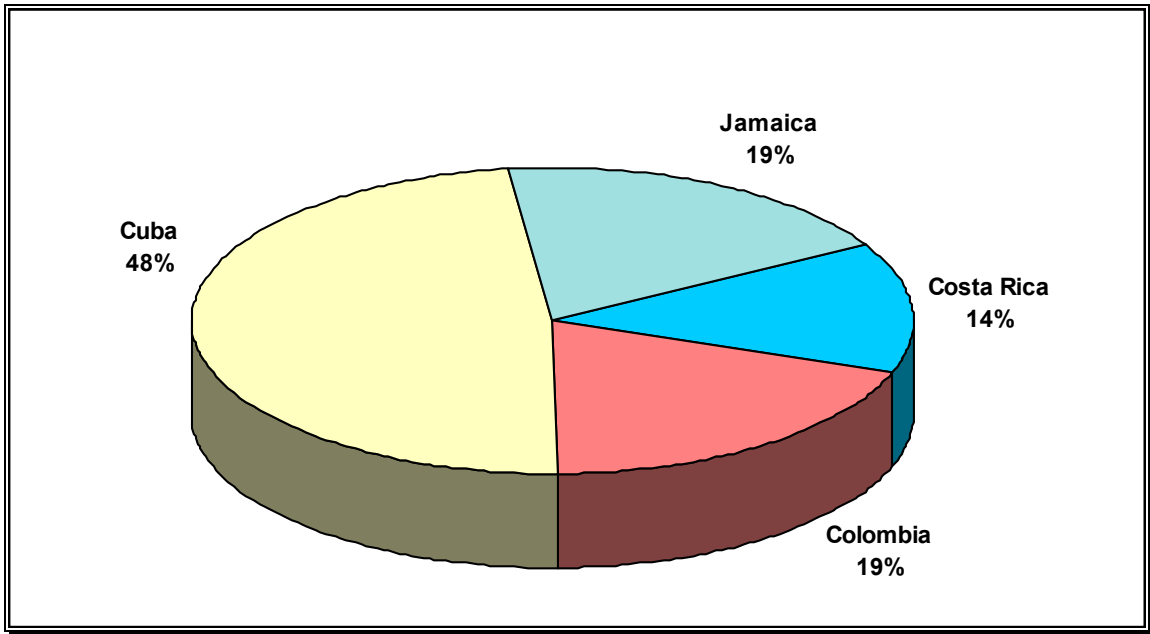


Figure 7.1 Percentage of Equipment Distribution in Terms of Dollars

CHAPTER 8. FINANCIAL MANAGEMENT

8.1 Originally Planned vs. Final Expenditures.

Figure 8.1 depicts a comparison between the original budget and final expenditures by budget lines.

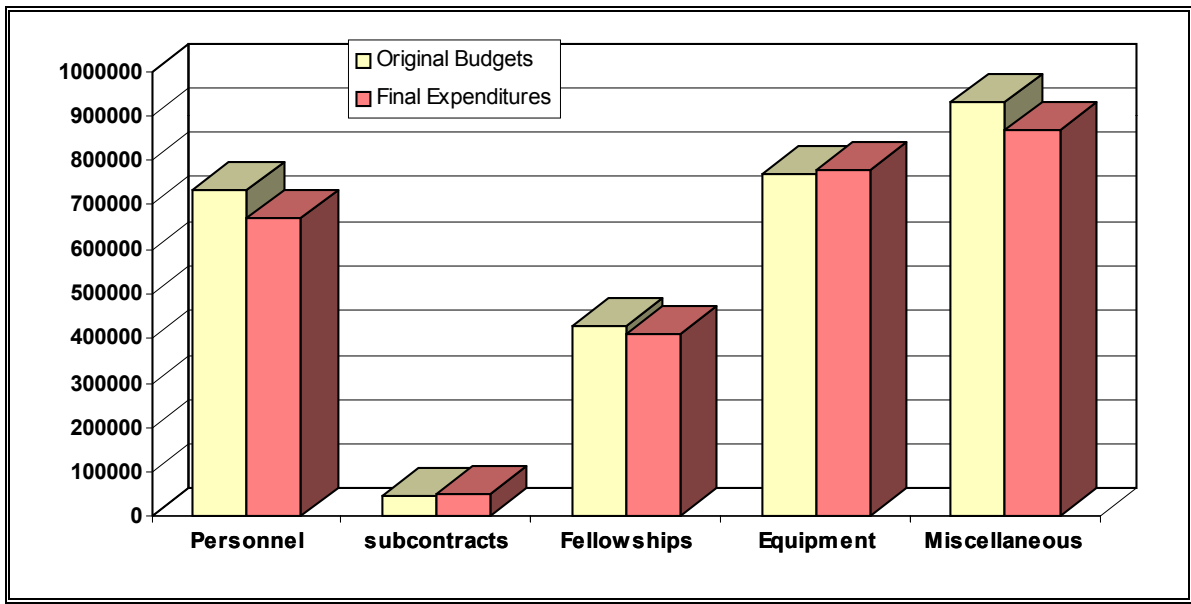


Figure 8.1 Original Project Budget vs. Final Expenditures by Budget Lines

Financial management of the project was centralized by UNOPS in New York. The RCO received periodically copies of the mandatory revisions of the budgets and expenditures report prepared by UNOPS at Headquarters, as the only source of information on financial matters. UNDP field offices kept track of all payments made to individual consultants, sub-contractors, suppliers and other project related expenses. The reporting efficiency of expenditures varied among field offices and in some cases, up to three or more months were taken to debit real expenditures.

One of the problems during project implementation for the RCO was the lack of up to date balances in the budget. Since UNOPS budgetary system is based principally on management by budget categories and by obligated amounts, it was almost impossible to know at any given time the real balance of the budget. This lack of information made planning of remaining activities difficult. The RCO often had to rely on UNDP field offices information for real expenditures which made matters cumbersome with the offices away from headquarters. Financial reporting from UNDP field offices to UNOPS was not always done on a timely fashion and that contributed to a continued uncertainty on project balances. The RCO was not staffed, budgeted nor equipped to maintain parallel financial management.

8.2 Government Counterpart Contribution in Kind (GCC)

Figure 8.2 presents a pie chart with percentages of the total estimated amount in dollar terms of each country's GCC.

After a lukewarm project start up in the countries, increasing government support was noticeable in terms of parallel actions to strengthen environmental operations at the bays and coastal zones as well as direct in kind contribution to project activities. GCC in kind was in the form of professional personnel, support personnel, offices, vehicles, computers, laboratory facilities, utilities, food and other services for workshops and many other forms difficult to identify in detail.

