



United Nations Development Programme

**Project Document of the
Government of Cuba**

*CUB/99/G31 Demonstration of Innovative Approaches
to the Rehabilitation of Heavily Contaminated
Bays in the Wider Caribbean*

Global Environment Facility

Havana, April 2002

UNITED NATIONS DEVELOPMENT PROGRAMME

Project with participation from the government of:

Cuba

Project Budget Number:

CUB/99/G31/A/1G/31

Project Title:

Demonstration of Innovative Approaches to the Rehabilitation of Heavily Contaminated Bays in the Wider Caribbean

Project Short Title:

Caribbean Contaminated Bays

Executing Agent:

UN Office of Project Services

Implementing Agent:

UNDP in cooperation with UNEP

GEF Implementing Agency:

UNDP

Project site:

Havana, Cuba

Beneficiary Country:

Cuba

Estimated Start Date: May 2002

Estimated End Date: May 2007

Local PAC (UNDP-Havana) Approval Date: 9 November 2001

Summary of UNDP and Cost-Sharing

UNDP:	<u>Current</u>
GEF	\$ 3,811,045
AOS:	
UNOPS Support cost	\$227,553
Total GEF budget:	\$ 4,038,598
Cost Sharing:	
Sub Total:	\$ 4,038,598
Parallel Financing:	
Cuba	\$15,999,000
GRAND TOTAL	\$ 20,037,598

Classification Information

ACC sector & sub-sector

0400 – Natural resources

0410 – Water resources planning and development

DCAS sector & sub-sector

003-Natural resources

015-Environmental preservation & rehabilitation

Primary type of intervention : Programme Support

Secondary type of intervention: Programme Technical Support

Primary area of focus/ sub-focus

03-Promoting environment & natural resources sustainability/25-Improvement of the urban environment

Primary target beneficiaries

03-Target place (environmental habitat)

Brief Description

The GEF pilot phase project, "Planning and Management of Heavily Contaminated Bays and Coastal Areas in the Wider Caribbean" was a Pre-investment Facility (PRIF) project working in Havana Bay, Cuba; Cartagena Bay, Colombia; Puerto Limón, Costa Rica and Kingston Harbour, Jamaica. The project succeeded in achieving its principal objectives, including: 1) development of integrated Investment Action Plans for the rehabilitation and management of the four bays, 2) formulation of proposals for Institutional Strengthening to improve the operational capacities of those institutions responsible for bay management, and 3) identify sources of financing for the implementation of proposed remedial actions. The PRIF and related national and donor activities have helped to leverage baseline investments in the four bays in excess of \$250 million.

One of the priority issues in the region identified in the pilot phase project and other studies is the problem of eutrophication resulting from excess inputs of nutrients to the coastal zone and adjacent international waters. Principal sources of nutrient contamination in the four pilot sites include poorly or untreated sewage, agriculture and industrial activities. As a follow-up to the PRIF and on-going baseline, the proposed GEF project will leverage national co-financing to help one of the countries to overcome a number of key barriers to the adoption of best practices that limit the contamination of its national and adjacent international waters. The project will implement demonstrations/pilot projects to test innovative technical, management, legislative and educational approaches for reducing the input of priority international waters contaminants, the nutrients nitrogen and phosphorus, to Havana Bay and the adjacent Wider Caribbean. It will further strengthen and/or help create new institutions responsible for the rehabilitation and sustainable management of the bay. The project supports the mandate of the Cartagena Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region, particularly Article 7, Pollution from Land-based Sources, and Article 13, Scientific and Technical Co-operation, as well as the new Land-Based Sources Protocol currently in preparation.

In addition to the demonstrations/pilot projects noted above to be implemented by UNDP, as GEF co-complementing agency, UNEP will be responsible, through CAR/RCU, for sharing and dissemination of project activities and nutrient pollution control strategies for the Wider Caribbean. Activities will include print and on-line information dissemination, regional workshops and study tours, in order to promote and exchange best practices and lessons learned to other countries in the Wider Caribbean Region facing similar problems with excess nutrients and eutrophication.

* assumes official exchange rate, 1 Cuban peso = 1 \$US

On behalf of the Government of:

Signature

Date

Name/Title

Cuba



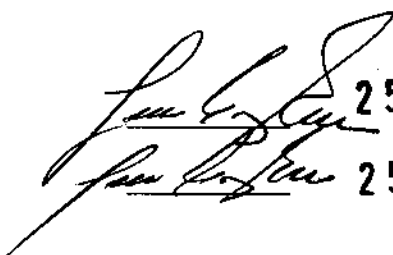
25 ABR. 2002

Raúl Taladrí
Vice Ministro
MINVEC

MINVEC, Public Authority for Coordination of International Cooperation and its Implementation

On behalf of:

UNDP (PPRR)



25 ABR. 2002

LUIS GÓMEZ-ECHEVERRI
REPRESENTANTE RESIDENTE

UNOPS

25 ABR. 2002

LUIS GÓMEZ-ECHEVERRI
REPRESENTANTE RESIDENTE

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I. CONTEXT

A. Description of the Region and the sub-sector

Introduction

The Wider Caribbean Region (WCR) comprises the marine environment of the Gulf of Mexico, the Caribbean Sea, and the 200 mile zone of the Atlantic Ocean adjacent to the countries in the region. The Caribbean Sea, an arm of the Atlantic Ocean, is partially enclosed on the north and east by the Islands of the West Indies, bounded to the south by South America and Panama and to the west by Central America. The WCR has an area of about 1 942 500 km².

The main oceanic current in the Caribbean Sea is an extension of the North Equatorial and South Equatorial currents, which enters the Sea at the south-eastern extremity and flow in a generally north-western direction. The currents originate mainly as a consequence of wind and tide action, but are also affected by the topography of the sea bottom and the configuration of the coastline. The current velocity is generally considerable and may contribute significantly to the dispersion of long-lived contaminants generated in any site to the region, creating a potential transboundary pollution effect.

Economic activity in the WCR focuses on the expansion of tourism, agriculture and extractive industries that are often directly or indirectly linked to coastal and marine resources. Population growth combined with poorly managed economic development and industrialisation in the region have led to widespread contamination of the coastal and international waters of the Wider Caribbean. Principal contaminants impacting the region domestically and/or across national borders include untreated sewage, solid waste, sediments, petroleum hydrocarbons, pesticides and agricultural run-off, primarily from land-based sources.

An inventory of land-based point sources of pollution in the WCR, conducted in 1994, revealed that domestic wastewater/sewage was the predominant source of pollution, followed by six industrial categories: oil refineries, sugar refineries and distilleries, food processing, manufacture of beer and other drinks, pulp and paper factories and chemical manufacturing. Although not a part of the 1994 study, urban and agricultural non-point sources of pollution are also recognised as significant contributors to pollution of the WCR.

Nutrient enrichment is of increasing concern in the WCR, as it causes eutrophication¹, algal blooms, oxygen depletion and changes in marine ecosystem biodiversity. In many of the bays connected to highly populated centres, extremely low levels of oxygen are observed in the lower part of the water column, where bottom sediments are often turned black. These hypoxic conditions kill and drive away fish and benthic species. Like in other areas facing widespread eutrophication (Black Sea, Baltic Sea, Yellow Sea, Gulf of Mexico, etc.), there is a longer-term risk that this phenomenon will extend beyond the natural borders of the bays and into the Gulf of Mexico and the Caribbean Sea. Nutrient enrichment and associated eutrophication over broad areas is so ubiquitous that it is now considered a global problem, and nutrients are considered to be among the priority contaminants requiring attention in the GEF International Waters Operational Programme 10 - Contaminants-Based.

¹ A recent definition of eutrophication is that provided by Nixon (Ophelia 41:199-219, 1995): "An increase in the rate of supply of organic matter to an ecosystem"; this is nearly always the result of excessive inputs of the nutrients nitrogen and phosphorus to the aquatic environment. The nutrient enrichment most commonly results in the excessive stimulation of phytoplankton growth but may also trigger the growth of larger plants (macrophytes) on the sea floor in shallow areas.

The Caribbean Action Plan emerged in 1981 as a result of many years of work by governmental and non-governmental representatives of the Caribbean community. Assistance in the development of the plan was provided by the United Nations Environment Programme (UNEP) and the Economic Commission for Latin America and the Caribbean (ECLAC). The program objectives embraced by the Caribbean Action Plan, which was adopted in 1981, include the following: assistance to all countries of the region, recognising the special situation of the smaller islands; co-ordination of international assistance activities; strengthening existing national and sub-regional institutions; and technical co-operation in the use of the region's human, financial and natural resources.