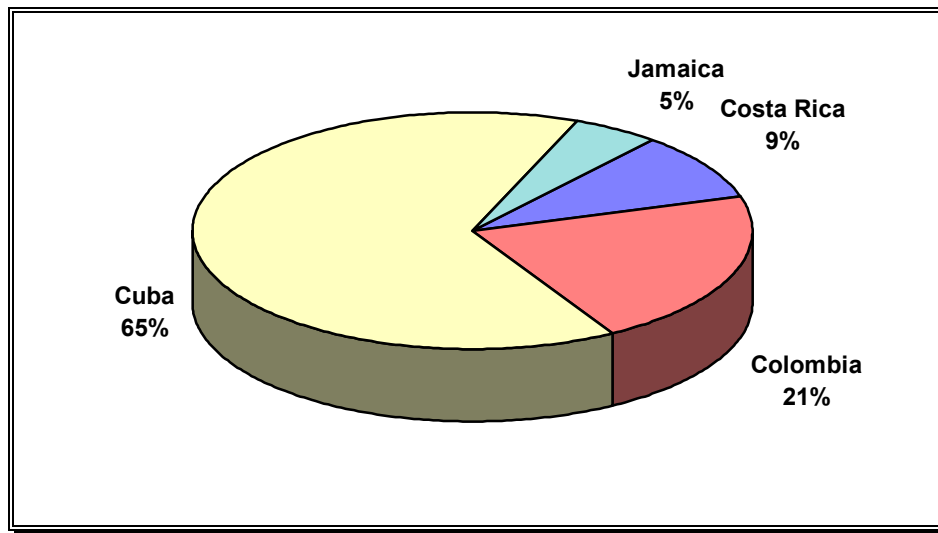


Fig 8.2 Percentages of the Total Estimated Amount of Government Contribution

CHAPTER 9. SECOND PHASE PROJECT

9.1 The Need for a Second Phase Project

The increasing degradation of the blue and clear waters of the Caribbean with particular emphasis on the selected study sites, call for swift and bold actions if further ecological damage is to be avoided. The integrated investment action plans prepared in Output 1.4 (Section 7.1) are very ambitious and demand more financial resources than the countries can realistically allocate to solve the problem. However, the political authorities at the highest levels in the countries are very much aware that urgent action is needed to initiate a gradual process of rehabilitation of the bays and coastal zones and a follow up project with modest investments has been formulated for quick implementation. As the cover of this report shows, (now is the time to move) *from planning to action*.

Among the priority pollutants for their ultimate impact in the global environment entering the coastal and marine environment of the Wider Caribbean region, there is increasing concern regarding nutrient enrichment of coastal waters from point and non-point sources, particularly nitrogen and phosphorous compounds.

The need for a follow up phase with GEF funds (and of country co-financing) stems from the fact that nutrient enrichment of the coastal areas of the Wider Caribbean is sure to increase if no actions are taken thus impacting the global environment. The continuous discharge of these nutrients in enclosed bays and coastal areas is a major cause of eutrophication phenomena as has been discussed in previous sections of this report. The eutrophication process is perhaps one of the most important factors in the degradation of coastal ecosystems in several areas of the Wider Caribbean including the Gulf of Mexico.

Coastal regions have experienced rapid population growth together with changes in adjacent land use. To control the sources of nutrient enrichment and to reverse the adverse effects of eutrophication, it will be necessary to build treatment plants using natural treatment technologies that arrest transboundary pollutants as well as to improve the effectiveness of those existing sewage treatment plants. It is important also to control the runoff from non-point sources and atmospheric deposition of nutrients by changing their levels of application and use, as well as to encourage changes that will promote long-term benefits and cause the least damage to interrelated ecosystems.

This project has numerous examples such as the case of Cartagena Bay in which seasonal episodes of massive fish kills do occur, caused by the depletion of dissolved oxygen in the near shore waters of the Bay. These fish kills have been attributed to nutrient enrichment caused by the discharge of untreated sewage and agricultural nutrient runoff prevalent in the area. Elimination of pollutants inflows to Kingston Harbor will lead to restoration and maintenance of good water quality, not only within the harbor basin itself, and adjacent coastal areas, but also in the open waters of the Wider Caribbean, where negative long-term transboundary effects would become serious if the increasing inflows of polluted wastewater from land-based sources were to continue.

A follow up project has been formulated with the assistance of international consultants from the Norwegian firm NORPLAN with a grant from the Nordic Trust Fund obtained for the project through the UNOPS Copenhagen office late last year. The following chapter attempts to present a synthesis of the projects identified for the second phase.

9.2 Identified Pilot Investment or Demonstration Projects

9.2.1 COLOMBIA

INSTITUTIONAL STRENGTHENING

The environmental management of the Cartagena Bay, which is an economic zone of multiple uses, requires coordination among the different users. At the same time, the success of the coordination efforts will depend on the capabilities and strength of key environmental institutions in Cartagena in order to support their surveillance and regulation enforcement tasks.

The main output of this plan will be:

- ***Creation of an “Inter-institutional Committee for Environmental Management of Cartagena Bay”.***

This has been proposed to face the existing challenges such as lack of coordination among the different users and stake holders of Cartagena Bay.

The following activities will be developed:

- Define needs and a working action plan.
- Create a database.
- Prepare land-use plans and maps.
- Public Participation.
- Environmental Education.
- Voluntary Agreements.

- ***Environmental monitoring for water resources in the Cartagena Bay area.***

In order to establish a comprehensive monitoring programme of the water quality in the Cartagena Bay area, and surveillance and control routines for sources of industrial pollution into the Bay and share the best experiences the following activities will be executed:

- Design and implement a monitoring programme.
- Design environmental quality indicators.
- Document and widely disseminate lessons.

- ***Training for environmental monitoring***

Based on the definition of the needs and objectives of the monitoring programme, training needs among the personnel and institutions involved in the different aspects of the monitoring efforts should be identified as well as institutions and courses in the region to

improve the quality of the human resource base through capacity building in environmental management.

The activities to be executed will be:

- Identify training needs.
- Identify suitable institutions and courses.
- Identify suitable.
- Provide scholarships to community leaders.
- Conduct study tours.

IMPROVEMENT AND STRENGTHENING OF THE INCENTIVE FRAMEWORK FOR ENVIRONMENTAL POLICY IN COLOMBIA AND ESTABLISHMENT OF THE BASIS FOR THE USE OF INNOVATIVE INSTRUMENTS FOR ENVIRONMENTAL MANAGEMENT.