In 1983 the Cartagena Convention (CAR) was adopted as the legal instrument for the implementation of the Caribbean Action Plan. The Convention is a framework agreement setting out the political and legal foundations for actions to be developed in the implementation of the Plan. These actions are directed by a series of operational Protocols designed to address special issues and to initiate concrete actions. The Convention Protocols include: the Oil Spills Protocol, concerning cooperation among countries in the region in combating oil spills and the preparation and updating of contingency plans; the Specially Protected Areas and Wildlife (SPA) Protocol, an instrument for dealing with marine nature conservancy measures to protect, preserve and manage sensitive areas and threatened or endangered species of flora and fauna; and the Land-Based Sources of Marine Pollution (LBSMP) Protocol (Draft), an instrument for dealing with environmental pollution reaching the marine environment from land-based sources and activities, both point and non-point source. The governments of the nations and territories of the WCR established the Caribbean Environment Programme (CEP) in support of the Convention and its Protocols. A regional co-ordinating unit (UNEP-CAR/RCU) has been established in Kingston, Jamaica and serves as a Secretariat for the CEP.

Most of the countries in the WCR have also adopted national legal instruments to control various aspects of domestic and industrial wastewater disposal to coastal and marine waters. The degree to which these legal instruments are applied in the practical management and control of environmental pollution varies from country to country, but is generally rather weak. At the regional level, a new protocol to the Cartagena Convention on land-based sources of marine pollution (LBS protocol) is developed, and was adopted in 1999 (See Annex 2). The Contracting Parties to the Convention have taken advantage of the various studies of contamination of the Wider Caribbean in developing this protocol, with an aim towards regulating the sources most impacting the WCR. The LBS Protocol, through source-specific annexes, sets regional effluent limits for selected point sources, based on appropriate control technologies. The LBS Protocol will also obligate the signatories to develop national plans to implement best management practices for non-point sources and to implement coastal zone management programs. Both Jamaica and Cuba have signed the Cartagena Convention and have been active in the negotiations on the LBS Protocol.

The geographical area selected for this project, Havana Bay in Cuba is heavily polluted with increasing industrial and agricultural activities and an expected growth in population and tourism. Sewage and nutrient enrichment have been identified as priority environmental concerns. In addition, other countries in the Wider Caribbean Region face many of the same environmental problems, connected to discharges of untreated or poorly treated sewage. Thus, some of the approaches to nutrient removal to be tested in this project will be replicable among other sites in the Wider Caribbean Region.

Background – Havana Bay, Cuba

Havana Bay is the most important port in Cuba. It is surrounded by urban and industrial developments, which have a major impact on the quality of water reaching the bay and distributed to the Wider Caribbean Region. The average residence/turnover time of the water in the Bay is about 8 days.

Havana Bay receives suspended solids, hydrocarbons, heavy metals and other micro-pollutants from agriculture, industry and port activities. High concentrations of hydrocarbons and heavy metals have been observed in the sediments, and degradation of the ecosystem is increasing, both within Havana Bay and the adjacent Wider Caribbean area.

The existing wastewater collection system in Havana was designed for approximately 600 000 inhabitants. This system was constructed without any treatment of the wastewater. Today the main collector system is overloaded and many sewers discharge to local rivers flowing through the city. The tributary area of Havana Bay, including the rivers Luyano and Martin Perez, thus receives polluted water from large residential areas and also some industrial areas. The pilot phase project determined that the main sources of pollution to Havana Bay are: 1) the Luyano River (organic material, nutrients, sewage, solid waste), 2) the gas plant and the oil refinery, 3) the Regla and Hacendados fish factories, and 4) the fishing port.

The project also determined that Havana Bay receives about 48 000 m³ of wastewater per day, carrying around 4 800 kg nitrogen and 1 200 kg phosphorous, resulting in elevated concentrations of nutrients. Studies show that the waters of Havana Bay are strongly affected by the dumping of sewage, with concomitant risks to human health. Increased nutrient concentrations have promoted eutrophication and bacterial growth, and degradation of sea-grass and coral reef ecosystems.

The Government of Cuba has taken some mitigating actions to rehabilitate Havana Bay, but the special economic situation in Cuba has reduced the possibilities for intervention. Cuba has several ongoing development programs for alternative, environmentally sound technologies related to wastewater treatment (WWT). Demonstrations of more sustainable and cost-effective technologies, which are expected to be applicable to other countries in the region, are urgently needed. The economic situation in Cuba also accentuates the need for potential domestic production of fertilisers and energy recovered from alternative WWT approaches.

Cuba has signed several international agreements that have established an interrelationship between the national legislative framework and international regulations. In spite of this, an analysis of the institutional and legal framework conducted in the pilot phase project found that: 1) Current laws and regulations are diffuse and to a certain degree outdated and not enforceable, 2) Port authority is lacking, and 3) The integration between central and sectoral government institutions is insufficient.

A proposal for rules and regulations for the use and protection of Havana Bay has been elaborated. The rules define the use of the bay in terms of port, industrial, cultural and tourist activities and the treatment of waste. They include environmental monitoring, environmental education and public information plans and the establishment of a monetary fund for the rehabilitation and a sustainable development of the bay. Meanwhile, and taking into consideration the above-referred deficiencies, the Cuban Government created on 29 July 1998 a Governmental Working Group for the sanitation, conservation and development of Havana Bay. The group is chaired by the Ministry of Transportation while the Government of the City of Havana and the Ministry of Science, Technology and Environment will operate as vice-chairs. On an interim basis, this group will assume the functions of a port authority until the new rules and regulations are approved.

Background – Summary

Table 1 summarizes the pollution problems, the environmental impacts and obstacles to solve these problems for the Wider Caribbean Region and for Havana Bay. The table shows that the bay/country faces mostly problems connected to discharges of sewage, nutrients and micro-pollutants, and that some of these discharges may also pose a risk for environmental degradation of the Wider Caribbean Region.

Table 1 Environmental impacts and obstacles

Pollution Problem	Sources	Environmental Impacts	Obstacles/Barriers	Comments
Wider Caribbean				
Nutrients	Untreated sewage Agriculture run-off Industry	Risk for: Algae blooming Eutrophication Oxygen depletion Reduced biodiversity Reduced reproduction of species	Lack of financial resources Weak institutional and legislative frameworks	Cartagena Convention focuses on the environmental problems in the Wider Caribbean
Micro-pollutants (heavy metals, persistent organic pollutants, incl. Pesticides, oil and hydrocarbons)	Industrial and oil activities Hazardous waste Use of agro-chemicals Ship traffic	Bio-accumulation Contamination in food chain Reduced biodiversity	Lack of enforcement of existing regulations Lack of incentives to reduce emissions of persistent toxic substances Lack of alternative, more benign chemicals and industrial processes	Several international conventions and agreements focus on pollution of the marine environment (MARPOL, Oil Pollution Preparedness, etc.)
Havana Bay, Cuba				
Nutrients	Sewage Agriculture	Increased algae and bacterial growth Degradation of sea-grass and coral reef ecosystem Eutrophication Oxygen depletion Reduced biodiversity	Lack of financial resources Outdated, dispersed and non-enforceable legislation Lack of port authority	Cuba has signed several international conventions and agreements (MARPOL, Cartagena Convention)
Suspended solids	Rivers Land use in watersheds	Sedimentation Reduced biodiversity	Insufficient integration of sectoral and central institutions	
Micro-pollutants (heavy metals, persistent organic pollutants, incl. Pesticides, oil and hydrocarbons)	Industrial and oil activities Hazardous waste Ship traffic	Bio-accumulation Contamination in food chain Reduced bio-diversity		
Solid waste	Port activities Industry Households	Littering Water pollution Threats to selected organisms		

B. Host Country Strategy

The government of Cuba has demonstrated its commitment to protecting the natural environment, including coastal and marine ecosystems, by enacting policies, strategies, and programmes to mitigate the negative impacts of pollution. The government of Cuba has established a national environmental strategy, and the current project fits within the strategy's components. There is, however, a lacuna in management in that these initiatives have hitherto focused on addressing domestic impacts, rather than those occurring outside of national jurisdictional limits in international waters. Recognizing the negative externalities imposed by the release of certain 'global' or transboundary contaminants, and the value to the region of demonstrating national approaches to the mitigation of these contaminants, the countries are now seeking to introduce abatement programmes for transboundary pollutants, specifically the nutrients nitrogen and phosphorus. The country places a high priority on implementation of the Caribbean Action Plan, and, as a sign of commitment to regional action, has ratified the Cartagena Convention. The Convention provides a legal framework for the implementation of the Caribbean Action Plan.

In addition, Cuba has played an active role in the development of the Protocol to the Cartagena Convention on Land-based Sources of Marine Pollution. The majority of the pollutants impacting Havana Bay are from land-based sources. With incremental assistance from the GEF, the project country will design and operate a sewage treatment plant in accordance with the Global Programme of Action for Land-based Activities and any regional standards adopted by the Contracting Parties resulting from adoption of the LBS Protocol to the Cartagena Convention.

C. Prior and on-going Assistance directed at the same Sub-Sector

The Pilot Phase GEF Project

The GEF Pilot Phase (PRIF) project (RLA/93/G41,1995-1998), "Planning and Management of Heavily Contaminated Bays and Coastal Areas in the Wider Caribbean", included Colombia (Cartagena Bay), Costa Rica (Puerto Limon), Cuba (Havana Bay) and Jamaica (Kingston Harbour) as participating countries.

The project had three main objectives:

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 was the largest pre-investment grant financed by the Global Environment Facility (GEF) under its concluded pilot phase program. The GEF project was originally initiated by the UNEP CAR/RCU office in Kingston. The project was 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:

1. The present environmental conditions of the bays and coastal zones were characterized including the impact on their biodiversity and their regenerative capacity.

2. Inventories of point and non-point sources of pollution were brought up to date including sewage, agricultural discharges, industrial and solid waste.
3. Proposals to restructure the institutions responsible for bay management and to improve the legislative framework guiding economic activity to sustain remedial actions were prepared.
4. An integrated investment action plan for the rehabilitation of the bays and coastal areas was formulated, to be implemented over the next 5, 10 and 15 years.
5. An integrated inter-institutional management plan aimed at increasing the coordination, managerial, planning and enforcement capacities of the institutions responsible for bay and coastal zone management was developed.
6. 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.
7. Regional and national workshops were carried out to promote exchange of information, institutional cooperation and replicate project-related experiences in the Caribbean.
8. The countries' environmental institutions were equipped and strengthened. Scientific equipment, modern office and communication systems and vehicles were provided.

The activities presented in this proposal are based on the information and results from the GEF Pre-investment Facility (PRIF) project.

Cuba

Several projects related to the management of coastal areas, environmental protection of the oceanic waters and the preservation of marine ecosystems have also been conducted or are going on. The most important projects connected to Havana Bay are:

- Research and Control of Marine Pollution in the Bay of Havana, characterising the environmental situation of Havana Bay and adjacent coastal areas. It provided the basis for the preparation of an action plan for environmental management and facilitated the foundation of the Centre of Engineering and Environmental Management of Bays and Coastal Areas of Cuba (CIMAB) (UNDP, UNEP, UNESCO).
- Evaluation of existing facilities for ship waste in the main ports. (Initiative for controlling ship wastes) (GEF-IMO, in progress).
- Preservation of the archipelago Sabana- Camagüey, (UNDP- GEF, in progress). The objective is to preserve bio-diversity and habitats of migratory species, in an area of intense tourist development.

D. Institutional Framework

The main national environmental legislations relevant for the rehabilitation of Havana Bay are:

- Law of the Environment (81), approved by the National Assembly on and effective from July 11 of 1997
- Acts on the obligation to prepare Environmental Impact Studies previous to the approval of any investment
- Regulations for the use of sewer system, March 1997.
- Provincial Assembly Agreement on the Havana Bay Action Plan
- Bill on Maritime Port Authority (Marine).
- Bill 211-97 of the Ministry of Transportation on Management and Disposal of the waste generated by the ships (1997).

Cuba has signed/ratified the following international conventions:

- International Convention on the Prevention of Pollution from Ships (MARPOL)
- Convention for the Protection and Development of the Marine Environment of the Wider Caribbean (Cartagena Convention)
- Agreement on the Biological Diversity, ratified by Cuba in March 1994.

Cuba is playing an important role in preparing the discussion of the Protocol on the Control of the Land Based Sources of Pollution, connected to the Cartagena Convention.

The National Assembly is the supreme representative organ in Cuba. The highest governmental authorities are given to The Council of State and the Council of Ministers.

Each of the ministries is responsible for incorporation of environmental aspects and policies within their jurisdiction and for requiring environmental impact studies for new investments, to be presented to the Ministry of Science, Technology and Environment (CITMA).

The Ministry of Science, Technology and Environment (CITMA) has the authority to implement the environmental policies, and is also responsible for the conservation of natural resources. The Environment Agency manages environmental matters through the Center for Environmental Management and Inspection (CGIA), and a Centre of Environmental Information, Management and Education (CIGEA). CIGEA is in charge of stating environmental management policies. There are also local delegations of CITMA at the provincial level.

CITMA is also in charge of several Research Centres of national importance, such as:

- The Institute of Oceanology
- The Institute of Meteorology
- The Institute of Tropical Geography

The Ministry of Transportation has the responsibility for protecting the environment of the coasts and ports and to eliminate/reduce pollution caused by ships. The Directorate of Marine Security and Inspection (DSIM) of the Ministry of Transportation, and their District Offices, as well as a national company for port sanitation are also working with these issues.

The Governmental Working Group for the Sanitation, Conservation and Development of Havana Bay (GTE-Havana Bay) was created to improve the environment conditions in this ecosystem of Havana City.

In addition, the following institutions are relevant for the administration of the coastal environment:

- The Ministry of Public Health and the Provincial and Municipal Health Units, Hygiene and Epidemiology Departments (waste to sewer systems and controlling vectors)
- The Ministry of Tourism (hotels in beaches and marines)
- The Ministry of Agriculture (chemicals and wastes)
- The Ministry of Fishing (industrial wastes and aqua-culture)
- The Ministry responsible for the Sugar Industry (chemical and sugar mills wastes)
- The Ministry responsible for the Heavy Industry (impact of refineries of petroleum, electric generating plants, nickel industries)
- The Civil Defense National Staff, organised under the Ministry of the Armed Forces, (disaster prevention and contingencies)
- National Institute of Hydraulic Resources (water resource)
- Physical Planning Institute
- Instituto Superior Politecnico Jose Antonio Echevarria/Centro de Investigaciones Hidraulicas
- Instituto de Investigaciones Porcinas

Other institutions that act in marine sciences and in scientific and technical services, related to coastal management, are:

- The Centre of Marine Research of the Havana University
- The Fishing Research Centre of the Ministry of Fisheries
- The Centre of Engineering and Environmental Management of Bays and Coastal Areas (CIMAB) (Ministry Transportation)
- Geocuba, the Governmental entity for geodesic services cartography and marine studies, (Ministry of the Armed Forces)
- The National Oceanographic Committee, co-ordinator of actions of common interest

The Provincial Assemblies of the Popular Power are, through their Council of Administration, the local governmental authority in each one of the 14 provinces. The councils are in charge of health, education, environment protection, labour policy, community services, passenger transport, tax collection and land use.

The Council of Administration delegates tasks to relevant provincial directorate or to ad-hoc commissions of the Provincial Assembly, for example the Environment Commissions.

Many functions are managed at municipality level. The Popular Councils operate at neighbourhood level. In addition, there are some Non-Governmental Organisations, such as Association Pro-Naturaleza and Group for the Integral Development of the Capital (in the City of Havana)

II PROJECT JUSTIFICATION

A. The problem to be addressed: The present situation

General

The project falls under GEF Operational Program #10 International Waters – Contaminant-Based, whose objectives include "...demonstrate strategies for addressing land-based activities that degrade marine waters...". In OP10, "GEF plays a catalytic role in demonstrating ways to overcome barriers to the adoption of best practices limiting contamination of International Waters". The main expected outputs from the five-year project are

- Demonstrations of substantial reductions of nutrient inputs to the bay, through the application of more sustainable technologies. The technologies proposed perform in line with the effluent limitations for municipal wastewater described in the draft LBS protocol to the Cartagena Convention (see annex 3).
- Development and strengthening of national environmental institutions responsible for management of the respective bays.
- Regional activities (implemented by UNEP through CAR/RCU) aiming at disseminating best practices and lessons learned from the project and related activities in the region.