At the same time, and oriented to support the institutional strengthening efforts, the use of economic incentives instead of only “command-and-control” regulations should be supported. In particular, support is required to warrant the success of the new environmental regulation that has been approved imposing environmental fees to effluents. As part of the proposed GEF project, efforts will be done in two directions : to support the -decentralized- Cartagena environmental authorities to implement/enforce the current legislation on BOD and SST, and to support the process of assessing the potential for additional innovative instruments for other sources of pollution,

- ***Support to the -decentralized- Cartagena environmental authority to implement/enforce the current legislation on water pollution.***

This output includes:

- Assess training needs
 - Support and promote training activities.
 - Support sector and community studies of environmental conditions.
 - Assessing impacts of effluent charges.
-
- ***Support the efforts of provincial/municipal environmental authorities in assessing the potentials benefits of innovative instruments for environmental management.***

The proposed activities are:

- Establish a training program.
 - Case studies of resource valuation.
 - Support scholarships to environmental managers.
 - Disseminate the results of studies.
 - Organize national and international workshop on ICZM.
-
- **Infrastructure and Equipment**

This project component will support those efforts to ensure the new facilities meet the requirements for monitoring environmental quality using international accepted standards and it proposes:

- Support building of necessary infrastructure.
- Support purchasing of remaining equipment.
- Ensure maintenance of infrastructure and equipment.

INTEGRATING DEVELOPMENT AND CONSERVATION (CLEAN TECHNOLOGY PROGRAM).

The proposed project component aims to: on the one hand, to strengthen the institutional capabilities of the environmental authorities in order to control and enforce current regulations and to disseminate lessons and results from this agreement, and on the other hand, to support the efforts towards the implementation of similar agreement with medium and small industries in the periphery of the Cartagena Bay.

The program should reduce the discharge of nutrients, persistent organic pollutants (POPs), heavy metals and any other global pollutant, by a combination of optimising the production processes, wastewater treatment operations and reuse of materials.

This program should provide the environmental authorities in Cartagena with the technical and human resources to be able to face the challenges established by the increasingly demanding process of environmental regulations taking place in Colombia. The environmental authority should also play a catalytic role in supporting the efforts of the private industry to comply with the current regulations. This can be done through a program of education, training and technical assistance oriented towards the private sector, but channeled through a mixed-body, with the participation of representatives from both the private industrial sector of Cartagena and the local environmental authority.

- ***Clean Production Capacity Building Program.***

This program aims to support the private industry to improve the environmental quality of their production processes and to reduce the emissions.

Activities:

- Preliminary Activities for Capacity Building Program
- Conduct the First Capacity Building Program

- ***Sustainable financing mechanisms.***

Identify and develop sustainable financing mechanisms, which will extend coastal and marine pollution prevention and management activities in the region beyond the life of the project, is the objective of this component. It will execute the following activities:

- Assess the potential for public sector-private sector partnerships.

- Identify and assess existing and potential incentive mechanisms.

ENVIRONMENTAL MANAGEMENT TOOLS.

This project component aims at : improving the capabilities of the model developed during the first phase and, initiating the process of transforming the current scientific research tool into an environmental management tool which may be useful for the decision-making process related to the control, monitoring and management of the Cartagena Bay.

- ***Create, and initiate the use of data sets for validation of hydrodynamic and biological models.***

With this objective will be developed the following activities:

- Measurements of the hydrodynamics of Cartagena Bay.
 - Measurements of water quality in Cartagena Bay.
 - Measurements of auto-purification processes in Cartagena Bay.
 - Report and compile measured data as "cases" in an open data-base.
 - Invite guest specialists, compile results and arrange workshop.
-
- ***Validated and documented hydrodynamic, auto-purification, ecological and transport models for Cartagena Bay.***
 - Further model development.
 - Validation studies for CODEGO.
 - Write a Validation Document for CODEGO.
 - Write User's Manual for CODEGO.
-
- ***Training and technical support program for mathematical models in the Wider Caribbean. Making CODEGO available for other users in the Wider Caribbean.***

In order to make CODEGO available for other users in the Wider Caribbean and in that way contribute to the sharing of experience and the enhance of the regional cooperation a plan of training is proposed :

- Training in ocean related measurements and data acquisition.
 - Training in mathematical modeling and use of CODEGO.
 - Technical support to other CODEGO users.
-
- ***Initiate preliminary activities, training and data collection in other locations in the Wider Caribbean to assess and/or implement mathematical modelling of environmental quality.***

With the same objective of the prior output the following activities will be realize :

- Establish a regional network .
- Training in ocean measurements and data acquisition in Kingston
- Training in ocean measurements and data acquisition in Puerto Limón
- Training in ocean measurements and data acquisition in Havana.

Budget and Schedule

	<i>Amount in USD (in thousands)</i>
Baseline	136.500
Alternative	139.600
GEF Increment	2.500
Co-financing	600

9.2.2 COSTA RICA

In the first phase of the study the main pollution problems that contributes to contamination of Puerto Limon were identified. The Second Phase is aimed to establish two management programs in order to proposes solutions to this problems.

HAZARDOUS WASTE MANAGEMENT PROGRAM

The objective of this program is the improvement and the development of the existing waste treatment system in Limon, and to demonstrate sustainable waste management solutions and landfill technologies.

- ***Planning, design and construction of a new Sanitary Landfill for the City of Limón.***

In order to decrease the environmental problems in Limon due to inaccuracy handling of solid waste, this results in aimed to executes the Predesign, Design y Construction of municipal landfill including both logistics and technical requirements. As part of the design of the landfill, a gas utilization system will be designed and constructed (The system consists of gas collection, conveyance and a utilization system)

Leachate from the landfill will contain high levels of pollutants including nitrogen, phosphorus, heavy metals, and persistent organic pollutants, for that reason after Geotechnical studies, the collection of leachate from the landfill will be addressed by the geotechnical experts, as result, the Design and construction of leachate collection and treatment system will be done.

- ***Hazardous Waste Collection and Recycling Program***

Hospitals generate huge amounts of waste every year. A large portion of the waste is considered to be contagious and should not be recycled, while other portions of the waste can be recycled. That is for a source separation and collection program for solid waste at hospitals will be an effective solution to this problem.

A program to prevent oil spills and collect and recycle used oil will be initiated and a facility for receiving solid waste from ships anchoring in the harbor will be addressed in order to provide guidelines to prevent oil spills from industry and ships, as well as other sources and reduce the pollutant loading on the harbor and the Caribbean.

Economic instruments for environmental management

This result will develop an Environmental Cost Analysis Study which will provide the national and local authorities with a set of economical and institutional sound tools for environmental management. It will also demonstrate that economic incentives may reduce financial risk, overcome transaction barriers and build markets for waste management activities.

A more effective regulatory framework for the waste management in the Limon area will be implemented.

- ***Institutional strengthening of local authorities involved in Waste Management.***

Capacity building, human resource development and skills necessary to achieve reduction of contaminating sources of solid waste is an essential part of a hazardous waste management program. That is why it is necessary to implement programs for municipal, health and port authorities institutional strengthening.