The project will be consistent with and supportive of national action programs and investments aimed at reducing contamination of the bays. It is designed to provide incremental financing to facilitate efforts to achieve global environmental benefits through the reduction of transboundary pollution (nutrients) into the WCR. The project will support national investments, institutional arrangements, and capacity building programs supportive of global environmental protection.

The initial GEF/UNDP support to this project will contribute to the reduction of financial risks and to overcoming economic transaction barriers.

The project will help build awareness, necessary skills, and capabilities among the different stakeholders, in order to assure the sustainable use of the bays and coastal areas as multiple use zones. The institutional framework will be strengthened by involving the different stakeholders in constructive discussions and through establishment of appropriate incentive structures.

Cuba

The mean flow received by Havana Bay is estimated to be 330 000 m³/day, mainly from the main storm-water drainage and the rivers and streams. About 48000 m³ of this is reckoned to be wastewater, carrying around 4800 kg nitrogen (N) and 1200 kg phosphorous (P), or the equivalent of 290 000 - 350 000 pe. More than half of these wastewater and nutrient discharges originates from the Luyano River Basin.

The sewage from Havana City is discharged untreated into the bay and the rivers. Thus, elevated concentrations of ammonium-nitrogen, 1 mg/l and even higher, have been measured in the bay. The concentrations of phosphorous are also relative high, 0.02 - 0,08 mg/l, and the bay is classified as an eutrophic system, based on Chlorophyll concentration. In addition, the mean value of fecal *coliforms* is higher than the permissible concentrations listed in the Cuban norms for secondary contact.

At the same time, the water in the bay is contaminated by hydrocarbons. The values of total hydrocarbons found in the superficial waters of the bay fluctuate between 1.27 and 0.35 mg/l. The values found in the silts are in a range 865- 1240 µg/g of dry material.

High concentrations of copper, lead and zinc in higher concentrations in the silts are found in the Ensenada de Atarés (inside the bay), due to the contributions of urban-industrial residuals that are discharged through the city drainage. The content of nickel in the silts is high in the Ensenada de Marimelena, due to discharges from the thermoelectric industry and the petroleum refinery. The concentrations of heavy metals in the silts could cause biologically adverse effects.

Every day about 8 000 m³ of polluted water arrives to the open sea, transporting pathogens, nutrients, organic matter, suspended solids, hydrocarbons, heavy metals and other micro-pollutants. Thus, the mean value of total hydrocarbons found in superficial waters (0.45 mg/l) as well as the content in the silts (936 µg/g dry material) at the marine coast (Creek of San Lazaro), indicate pollution by water from Havana Bay.

Present actions

Although mitigating actions have achieved some effects, such as reducing spills from the petroleum refinery and other industries and managing and controlling solid and liquids wastes from ships, the degradation of the ecosystem grows. Thus, the actions carried out by the GOC have not been effective enough. These actions are also limited by the lack of funding for the necessary investments. Cuba is not a member of the International Monetary Fund and has very limited access to external sources of financing.

Table 3 summarizes the actions that have been carried out and the planned actions in order to improve the environmental conditions of Havana Bay.

Table 3 Actions to rehabilitate Havana Bay

Actions	Actual Status	Estimated cost, 1000 USD
Construction of fixed barriers for spills at the oil refinery	Operating	1 000
Conversion of the gas plant in order to use natural gas (Clean Technology)	Done	750
Deactivation of old alcohol distillery	Done	500
Deactivation of alcohol production line in existing distillery	Done	80
Rehabilitation of petroleum spills control at oil refinery	In process	35
Treatment plant in the Quibu River Basin	Done	2 000
Treatment plant in the Almendares River Basin	Done	2 500
Rio Almendares Basin pollution management project	Ongoing	200
Waste treatment system in Hemingway Marina project	Ongoing	150
Rehabilitation proposal and design of the submarine outfall in Playa del Chivo	Done	-
Environmental management design of solid waste and oil spill in Playas del Este	Done	-
Construction of incinerator for ship waste	Done	500
Equipment of the Port Cleaning Unit	Done	1 500
Construction of solid waste trap	Done	20
Wastewater treatment design project for the basins of and Martin Pérez River and the Tadeo Stream	Done	-
Design project of solid waste management of the Havana Bay Basin	Done	-
Design of a comprehensive system for solid and liquid ships wastes management	Done	-
Preliminary project for dredging of contaminated soils	Done	Dredging cost is estimated to 15 mill. USD

In addition, the Government has established a plan for the sanitation of Havana Bay and the basins of the tributary rivers, especially the basin of the Luyanó River, the main source of organic and industrial wastes to the bay. This plan comprises the establishment of four wastewater treatment plants to treat all the collected municipal wastewater within the actual area. Thus, the direct discharge existing today will be disconnected. The plan is based on data on amount of wastewater and pollution load from the present population and from existing industries in the actual zones.

The plans may be implemented in phases, making it possible to do the investments stepwise. As soon as the collector systems Sur 2 and Sur 4 can be disconnected, the water quality in the bay will improve.

Based on an evaluation of the local conditions and the available resources, the GEF financing will be most effective if the project is limited to wastewater treatment in zone IV.

B. Expected Project Benefits

The present project has been conceived in order to upgrade:

- the water quality of the coastal and oceanic waters, receiving pollution from urban and industrial areas in Havana city
- the estuarine coastal ecosystem in Havana Bay, receiving pollution from the industries, fluvial streams, storm-water drainage and sewer system
- the inter-institutional co-ordination and management capacity of the involved organisations

In the project techniques to treat the municipal wastewater and to protect the water resources will be introduced, as well as the production of bio-gas and fertilisers and/or soil conditioners. Improvements in the collection, treatment and disposal of the municipal wastewater from an important area of the city will contribute to solve a part of the threats to the environment of the Caribbean Sea. They will also reduce the risks for the health problems, connected to the highly polluted water in Havana Bay.

The expected benefits from the project are as follows:

- Improved water quality of the Havana Bay by reducing the inputs of suspended solids, organic matter and pathogens, and about half of the estimated nutrient (nitrogen and phosphorus) load to the Bay.
- Reduced inputs of nutrients and other transboundary pollutants (heavy metals and persistent organic pollutants) to the Caribbean Sea.
- Improved sanitary conditions for the inhabitants in the catchment area of the Luyanó river
- Bio-gas production from waste resources (sludge and black-water), reducing the consumption of fossil fuel and the emission of greenhouse gases and other long range air pollutants.
- Production of organic fertiliser for agricultural purposes from treated sludge and black-water. This will increase the recycling of nutrients and decrease Cuba's dependency on import of mineral fertiliser.
- Improvement of institutional weaknesses
- An incentive framework
- Improved competence in wastewater treatment in Cuba and in the region, as a result of the investigations and design/construction connected to the project, and also from the necessary training. This will be a benefit to future projects of similar character in other parts of Havana and Cuba.
- Demonstration of «zero emission housing unit», recycling nutrients, applicable to urban and rural areas. The technology may be introduced to countries with similar climatic conditions, and the possibilities for export of ecologically adapted prefabricated houses, based on “zero emission” technology, to these countries will increase.

C. Target beneficiaries

The beneficiaries of the project will include:

- Ecosystems in international waters and in Havana Bay, receiving less inputs of nutrients

- Inhabitants (around 70,000) in the Rio Luyanó catchment, as the sanitary conditions improve and areas close to the river will be attractive for recreational purposes
- People of Havana, as Havana Bay will be less polluted
- Tourists because the harbour area, urban rivers and riverbanks will be more attractive
- Cuban farmers, as the quantity and availability of organic fertiliser will increase
- Cuban universities and research institutions, who will use the different wastewater treatment facilities including the bio-gas production units for research, studies and training

The project will not only solve imminent problems. It will also promote the possibilities for development of new knowledge and interdisciplinary co-operation on subjects where basic knowledge already exists in Cuba, but where only limited co-operation and interaction between the different research institutions and professionals have taken place so far.

The local population will develop improved environmental awareness as new sewage systems replace the small streams as dumping sites.

D. Project strategy and institutional arrangements

The project will result in a reduction of nutrients and pathogens to Havana Bay, coming from the tributary rivers. These rivers transport today 70 % of the organic load to the marine waters. The effects will add to the control measures taken on industrial sources and on solid waste, based on intensified control from the Government of the City of Havana.