- ***Establish and operate a center for training, education and public information.***

Develop waste management knowledge and skills to remove implementation barriers and thus implement the waste management program will be the main goal of the result. Besides will be created an Information office for education and public information on the management of solid waste which will be responsible for the training programs as well as to improve public awareness of source separation and recycling programs for solid waste.

- ***Monitoring and documentation program of waste contamination***

In order to verify the effects of the hazardous waste management program, it is important to develop statistics of waste collecting and recycling activities, data should be collected on the amounts of waste collected, recycled and disposed off, on the other hand the effects of the hazardous waste management program can also be determined by the improvement in water quality in local surface runoff and the bay.

PESTICIDES MANAGEMENT IMPROVEMENT PROGRAM

Pesticides management improvement program to develop and demonstrate means to reduce the pesticide contamination from banana plantations to the waterways and the Caribbean.

Coast. Improve the awareness of environmental contamination and health effects from pesticides and train plantation workers and owners in more sustainable management methods of banana production. The outputs expected of the program will be:

- ***Improved methods of environmental management for banana plantations***

Solid waste from banana plantations contains high levels of pesticides, especially plastic used to cover bananas during application of the pesticides, to give solution to this problem a Waste management program for organic waste, plastics and chemicals, an Alternative methods to reduce the use of pesticides, and identify more acceptable substitutes and an Development program for surface water treatment from banana plantations will be addressed in this output

- ***Training and demonstration programs***

Is important that the plantation owners and the workers at the plantations directly involved in the management of hazardous waste get training and demonstration in several techniques to improve the methods of environmental management of the plantations. This includes hazardous waste management, solid waste collection and recycling, and surface water collection and treatment methods

- ***Budget and Schedule***

	<i>Amount in USD (in thousands)</i>
Baseline	23.125
Alternative	26.295
GEF Increment	2.500
Co-financing	650

9.2.3 CUBA

The overall objective of the proposed project is the implementation of technology and capacity building for sustainable development in managing the pollution problems from sanitary installations in the Luyano river basin in Havana, and subsequent reduction of the pollution component input (including the nutrients nitrogen and phosphorous) to local and international waters. The proposal is based on existing host country strategy on waste water treatment in the study area with supplements on cost efficient nutrient removal and recovery energy.

The proposal for Second Phase have three immediately objectives:

LUYANO RIVER BASIN SEWAGE TREATMENT PLANTS

In the prior studies, Luyano River has been identified as the main pollutant source to Havana Bay, with great amount of nutrients, solid wastes and almost 30% of organic matter load entering to the bay.

The prime objective is the waste water treatment plant but the project output is separated in two categories, nutrient removal and biogas unit as follow :

- ***Nutrient Removal***

The main goal of this output is build a relatively low maintenance treatment plant with a high and stable nutrient removal that suits the local competence and resource situation.

The principals activities to be developed in this phase of the project will be:

- Capacity building, training of local experts and final location and design of the treatment Plant.
- Planing and construction of one treatment Plant that have the potential to remove about half of he estimated emissions of nutrients to Havana Bay.
- Develop a program for optimizing the operation and monitoring the treatment plant headed by local counterparts.
- Develop and organized research activities and training programs connected to local capacity building.

- ***Sludge Treatment and Energy Recovery as Biogas***

The main objective of this results will be, utilize energy from wastewater and provide a main link to the development of a more sustainable wastewater system.

Different activities will be executes under this objective, among them:

- Finalize the design and construction of the biogas unit connected to the proposed treatment plant.
- Develop a program for optimizing the operation and monitoring of the biogas unit. And of the usage of produced biogas
- Develop and organized research activities and training programs connected to local capacity building
- Investigate and develop infrastructure for local recycling, utilization and quality assurance of the fertilizer products generated by the system.
- Initiate research and development regarding the agricultural aspects of using organic fertilizer products generated by processing resources in wastewater and organic waste.

DEMONSTRATIONS PROJECTS FOCUSING ON INNOVATIVE BETTER PRACTICES FOR RECYCLING OF NUTRIENTS AND ENERGY FROM WASTE WATER

The proposed demonstration projects are needed to test local adaptability and the practical technical, economical and legal aspects of system not previously used in Cuba.

This objective is splitting in two principal outputs :

- ***MATCO prefabricated house***

This plan seeks the demonstration of “zero emission housing unit” applicable to urban and rural areas and strengthen local capabilities to implement and produced environmentally sound sustainable technology to wastewater treatment, including recycling of nutrients and energy production.

The main activities to develop are:

- Implement water saving toilets, a blackwater collection system and separate greywater treatment in an apartment building consisting of 16 flats. The greywater is preferably treated locally.
- Establish a technology transfer program with relevant local counterparts and explore the possibilities of producing the main system components(toilet and vacuum units) in Cuba.
- Establish a program for survey, monitoring and research headed by local counterparts.

- ***Sewage treatment in areas with low infrastructure and housing standards.***

Use special low flush toilets and separate blackwater collection to reduce immediate pollution problems and demonstrate how, on long term basis , “end of pipe solutions” can over time slowly be converted to a recycling system.

This project will develop the following activities:

- Implement water saving blackwater collection system for 50 households. Build a pond wetland system for treatment of waste water for the El Moro area. Improved collection system for organic waste.
- Develop and implement a program for public participation.
- Establish a technology transfer program with relevant local counterparts and explore the possibilities of producing the special low flush toilets in Cuba.

TRANSFERRING PROJECT EXPERIENCES ACROSS THE REGION

The sustainability and the cost effectiveness of the proposed projects in different regions will to a certain degree depend on their applicability and transferability across regions.

Is an output of this objective spread the experiences obtained in the application of the proposed demonstrative projects through meetings and forums, as well as the elaboration of a common final report on project experiences.

- **Budget and Schedule**

	Amount in USD (in thousands)
Baseline	12.265
Alternative	28.925
GEF Increment	2.500
Co-financing	16.660

9.2.4 JAMAICA

TO DEVELOP AN INSTITUTIONAL ENTITY RESPONSIBLE FOR THE REHABILITATION AND ENVIRONMENTAL MANAGEMENT OF KINGSTON HARBOUR.

The first phase of the GEF project identified the need for definition and delineation of the responsibilities in the planning and management of Kingston Harbor. This objective will provide the institutional entity necessary for the effective rehabilitation of the harbor.

- ***A new institutional entity responsible for the rehabilitation of Kingston Harbor.***

Is necessary the establishment of a new organization for the management of Kingston Harbor which must be given the required political power and existing institutions involved in the rehabilitation of Kingston Harbor must recognize the new organization as responsible for the overall planning of projects affecting the harbor; The first main objective of the new institution is the design and construction of a pilot wastewater treatment facility

On the other hand at present there are several projects, already initiated, aimed at improving the water quality of Kingston Harbor the Project Management Unit has the responsibility of producing a monitoring plan for Kingston Harbor. Several organizations are already involved in monitoring the harbor; and, the new PMU will coordinate these efforts.

TO DESIGN AND CONSTRUCT A PILOT WASTEWATER TREATMENT FACILITY FOR THE KINGSTON METROPOLITAN AREA.

This will provide the facilities necessary for treatment of wastewater from portions of the Kingston metropolitan area. The treatment plant will demonstrate the chosen technology under local conditions.

- ***Design of a pilot wastewater treatment facility.***

In this phase is necessary conduct a geotechnical study of the Soapberry lands in order to determining the geotechnical limitations of the site, after that a predesign and detailed design

of a pilot wastewater treatment facility will be made. The output will be plans and specifications for the construction of a wastewater treatment facility.

- ***Construction of a pilot wastewater treatment facility.***

As soon as the design of this facility is completed and financing secured, construction of the pilot wastewater treatment facility at Soapberry will commence including the construction of constructed wetlands as effluent polishing at the pilot wastewater treatment facility at Soapberry.

On the other hand, to transport the wastewater to the proposed site at Soapberry, some modifications to existing pump stations have to be made and new force mains from Seaview Gardens to Nance Pen and from Nance Pen to Soapberry must be constructed to transport the wastewater to Soapberry.

OPERATION AND MAINTENANCE OF THE TREATMENT FACILITY.

To ensure proper treatment of the wastewater during the life of the treatment plant, skilled operators, and an operation and maintenance program are of crucial importance.

- ***Operation and maintenance program for the treatment facility.***

The activities that are necessary to execute in order to develop the proposed objective are:

- Initiate a program for operator training.
- Operation and maintenance of the pilot wastewater treatment facility for the first year of operation.
- Monitoring of the treatment plant performance

- ***Budget and Schedule***

	<i>Amount in USD (in thousands)</i>
Baseline	30.000
Alternative	43.700
GEF Increment	2.500
Co-financing	11.200

CHAPTER 10. CONCLUSIONS AND RECOMMENDATIONS

10.1 Conclusions

1. The experience of this project in the countries affected indicates that the oceans and coastal areas are still not considered as finite economic assets which can be used on a sustainable basis only through prudent exploitation. This is evident when development plans and environment protection confront conventional spending priorities of the governments. Therefore relatively low priority is assigned in most national development plans to the protection of these areas and to the rational use of their resources. The result is a scarcity of funds needed for measures which could prevent, reduce or eliminate the pollution of the environment, halt the physical degradation of coastal areas and protect their resources.
2. The countries of the region realize that their separate, individual efforts at environmental management are likely to become more effective if such efforts are formulated and implemented within a clear regional framework. Transboundary pollution is caused by the transfer of pollutants through natural oceanic processes which do not respect political boundaries. Transboundary management of marine pollution requires a long-term regional effort, given the diversity of the region regarding each country's ability to manage coastal areas.
3. Recognizing the diversity of the countries and its economic constraints, the successful implementation of any environmental remediation program requires the establishment of institutional arrangements suitably adapted to regional needs. This can be achieved by fostering the integration of efforts, through horizontal cooperation, of the relevant institutions of the countries of the region.
4. Public health is directly dependent on the quality of the environment. Environmental degradation, pollution of water, soil and air inevitably leads to conditions favoring the occurrence of specific diseases. Cholera, typhoid fever, viral hepatitis, gastroenteritis and dysentery are among the most frequent illnesses associated with contaminated water in the Wider Caribbean region. They can be contracted through inadequate quality of drinking water, bathing in water containing pathogens and through contaminated agricultural and fisheries products.
5. The degradation of the marine and coastal environment of the Caribbean is today clearly recognized as a problem for the whole region. It is deeply rooted in the complex political, social and economic circumstances of our planet. Therefore, it can not be solved by individual countries without effective international co-operation, although solutions should be sought primarily through concrete national actions taken within a globally and regionally agreed framework.
6. Four main factors seem to be at the root of the present environmental problems hampering sustainable development of the region:
 - inappropriate economic development policies which do not adequately take into account the environmental consequences of these policies;

- weak regulatory mechanisms and administrative systems dealing with environmental issues;
 - insufficient public awareness about the real causes and magnitude of environmental problems, and about the available remedial measures; and
 - inadequate forecasting of emerging environmental problems.
7. It is of utmost importance to promote the widest possible participation of the population in the protection of the marine and coastal environment is essential. Such participation necessitates involvement of those who may be affected by changing environmental conditions in decision-making debates about development schemes which may cause such changes. It also requires broad educational and public awareness programs, including introduction of environmental subjects in school curricula on all levels, as well as the provision of information on a regular basis to the general public through mass media and specific campaigns about environmental and developmental issues. Such publicity campaigns should emphasize the importance of the potential contribution from each individual to maintain a healthy environment as a basic precondition for sustainable socio-economic development
 8. The lack of funds of the countries in the region is one of the most crucial impediments to forceful and dynamic environmental protection action. The remedy, without which all measures and decisions will remain only at the level of declarations, is in the provision of financial resources additional to those currently available, enabling the disadvantaged countries to become equal partners in dealing with global economic and environmental issues.
 9. The financial resources required are of unprecedented magnitude, unlikely to be met from regular government budgets. They could only come from increased flow of assistance through international agreements, from radical expansion of the present bilateral agreements between developing countries and lending/funding/ donor/aid countries and agencies, or from new multilateral funds through which such resources would be channeled to disadvantaged countries.
 10. The project planning and appropriate management of the four bays that are heavily contaminated in the Wider Caribbean, constitute a great effort in order to integrate the requirements of the environment conservation with the needs of the country development, in the search of the life quality improvement for the current and future generations.
 11. The studies seem to indicate that in the Wider Caribbean, if land cost is not prohibitively expensive, lagoons (sometimes called stabilization ponds) are often the most cost-effective and efficient type of facilities for wastewater treatment .