Project Concept and Strategy

The proposed project will address problems related to sanitary installations in the river basin in Havana, and subsequently lead to a reduction of the contaminant input (including the nutrients nitrogen and phosphorous) to local and international waters. The main strategy is to remove the pollutants from the sewage and utilise the nutrients and energy in the wastewater in a cost-effective way.

The project will also reach for a highly effective treatment on black- and grey-water combined with the production of bio-gas and fertiliser and present ways to reduce the volume of untreated black-water that presently is discharged directly to the ocean through the submarine outlet of *Playa del Chivo*.

Site Selection.

The AOCH has selected the tributary river basins to the Bay as primary project location, particularly that of the Luyanó River. Prior to this decision, local organisations, advisory groups and scientific institutions have been widely consulted, as the degradation of these rivers highly influences the quality of life of a population of 140 000 inhabitants in addition to the environmental effects in the Bay and coastal waters.

Project Replication Capacity

In Havana, like in almost all the coastal cities in the countries of the Caribbean, there are inadequate collection systems of wastewater. Lack of treatment and disposal of wastewater from land-based sources are the main causes of the contamination of the sea by nutrients, heavy metals and other micro-pollutants, such as persistent organic pollutants (POPs), through direct discharges, surface runoff and groundwater discharge. The effects of this contamination in the marine environment are more or less similar in all the Caribbean countries, affecting not only the bio-diversity, but also the tourist industry.

This project will therefore have a demonstration effect for the whole region and will contribute to a regional transfer/exchange of new scientific knowledge on the marine environment.

The Secretariat for the Cartagena Convention, CAR/RCU, will play an important co-ordinating role in exchanging new knowledge through the UNEP-implemented component of the GEF project. Project results, best practices and lessons learned will also be disseminated to the wider Caribbean and beyond via UNDP-GEF Distance Learning project IW: LEARN.

E. Reasons for UNDP Assistance

The project falls under GEF Operational Program #10 International Waters – Contaminant-Based. The main expected outputs from the seven-year project are:

- Demonstrations of substantial reductions of nutrient inputs to the two bays, through the application of more sustainable technologies. The technologies proposed perform in line with the effluent limitations for municipal wastewater described in the draft LBS protocol to the Cartagena Convention (see annex 3).
- Development and strengthening of national environmental institutions responsible for management of the respective bays.
- Regional activities (UNEP component of GEF project) aiming at disseminating best practices and lessons learned from the project and related activities in the region.

The project will be consistent with and supportive of national and regional action programs in the two countries aimed at reducing contamination of the bays. It is designed to provide incremental financing to facilitate the efforts of the two countries to achieve global environmental benefits through the reduction of transboundary pollution (nutrients) into the WCR. The project will support national investments, institutional arrangements, and capacity building programs supportive of global environmental protection. The initial GEF support to this project will contribute to the reduction of financial risks and to overcoming economic transaction barriers. The project will help build awareness, necessary skills, and capabilities among the different stakeholders, in order to assure the sustainable use of the bays and coastal areas as multiple use zones. The institutional framework will be strengthened by involving the different stakeholders in constructive discussions and through establishment of appropriate incentive structures

F. Special considerations

Innovative Features

This project, being considered for GEF funding under Operational Program No. 10 in the International Waters focal area, will make an important contribution towards reducing the environmental degradation of the Caribbean. In addition the areas that surround the rivers that at present are heavily polluted from open sewers will have the potential of being transformed into natural and ecological parks.

Demonstration Effects

Through the project new technology for biological treatment of municipal wastewater and sludge will be tested. In a pilot project the technology of low water-consumption and "zero emission" housing units will be demonstrated, and, through Caribbean-wide dissemination, the results may lead to a wider use of these technologies both in Cuba and in other parts of the Caribbean area.

Sustainability

The proposed handling and disposal systems for wastewater need resources for their continued operation and maintenance beyond the GEF grant period. Future service tariffs must consider the special conditions of the Cuban economy.

It may be necessary to find ways of financing operation and maintenance costs not only in the present Project actions, but also of other activities necessary for environmental conservation. The **sustainability** of the Project could be based on the following considerations:

- The Project in Cuba contemplates the Replicability of their experiences in other areas of the country and in the Greater Caribbean Region. It is not possible to measure the economic effects of these experiences, but it is conceptually understandable to consider them as a component of **economical and ecological sustainability**. It should be kept in mind that the Caribbean is considered an Special Zone according to the MARPOL 73/ 78 Annex V (the declaration went into effect April 4 1993) and that the seas in these areas are especially fragile. The main threat to the Caribbean islands and their beaches is the land-based sources of pollution.
- A better quality of Havana Bay and adjacent coastal areas will permit an increment in the fishing potential of the zone. Although not considered commercially it might become an **economical sustainability** output
- Better recycling of limited resources. This is especially important for the nutrients phosphorous as fertiliser, as the world, and particularly Cuba's, resources are limited
- The Havana Bay is located in the central zone of the capital close to Old Havana, the old main commercial and business centre of the city which is now experiencing an increase in activities. The revitalisation of the bay-side areas, including transforming the old port warehouses into business and commercial centres, will serve to enhance revenue for the city generating financial resources capable to support the **financial sustainability** of actions to maintain the environmental quality of the bay
- The increasing importance of Cuba and Havana as one of the main tourist destinations of the Caribbean, makes it necessary to recover the environment in Havana Bay, as it is the site of the main port of the country. The port authorities consider that the current environmental conditions conspire against an increase in the tourist traffic. This traffic and the related services are a potential source of revenue in exchangeable currency for the City, and therefore also a component of the Project **financial sustainability**.
- There exists no appropriate environmental management of the urban and industrial wastewater discharged to the and Martin Perez Rivers and the Tadeo Stream, tributaries to the Bay. An environmental recovery of these rivers will improve the quality of life in these areas. Is an output to **social and financial sustainability**.
- The presence of pollutants in the waters are also vectors for transmissible illnesses. Because the strength of the primary medical attention in Cuba, the effects are not significant, but without doubts these risks represent extraordinary expenses in the attention to gastrointestinal diseases.
- The Project also promotes **institutional sustainability**, especially at provincial and municipal level, by providing best practice know-how in wastewater management, and broad community participation in the quality of life of their neighbourhoods.

Involvement of NGOs

The forms in which non-State sectors would act in support to certain aspects of the Havana Bays Project are explained in the epigraph Community Participation of Section VIII.

In Cuba, the NGOs are related fundamentally with diverse sectors not directly linked to marine activities. One of the aspects that are included in the Project implementation phase should be to find ways to more fully involve these organisations.

G. Counterpart Support Capacity

The Ministry of Science, Technology and Environment, through its Delegation for the City of Havana, will be responsible for the implementation of the project in Cuba and will co-ordinate all the activities with the Council Administration of the City of Havana and other involved institutions.

Earlier works carried out by the GOC with the support of UNDP, UNEP, GEF, and IMO on marine pollution, their management, as well as the systematic scientific development policy, have created a solid base of knowledge and personnel. This constitutes the main contribution that Cuba could give to the Project.

The members of the Provincial Environment Commission, and the executives and technicians of the Provincial Aqueduct and Sewage Office have been active in these earlier works. Also the Presidents and members of the related Popular Councils and health personnel have participated, not forgetting local groups of the Women Federation, the Youth, the Students, the Unions, involved in task-force activities at District level.

III. DEVELOPMENT OBJECTIVE

The *global environmental objective* of the project is to demonstrate and promote regional replication of innovative technical, management, legislative and educational approaches to reducing nutrient loads to Havana Bay and to the Wider Caribbean Region.

The *long-term objective* of the project is to promote and facilitate environmentally sustainable development and management of the two bays and to disseminate and replicate successful approaches to the rehabilitation of these bays to other sites in the Wider Caribbean facing similar environmental challenges.

The rehabilitation of the national and associated international waters will be based on mitigating measures and institutional strengthening and co-operation in each of the selected areas. As stated in the Introduction, the main environmental problems on a regional basis are connected to the discharges of nutrients (nitrogen and phosphorus) and micro-pollutants (heavy metals and persistent organic pollutants, including pesticides).