10.2 Recommendations

1. UNEP and the GEF to demand that countries in the region ratify regional and international treaties and agreements in order to guarantee the protection of the resources and the control of the contamination in the Caribbean Sea.
2. Costa Rica to promote the adoption of Annex V of the International Agreement in order to prevent the contamination by the ships, MARPOL 73/ 78 and the implementation of the agreement in the main ports of the country.
3. Impel actions so that Costa Rica signs the Wider Caribbean Initiative on Waste Generated by Ships guided to the environmental policy on waste management, as the reduction in the source and the recycle of the waste generated by the ships.
4. Promote horizontal cooperation at the regional level so that the main authorities of the maritime environmental administration should have electronic systems that allow them to carry out exchange of information on the acquired commitments, such as possible hydrocarbons spills, launching not authorized of ships wastes, chemical products and transboundary pollutants.
5. Create a Center of Information with an electronic and printed data base that gathers the information generated by the several Centers of Coastal Investigation to regional level.
6. Costa Rica to establish an oceanographic station in the Isla Uvita, that allows to conduct environmental systematic assessments of the influence of the Limoncito and Moin rivers, with attention to physical-chemical parameters, hydrocarbons and pesticides; this will be a relevant fact for the Costa Ricans and will contribute to a positive exchange with scientific and international institutions.
7. To disseminate and share positive experiences reached by the project and raise co-financing funds for the execution of activities that would contribute to the rehabilitation of the country's bays and coastal zones.
8. Consolidate the four different national case studies into a model plan that would be applicable throughout the region for rehabilitation of other degraded bays and coastal areas. .
9. Establish appropriate arrangements to promote the sharing of the use and application of Colombia's 3-D math model with the other three countries in the region.
10. Request Jamaica to host a Regional Workshop on environmental economics, with special emphasis on the Total Economics Value technique with the participation of Colombia, Costa Rica and Cuba along with international experts.
11. Request Cuba to host a Regional Workshop to consider the potential usefulness and possibly further development, of CITMA(the Cuban Ministry of Environment) model for capacity building and integrated inter-institutional management which is of interest to other environmental agencies throughout the region.

12. Promote and increase public/private sector partnerships in financing investments in environmentally sound developmental projects and environment protection measures, such as application of clean technologies;
13. Develop and establish wider applications of economic and fiscal measures (e.g. subsidies, tax incentives) linked with environmental accounting, and lending policies stimulating environmentally sound developmental activities.
14. Increase throughout the region pressure on the business communities for “environment-friendly products” (e.g. paper instead of plastic bags, returnable and recyclable bottles), or products manufactured through “environment-friendly technologies” (e.g. recycled paper);
15. Involve the private sector in the formulation of national economic and environmental goals and policies, particularly in countries where the private sector operates relatively free from the administrative control of the government.

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ANNEX 1

COLOMBIA

Outputs	List of Documents	Subcontractors	Contract Number
1.1	<p><u>Informe Final</u> Estudios que identifican la condición ambiental del ecosistema, grado de impacto sobre los componentes biológicos, potencial de la capacidad de recuperación y acciones de rehabilitación del sistema de la Bahía de Cartagena.</p> <p>Anexo 1 Revisión Bibliográfica</p>	Centro de Investigaciones Oceanográficas e Hidrográficas, CIOH	C-96685
1.2	<p><u>Informe Final</u> Inventarios actualizados de fuentes puntuales y no puntuales de contaminación incluyendo descargas industriales, aguas servidas, desechos portuarios y desarrollo urbano, brindando opciones específicas sobre como abordarlas.</p> <p>Anexos</p>	Corporación Autónoma Regional del Canal del Dique, CARDIQUE	C-96686
1.3	<p><u>Informe Final</u> Un informe general sobre los marcos institucionales jurídicos que orientan la actividad económica y de gestión en Cartagena y las áreas costeras contiguas y su perfeccionamiento para sostener las acciones correctivas propuestas.</p> <p>Anexos</p>	Universidad de Cartagena Instituto de Hidráulica y Saneamiento Ambiental (I.H.S.A.)	C-96687
1.4	<p><u>Informe Final</u> Propuesta integral de inversión para abordar los factores técnicos, institucionales, legislativos y financieros que han contribuido a la contaminación y deterioro ambiental de la Bahía de Cartagena</p>	Alcaldía Mayor de Cartagena de Indias, Departamento Administrativo del Medio Ambiente, DAMARENA	C-970076
2.1	<p><u>Informe Final</u> Plan Integral e interinstitucional de Manejo para la Bahía de Cartagena, tendiente a incrementar las capacidades de coordinación, gestión, planificación y ejecución de las instituciones responsables de la gestión costera a nivel local, regional y nacional</p>	Universidad de Cartagena Instituto de Hidráulica y Saneamiento Ambiental (I.H.S.A.)	C-96687
2.2	<p><u>Informe Final</u> Programa para el incremento de la capacidad orientado hacia un desarrollo adicional de las capacidades técnicas y científicas de las Instituciones que trabajan actualmente en Estudios Ambientales sobre el área de Cartagena y su Zona Costera contigua.</p> <p>Anexos No.1</p>	Universidad de Cartagena Instituto de Hidráulica y Saneamiento Ambiental (I.H.S.A.)	C-96687
	<i>Informe de Síntesis de País</i>		

CUBA

1.1	Informe Final Estudio de caso: Bahía de La Habana Estudios sobre la condición actual de la Bahía y las Areas Costeras Contiguas	Centro de Ingeniería y Manejo Ambiental de bahías y Costas CIMAB	C-96509
1.2	Informe Final Inventarios actualizados de fuentes puntuales y no puntuales de contaminación incluyendo descargas industriales, aguas servidas, desechos portuarios y desarrollo urbano, brindando opciones específicas sobre como abordarlas.	Centro de Ingeniería y Manejo Ambiental de bahías y Costas CIMAB	C-96509
1.3	Informe Final Un informe general sobre los marcos institucionales y jurídicos que orientan la actividad económica y de gestión en la Bahía y áreas contiguas y su perfeccionamiento para sostener las acciones correctivas propuestas.	Delegación Ciudad de La Habana del Ministerio de Ciencia, Tecnología y Medio Ambiente - CITMA	C-96511
1.4	Informe Final Propuesta integral de inversión para abordar los factores técnicos, institucionales, legislativos y financieros que han contribuido a la contaminación y deterioro ambiental de la Bahía de La Habana Anexos : <ul style="list-style-type: none"> • Saneamiento integral del río Luyanó • Estudio de factibilidad saneamiento Bahía de La Habana • Rehabilitación del emisario submarino de Playa del Chivo • Rehabilitación de los fondos contaminados de la Bahía de La Habana • Sistema de saneamiento marítimo portuario. Completamiento y Optimización. • Manejo de los residuos sólidos urbanos que afectan la Bahía de La Habana y el Río Luyanó. • Sistema de vigilancia ambiental para la Bahía de La Habana. 	Dirección Provincial de Acueducto y Alcantarillado DPAA	C-96872
2.1	Informe Final Plan Integral e Interinstitucional de Manejo para la Bahía de La Habana, tendiente a incrementar las capacidades de coordinación, gestión, planificación y ejecución de las instituciones responsables de la gestión costera a nivel local, regional y nacional	Delegación Ciudad de La Habana del Ministerio de Ciencia, Tecnología y Medio Ambiente - CITMA	C-96974
2.2	Informe Final Programa para el incremento de las capacidades científico-técnicas de las instituciones involucradas en proyectos de saneamiento de la bahía de La Habana y zonas costeras contiguas.	Delegación Ciudad de La Habana del Ministerio de Ciencia, tecnología y Medio Ambiente- CITMA	C-96874
	Informe Síntesis de País		

COSTA RICA

1.1	<p><u>Informe Final</u> Estudio de Caso: Puerto Limón, Costa Rica Estudios que identifican la condición ambiental del ecosistema, grado de impacto sobre los componentes biológicos, potencial de la capacidad de recuperación y acciones de rehabilitación.</p>	Universidad de Costa Rica Centro de Investigación en Ciencias del Mar y Limnología	C-96613
1.2	<p><u>Informe Final</u> Inventarios actualizados de fuentes puntuales y no puntuales de contaminación incluyendo descargas industriales, aguas servidas, desechos portuarios y desarrollo urbano, brindando opciones específicas sobre como abordarlas.</p>	Q. Tec. Soluciones Ambientales S.A.	C-96612
1.3	<p><u>Informe Final</u> Informe general sobre los marcos institucionales y jurídicos que orientan la actividad económica y de gestión en Puerto Limón y las áreas costeras contiguas y su perfeccionamiento para sostener las acciones correctivas propuestas.</p>	Fundación Ambio	C-96611
1.4	<p><u>Informe Final</u> Propuesta integral de inversión para abordar los factores técnicos, institucionales, legislativos y financieros que han contribuido a la contaminación y deterioro ambiental del Puerto Limón Anexos :</p> <ul style="list-style-type: none"> • Estudio de Factibilidad para completar las obras de alcantarillado sanitario y pluvial • Estudio de prefactibilidad del manejo de residuos de las operaciones marítimo portuarias • Estudio de prefactibilidad para la mitigación-eliminación de residuos contaminantes de origen industrial. • Estudio de prefactibilidad para el control-reducción-mitigación de los efectos por residuos agroquímicos • Programa de Monitoreo en Cuerpos Receptores 	Instituto Costarricense de Acueductos y Alcantarillados (A.y A.)	C-970076
2.1	<p><u>Informe Final</u> Plan Integral e Interinstitucional de Manejo para Puerto Limón, tendiente a incrementar las capacidades de coordinación, gestión, planificación y ejecución de las instituciones responsables de la gestión costera a nivel local, regional y nacional.</p>	Fundación Ambio	C-961177
2.2	<p><u>Informe Final</u> Un programa para el incremento de la capacidad orientado hacia un desarrollo adicional de las capacidades técnicas y científicas de las instituciones que trabajan actualmente en estudios ambientales sobre Puerto Limón y su zona costera contigua.</p>	Const. Int. Amb.	C-961166
	<p><i>Informe Síntesis de país</i></p>		

JAMAICA

1.1	Final Report Review and update of existing information on the biological environment, evaluation of the environmental impact of pollutants and forecast the regenerative capacity of the degraded elements.	Univ. West Indies. Centre for Marine Sciences Mona	C-96599
1.2	Final Report Updated inventories of point and non-point sources of pollution, including industrial and agricultural discharge, sewage, portuary waste, and urban development along with specific options on how to address them in the short, medium and long term.	Univ. West Indies Centre for Marine Sciences Mona	C-96599
1-3	Final Report A comprehensive Report on the existing institutional and legislative frameworks guiding economic activity and management of Kingston Harbour and related coastal areas, along with recommendations for any re-structuring of the existing frameworks that might be necessary to sustain the proposed remedial actions.	Witter/Pereira	
1.4	Final Report An Integrated investment Plan designed to address the technical, institutional, legislative and financial factors that have contributed to the contamination and deterioration of the Kingston Harbour.	Natural Resources Conservation Authority	C-961219
2.1	Final Report Integrated Inter-institutional Management Plan, aimed at increasing the co-ordination, managerial, planning and enforcement capacities of institutions responsible for coastal management at the local, national and regional level.	South Coast Conservation Foundation	C-961172
	Final Report A capacity Building Programme aimed at further developing the technical and scientific capabilities of those research institutions currently involved in environmental studies of Kingston Harbour and related coastal areas.	Call Associates Consultancy Ltd.	C-961173
	Country Synthesis Report		

ANNEX 2

UNITED NATIONS DEVELOPMENT PROGRAM

PROJECT RLA/93/G41

Planning and Management of Heavily Contaminated Bays and Coastal Zones in the Wider Caribbean

PROPOSAL FOR “BRIDGE” FINANCING

(AS FULFILLMENT OF ACTIVITIES 1 AND 2 OF IMMEDIATE OBJECTIVE 3)

1. BACKGROUND

The Wider Caribbean region is one of the most fragile ecosystems in the world. Land-and ship-based sources of pollution have severely affected the coastal and marine environment creating a major health hazard and impacting in the biodiversity of the region. The international community has acted upon these threats and as a result the GEF has financed with US\$ 2.5 Million project RLA/93/G41 (thereafter referred to as GEFI), with the principal Immediate Objective to develop Integrated Investment Action Plans for the management and rehabilitation of Cartagena Bay in Colombia, Puerto Limon in Costa Rica, Havana Bay in Cuba and Kingston Harbor in Jamaica. The Plans are essentially completed and a Final Project Report is due in May, 1998.

A five-year follow up project (thereafter referred to as GEF II) to implement immediate remedial action plans identified and prioritized in the ongoing project has been formulated. With the assistance of NORPLAN consultants from Norway a Project Brief and a Project Document will be presented by the countries and UNDP to the GEF Secretariat on July 30 and November 5, 1998, respectively, for a US\$ 10 Million seed financing. This “second phase” project, pending administrative approvals, is expected to start early on January 1999.

Norwegian consultants from NORPLAN and JORDSFORK, representatives of private enterprises such as GAND AS and academic research centers such as the Agricultural University at As, Norway, have visited Cuba several times since 1996. There is a growing interest in these institutions in participating in the “second phase” project in particular at the investment stage with technologies developed in Norway for natural treatment of sewage waters. The countries participating in the project have expressed interest in the new approaches and technologies for black water disposal and a pilot project has been formulated for Cuba, as a testing case.

2. THE NEED FOR “BRIDGE” FINANCING

The need for financing this interim period (July-December 1998), stems from the fact that a continuation of project activities has clearly been determined highly desirable by the governments and by UNDP. If field activities come to a complete stop at the end of May 1998

and demobilization begins, UNDP Cuba acknowledges that there is a risk in losing project momentum in the participating countries. Since no GEF funds are available for this interim period, external “bridge” financing from other sources is required.

3. SPECIFIC OBJECTIVES

3.1 Organization of Four National Workshops (GEF I).

Workshops will be organized in Colombia, Costa Rica, Cuba and Jamaica to present and discuss the findings and results of project RLA/93/G41, to disseminate information and learn from successful experiences. Participants will include all national and local institutions responsible for the environmental management and conservation of bays and coastal zones in the countries. Also, Universities and Research Centers will be invited to participate. Focal points will be charged with the main responsibility for delivering the presentations.