This GEF/UNDP project will complement planned and ongoing baseline activities in Havana aiming at improving the quality of the respective aquatic (marine) systems, by introducing sustainable contaminant reduction and reuse technologies, and enhancing water resource management capabilities, thus reducing environmental threats to the bay and the Wider Caribbean. Based on the analyses carried out during the pilot phase project, the country has prioritised similar activities connected to biological treatment of sewage and nutrient removal.

IV. PROJECT COMPONENTS/ACTIVITIES AND EXPECTED OUTPUTS

Output 1: Construction of a sewage treatment plant, including nutrient removal and sludge utilisation

A new sewage treatment plant will be constructed that will cover a population of about 70,000 in the Luyano River area. The plant will include nutrient removal and will be designed for sludge utilisation either to energy or as fertiliser. The GEF substitutional financing covers the difference in cost between a basic primary/secondary treatment system and a more advanced, integrated system that includes tertiary treatment (removal of the nutrients nitrogen and phosphorous)

Process description:

The proposed sewage treatment plant uses an activated sludge process, designed to remove suspended solids, organic matter and nutrients. The plant will be based on the following design criteria:

Table 7. Design criteria for the treatment plant in Havana

Design parameter	Influent loading	Effluent quality
Average wastewater flow	1100 m ³ /hour	
Maximum wastewater flow	2400 m ³ /hour	
Organic matter (BOD ₅)	2880 kg/day	<20mg/l
Suspended solids (SS)		<30 mg/l
Total nitrogen (Tot-N)	528 kg/day	>70 % removal
Total phosphorous (Tot-P)	120 kg/day	>56 % removal

The proposed sewage treatment system includes the following elements:

- Collection and transport system to convey wastewater to the treatment plant site
- Headworks consisting of a bar screen, grit and grease removal, and if necessary, an influent pumping station
- Primary clarifier to remove suspended solids from the wastewater
- Biological treatment unit consisting of alternating anaerobic/anoxic/aerobic zones for optimised nutrient removal, equipped with biological selector zones
- Secondary clarifiers for the separation of treated wastewater and sludge
- Sludge return system to maintain a high suspended solids concentration in the biological process
- Effluent polishing in vertical flow filters
- Discharge piping

Activity 1.1: Nutrient removal

The two processes involved in nitrogen removal are called nitrification and de-nitrification. Nitrification converts ammonia in the incoming wastewater to nitrate. This process requires oxygen. Denitrification converts nitrate to nitrogen gas. This is a process that requires a relatively high organic loading and anoxic conditions. The effluent of an activated sludge process has elevated concentrations of nitrate due to the nitrification process in the aerated zone. By recycling a portion of this wastewater to the influent end of the basin, the nitrates will be exposed to anaerobic conditions and a high organic loading.

Phosphorus removal is accomplished by first exposing the wastewater and return activated sludge to anaerobic conditions. Micro-organisms exposed to alternating anaerobic and aerobic conditions increase their uptake of phosphorus above normal levels. Following the anaerobic zone is an aerated zone where the actual phosphorus uptake takes place. Sludge removed from this process will therefore have elevated levels of phosphorus, and effluent from this process generally has P concentrations less than 1 mg/l.

To accomplish both nitrogen and phosphorous removal, these two schemes must be combined. This can be accomplished by dividing the activated sludge process into three zones; first an anaerobic zone followed by an anoxic zone where nitrate is present, and finally an aerobic zone. This system is expected to remove approximately 60-70% of the nitrogen and phosphorous.

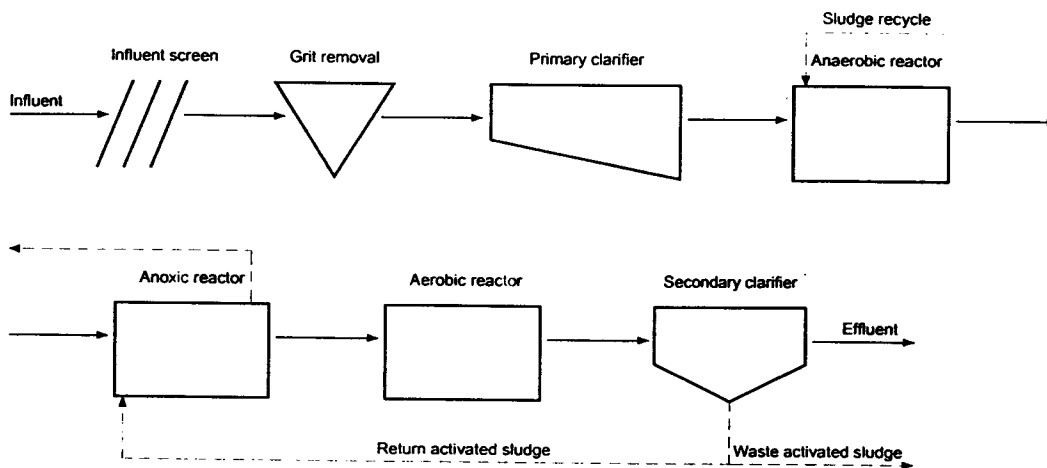
Activity 1.2: Sludge utilisation

The project proposal includes utilisation of the sludge produced in the wastewater treatment process, either as a fertiliser or as energy from gas. There are three possible solutions for sludge treatment:

- Dewatering, and mixing with yard waste/bark for compost production
- Anaerobic digestion for methane gas production and energy utilisation
- Dewatering, and anaerobic stabilisation.

The pre-design report will provide a final proposal for which alternative that will be implemented.

Figure 2. Diagram of the proposed sewage treatment plant in Havana



Output 2: Demonstration projects focusing on recycling of nutrients and energy from wastewater.

To demonstrate sustainable technologies for decentralised wastewater treatment and disposal, two smaller projects are included in the project proposal. These activities will be a part of ongoing research activities at the University of Havana. The technologies to be demonstrated include use of low flush toilets to reduce water consumption and wastewater production, black water collection and treatment, and small scale constructed wetlands for wastewater treatment. For these demonstration projects training/

educational programs and monitoring programs will also be implemented.

Activity 2.1: Zero emission housing

Cuba is producing prefabricated apartment buildings for use in Cuba and for export (MATCO house). These buildings can be fitted with low flush toilets and separate collection systems for black and grey water. At approximately eight demonstration housing units, black water will be collected and transported to a central treatment facility, while grey water will be treated locally and used for irrigation purposes. About 90 percent of the nutrients are removed and recycled.

Activity 2.2: Sewage treatment in areas with low infrastructure and housing standards

In a small suburban area "El Moro" all sewage is currently drained to an open canal and ends up in the Luyano River and subsequently in Havana Bay. To demonstrate alternatives for decentralised wastewater treatment, a constructed wetlands system will be built. The system consists of a septic tank, a trickling filter and open-surface constructed wetland and serves 50 households. The expected treatment efficiency for nutrients in this system is approximately 60-80 percent.

VIII. INPUTS

A. Government Inputs

The inputs from the Government of Cuba to the project are mainly in the form of human resources, existing premises and construction of new facilities. Total inputs from GOC and The Authorities of the City of Havana total an equivalent of USD 14 millions (at 1\$US = 1 Cuban peso) for a period of 5 years. Detailed description of costs is given in Budget, Section XI.

The GOC shall make available the services of existing professional staff from related institutions at times required for the successful implementation of the project.

An inter-institutional committee will facilitate participation of the wide variety of institutions involved in the project. The committee will be required to designate issue-specific Task Forces to attend particular needs.

The project funds will be used to warranty that the equipment required for the execution of the project, including training, monitoring and surveying activities, will be purchased in due time. Funds will be provided by the project to support capacity building activities such as subsistence costs for workshops, training seminars and conferences. Funds will also be provided for preparation, acquisition and dissemination of publications related to the environmental management of Havana Bay and its relations to international waters. Funds will also be used to finance international and national consultants with experience in relevant subject matters in order to support the local and national authorities in achieving the envisaged goals of the project.

B. GEF Inputs

The GEF has allocated a total of US\$ 4,038,598 for the implementation of this project (UNDP: \$ 4 million; UNEP \$0.40 million; Support Costs \$0.2 million). The indicative time frame for the project is five years, from approximately May 2002 to May 2007.

C. UNDP Inputs

UNDP will serve as implementing agency for the wastewater (Cuba) treatment component of the GEF project and will continue to backstop this project with its own staff members and financing, both from headquarters and locally from the Country Office in Cuba. UNEP is the lead IA for the regional dissemination component of the GEF project; the UNEP implementation plan is outlined in a separate UNEP project document.

VI. RISKS

As far as possible the project activities will be designed to minimise potential risks. Possible sources of risk to the success of the project include:

Reluctance of authorities to support the initiative

The GEF-financed project components are focused on addressing global environmental issues, in this case control of a significant contaminant of both national and international waters, the nutrients nitrogen and phosphorus. Successful implementation of the global elements, through effective demonstrations of nutrient removal, will in turn strengthen the initiatives from local authorities to solve local pollution problems. This connection between local and global benefits is expected to reduce the risk of reluctance from authorities to support the proposed project components. Risks for reluctance of authorities to support the initiative is considered to be low.

Conflicts among institutions/stakeholders

Cuba faces various national and local challenges related to institutional coordination and stakeholder involvement in projects such as this one. However, it does not have any major political conflicts, and no conflicts between local institutions have been identified which could impede progress of the project. The project implementation is based on close coordination, based on existing national and local institution. Each national agency responsible for project coordination will play a key role in the management of possible conflicts among institutions/stakeholders throughout the whole project period. Risk for conflict among institutions/stakeholders is therefore considered as low.

Overestimation of institutional capacities

Risk may arise in the event that the project proposals have overestimated the technical and administrative capacities of the different agencies and institutions involved in the different project components. A need for institutional strengthening in environmental management of the bay has been identified during the pilot phase project. Limited amounts of institutional strengthening and training are therefore included to reduce this risk. With this input, the risk for overestimation of institutional capacities is reduced from medium to low.

Lack of technically qualified personnel

The available technical personnel in Havana are generally not familiar with the proposed technologies. It is therefore assumed that international, technically qualified personnel may be engaged in the planning, construction and start-up of the sewage treatment plant as required. The project involves extensive training of local staff in operations and maintenance of the respective facilities to ensure sustainable plant operation beyond the project period.

Lack of financial resources

The Cuban authorities have made a commitment to support the project with all available domestic resources needed to implement the project. The inputs from the Government of Cuba to the project are

mainly in the form of human resources, existing premises, land for the proposed plant, and construction of new facilities, all covered by local currency. In nearly all Cuban infrastructure projects such as this there is a need for partial funding in hard currency. Domestic sources for needed equipment and materials are scarce in Cuba, and often must be imported. The project proposes therefore to use a "low equipment/high labour rate" approach, while still utilizing a commercial technology for sewage treatment plants with nutrient removal. The pre-design report will identify in detail the available domestic resources and imports required. Much of the GEF financial contribution will then be used to finance the necessary imported materials. There is a risk that this GEF contribution will be insufficient. In that case additional financial resources will need to be mobilized, leading to project delays. The Cuban authorities are examining a number of approaches to sustainable O&M of the facility, including user fees, fertilizer sales, and using the increasing tourist revenue anticipated from improved conditions in the Bay. Overall, this risk is considered as a medium risk.

VII. PRIOR OBLIGATIONS AND PREREQUISITES

Prior Obligations

There are no prior obligations, except signing the project document, associated with the Project.

Prerequisites

The following is considered as prerequisite conditional at the signature of the project documents for releasing funds:

- it is assumed that the commitments stated as baseline activities will be carried out as planned

The following are considered as prerequisites required at the outset of the Project in order to assure smooth implementation but are not pre-conditions for signature of the project documents and release of funds:

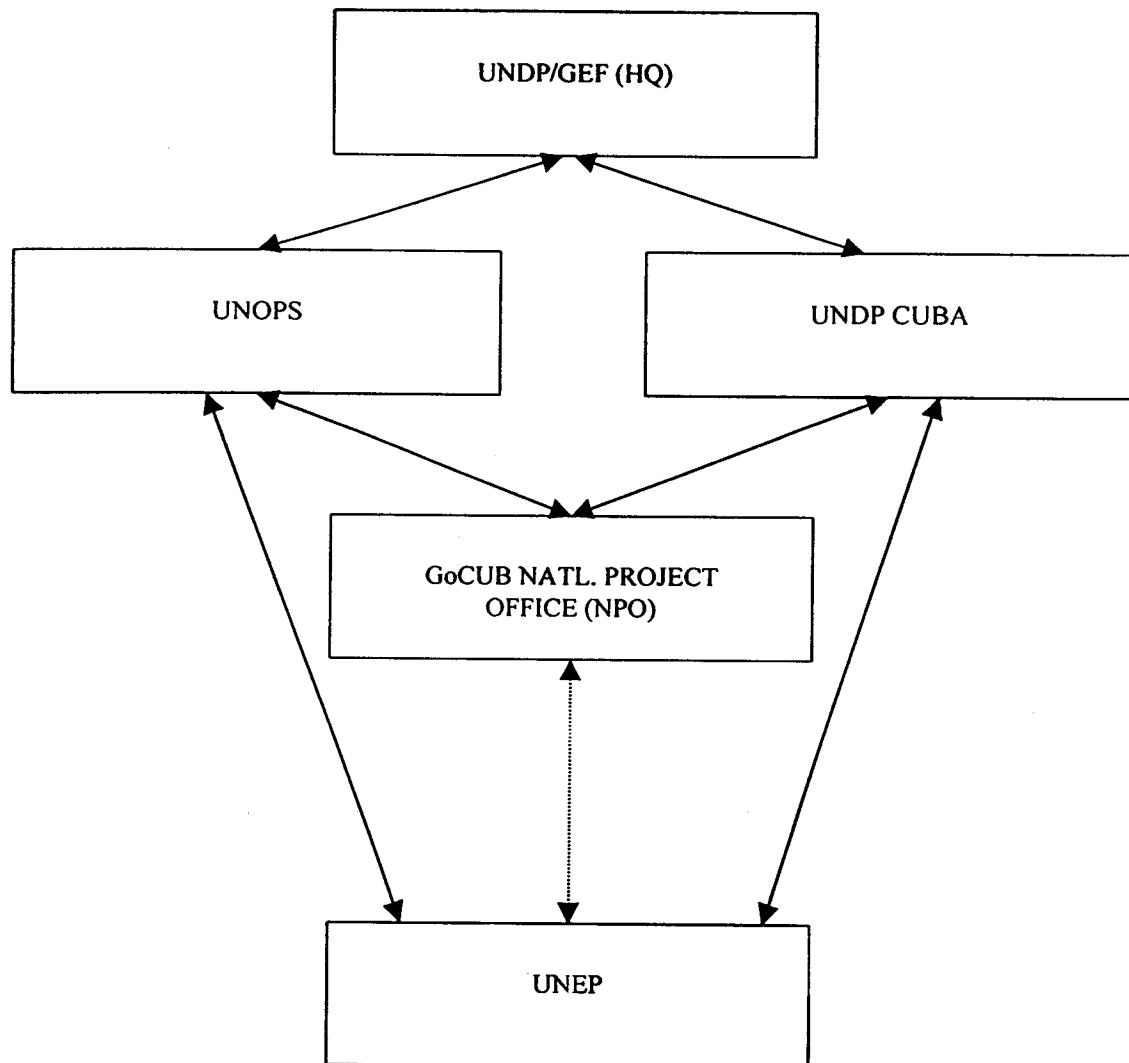
- to secure confirmation from the group acting as Steering Committee at National level as indicated in the Project.
- the Cuban counterpart to designate key staff to work with the project and establish the Project Core Team
- the Cuban counterpart to prepare specifications and possible sources
- the Cuban counterpart and UNOPS will discuss procurement and contracting arrangements for budget items and activities in line with UNDP financial rules and procedures.

VIII. INSTITUTIONAL FRAMEWORK, CO-ORDINATION AND ADMINISTRATION

The project will be internationally managed by UNOPS, which will take charge of all coordination and administration arrangements, working directly with the UNDP country office in Cuba and with the national project management office established for purposes of coordinating this project by the Government of Cuba. It will also liaise with UNEP on the timing of the implementation of the component that is to be implemented by UNEP.

Overall project organization is shown in Figure 3.

Figure 3: Project Organisation



Cuba

Implementing Agencies and Arrangements

In Cuba the Ministry of Foreign Investment and Economic Cooperation is the central body of the Government for the coordination of international cooperation and as such supervises the execution and implementation of all projects in Cuba. The Ministry of Science, Technology and Environment, through its Delegation for the City of Havana (DCITMA), will be responsible for the implementation of the project in Cuba and will coordinate all the activities

with the Council of Administration of the City of Havana and other involved institutions, including the National Institute of Hydraulic Resources, the Ministry of Transportation, and the Port Authority of Havana.