3.2 Organization of Two Regional Workshop (GEF I and GEF II).

Two Regional Workshops will be organized to promote institutional cooperation, exchange information and replicate project related experiences.

The first regional workshop will deal primarily with the overall integrated investment action plans for the rehabilitation of the bays developed in GEF I. Medium and short term plans for bay control and management will be reviewed and discussed. The second regional workshop will deal with the immediate action plans to be implemented in the follow up project (GEF II) and NORPLAN will be responsible for conduction and delivering the presentations. Representatives of public and private financing institutions, development banks, and bilateral donors potentially interested in financing or co-financing project activities at the feasibility or investment stage will be invited to participate. Representatives of Norwegian private firms, manufacturers of sanitary facilities, research centers, aid organizations and potential investors will also be invited to participate.

3.3 Organization of Four National Workshops (GEF II).

Four national workshops will be organized, one in each country to present and discuss the immediate remedial action plans proposed to be implemented in the “second phase” project. NORPLAN will be responsible for the presentations in each country. Participants will include representatives from all sectors of society that have a stake in the rehabilitation of the bay or coastal zone.

3.4 Second Phase Project Preparatory Activities.

The Regional Coordinator will conduct a series of preliminary meetings with representatives of international financing organizations and government economic ministries to create awareness and further disseminate information on the long term structural, institutional and financial needs for each country. Contacts with potential investors from Norwegian sources will be prioritized. The R.C. will identify immediate technical assistance needs for contracting second phase project start up and develop the TOR. The R.C. will link with other ongoing GEF projects in International Waters and serve in an advisory panel of the upcoming IW:LEARN project.

4. ORGANIZATION AND MANAGEMENT

Implementation and execution of the proposed bridging activities are to be stipulated by the donor. For maximizing efficiency however, it is proposed that the implementing and executing agencies be UNDP and UNOPS respectively, and project management continues with a Regional Project Coordinator, Havana based, assisted by National Focal Points in each of the participating countries. Up to two senior international consultants from Cuba's Centro de Manejo Ambiental de Bahias y Zonas Costeras (CIMAB) are proposed to assist the Regional Coordinator in the logistics and organization of the technical components of the workshops. The Steering Committees created for overseeing the project RLA/93/G41 will remain active and convene on an as need basis.

5. OUTCOMES

The following specific outcomes would be expected:

- 5.1 Three Workshop Reports, for Colombia, Costa Rica and Jamaica, on the findings of project RLA/93/G41 (GEF I).
- 5.2 Two Workshop Reports on the findings of the Regional Workshops
Cuba will be included in the Regional Workshops since it will be host country to these meetings.
- 5.3 Three Workshop Reports, for Colombia, Costa Rica and Jamaica, on the findings of NORPLAN's proposals for the "second phase" project (GEF II).
- 5.4 One Final Report summarizing all project activities and recommendations for a quick start up of the GEF II project.

6. WORK PLAN

The following plan assumes that approval for "bridge" financing has been obtained by June 1, 1998 and the order to proceed is effective July 1, 1998.

The plan calls for appointments of the National Focal Points in the respective countries and organizational meetings with the Regional Coordinator during the first month of activities. Preliminary contacts and an agenda for meetings with potential investors will be developed. International consultants from Cuba's CIMAB are expected to focus on the technical aspects of the workshops and work with the National Focal Points in the following months to organize the workshops.

Starting the first week in September workshops will take place in all countries according to the schedule proposed below. The first series of workshops will deal primarily with the results of project RLA/93/G41 and the second series will focus on the second phase project. NORPLAN will take responsibility for organizing the technical components of these last series of workshops.

WORK PLAN AND SCHEDULE (1998)

Activity	Respons	July	Aug	Sept	Oct	Nov	Dec
Coordination Meetings	R.C.	▬					
International Consultants	I. C.		▬				
GEF I Related Activities							
National Workshop - Colombia	R.C./I.C.			♦			
National Workshop - Costa Rica	R.C./I.C.			♦			
National Workshop - Jamaica	R.C./I.C.				♦		
Regional/National Workshop - Cuba	R.C./I.C.				♦		
GEF II Related Activities							
National Workshop - Colombia	N./R.C.					♦	
National Workshop - Costa Rica	N./R.C.					♦	
National Workshop - Jamaica	N./R.C.						♦
Regional/National Workshop - Cuba	N./R.C.						♦
Meetings with potential donors	R.C.						
Final Report	R.C.						▽

Note: R.C.= Regional Coordinator, I.C.= Int'l Consultant , N.= NORPLAN

7. BUDGET

The budget is expressed in US Dollars

Item	USD	Time	Observaciones
Regional Coordinator	60,000	6 M/M	Havana based.
NORPLAN Consultants	30,000	2.5 M/M	Norplan experts will prepare technical inputs for the four national workshops in November - December (the last one with regional participation), and will assist in final report preparation.
International Consultants	10,000		CIMAB experts will prepare technical inputs for the four workshops in September-October (the last one with regional participation), and will assist in the Phase One final report preparation.
Subtotal	100,000		
Official Missions	27,500		Includes 17 missions by the RC, Norplan and International Consultants
Sub Total	127,500		
Training			
Workshops and meetings	65,000		Includes food and beverage, translation, rent for the venue, etc.
Sub Total	65,000		
Miscellaneous			
Sub Total	7,500		
GRAND TOTAL	200,000		

Note: The Budget does not include Agency's fee (UNOPS 8%) and UNDP Country Officer Support cost, if any.

8. BENEFITS

The “*bridging*” activities are expected to render the following benefits:

- Complete project activities that would otherwise remain to be addressed in terms of regional and national workshops, therefore achieving information dissemination, horizontal cooperation and source financing with the participation and collaboration of selected government ministries and environmental agencies.
- Maintain project momentum to keep alive the institutional framework within the region and within each country.
- Provide a smooth and cost-effective transition to the “second phase” project therefore minimizing start up costs including recruiting and other related expenses.
- Identify and carry out preparatory activities to the “second phase” project with the participation of NORPLAN.

9. CONCLUSIONS AND RECOMMENDATIONS.

The need and rationale for “bridging” activities has been clearly defined and presented. It is widely thought that the execution of a number of national and regional workshops in the countries as proposed in the preceding paragraphs, will contribute to expand the aims of project RLA/93/G41 and assure a smooth transition to the follow up project. It is felt that the workshops will increase the possibilities of attracting potential investors to the Caribbean in funding environmental projects, particularly from countries which have already expressed interest such as Norway. The environmental rehabilitation of heavily contaminated bays and coastal zones in the participating countries in the Caribbean is a long-term effort that can only be accomplished with the support and solidarity of the international community. It is highly recommended therefore, to approve the proposed financing and initiate project activities as planned by July 1, 1998.