The National Project Office (NPO) will be located at the Delegation of CITMA (DCITMA), with a full-time co-ordinator and secretarial and logistic support. NPO will be responsible for the general co-ordination of the activities, including community participation, supervision of works, inter-institutional arrangements and information about the outputs.

Additional benefits may be obtained later by expanding the period and the mandate of the NPO beyond the proposed project period.

At national level, a Steering Committee, co-ordinated by CITMA, will be established to be responsible for supervisory, co-ordination and review functions. Members of this committee should be the Government of the City, the Ministry of Transportation, the Ministry of Foreign Investment and Co-operation, the Ministry of Construction, The Ministry of Economy and Planning, the Ministry of Public Health, the National Institute of Hydraulic Resources, the Institute of Physical Planning and the Technical Center for Development of Construction Materials (MATCO), the Governmental Working Group for the Sanitation, Conservation and Development of Havana Bay and other institutions involved in the project actions and UNDP.

Community Participation

The integral management of a basin within a city needs to have an urban approach and to include e.g. sanitary engineering. This means that community groups, neighborhood councils, NGOs, and professional associations should participate in the management of the basin of the Luyanó River.

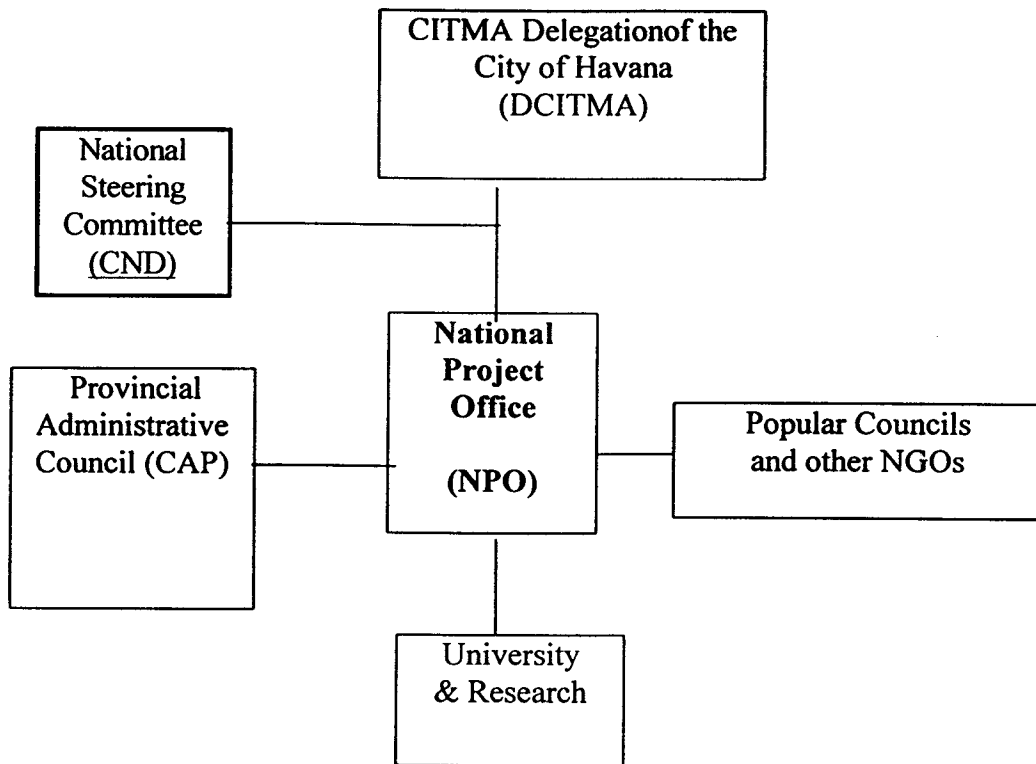
Consultations have been carried out with the involved instances, at national, provincial and local level, in preparing the project in Cuba. Their ideas and recommendations have been incorporated in the proposal. Also, NGOs, academic and scientific institutions and local resource persons have been consulted at all levels. There is a consensus between all these institutions on the importance of the sanitation of the Luyanó River and the other tributary rivers to the Havana Bay and on the environmental rehabilitation of the coastal ecosystem.

The political system in the country leans on community participation, by means of the Popular Councils. These Councils are elected in each district, thus representing the point of view of the community represented by municipal and provincial government. They will constitute a point of support in order to organise local efforts in environmental protection and will get technical assistance from the sanitary authorities at zone level (i.e. polyclinics in the district and the family doctors at block level).

Popular organisations like the Comités de Defensa de la Revolución (CDR) (in each block), the workers unions, youth, students and women organisations, act in the municipalities and the districts. These organisations have some responsibilities for health, collection of waste materials, support to the schools, etc. and will therefore be important for the project.

In the case of the City of Havana, the Group for Integral Development of the Capital has had some international support for their activities. Some of these activities have been related to Havana Bay and sanitation rehabilitation of the coast. There might also be possible to identify other sources for financing the environmental management of the ecosystem of Havana Bay.

Figure 4. Cuba Project Organisation



IX. PROJECT REVIEWS, REPORTING AND EVALUATION

Routine monitoring and evaluation of project activities are incorporated into the project design. In addition to routine reporting, the project will undertake an independent mid-term and final review and financial audit. The project will be subject to the standard annual UNDP tripartite review (TPR), Annual Project Report (APR), as well as the annual Project Implementation Review monitoring and evaluation exercise of the GEF (PIR). In line with GEF policies, each project site will also develop a suite of M&E indicators based on the process, stress reduction and environmental status framework.

The Cuban Ministry of Science, Technology and Environment (National Project Office), the Cuban Ministry of Foreign Investment and Co-operation of Cuba, UNEP and UNDP will conduct annual tripartite reviews of the project. The project managers will prepare an Annual Project Report (APR) and submit this to the two international agencies, UNDP and UNEP, as well as UNOPS, prior to each tripartite review meeting. The report will summarize progress, results, system performance, local participation, and expenditures vs. budget. Additional APR's may be requested during the project period, if deemed necessary.

A project terminal report will be prepared for consideration at the terminal tripartite review meeting. It will be prepared in draft at least four months prior to the final tripartite review to allow review and technical clearance by the Steering Committee. In the final year of the project a full scale evaluation of the two project sites will be undertaken to provide detailed practical recommendations on application of the project results and lessons learned to the Wider Caribbean.

UNEP-CAR/RCU will arrange a terminal workshop on viable opportunities for nutrient removal and sludge utilization, in co-ordination with the participating national agencies. The workshop will review lessons learned in the project, and publish the results for distribution in the region.

X. LEGAL CONTEXT

This Project Document shall be the instrument referred to as such in Article 1 of the Standard Basic Assistance Agreement, which has been signed between the Government of Cuba and the United Nations Development Programme.

The following types of revisions may be made to this project document with the signature of the Principal Project Resident Representative (PPRR) only, provided he or she is assured that the other signatories of the project document have no objections to the proposed changes:

1. Revision in, or addition of, any of the annexes of the project document.
2. Revisions which do not involve significant changes in the immediate objectives, outputs or activities of the project, but are caused by the rearrangement of the inputs already agreed to or by cost increases due to inflation

Mandatory annual revisions which rephrase the delivery of agreed project inputs or increased expert or other costs due to inflation or take into account agency expenditure flexibility.

XII. GEF BUDGET

		Total	Year 1 2002	Year 2 2003	Year 3 2004	Year 4 2005	Year 5 2006
CMBL	Description						
10	PROJECT PERSONNEL						
11	International Personnel						
11-97	Evaluations	20,000			10,000		10,000
16-02	UNDP Missions	3,000			1,500		1,500
19	Component total	23,000			11,500		11,500
20	CONTRACTS						
21-01	Admin & Supervision	75,000	15,000	15,000	15,000	15,000	15,000
21-02	Detail Design	45,000	30,000	15,000			
21-03	Construction	235,000		90,000	60,000	50,000	35,000
21-04	Plant Technology & Training	3,130,000	400,000	900,000	900,000	850,000	80,000
21-05	Demonstration units	50,000	10,000	30,000	10,000		
29	Component total	3,535,000	455,000	1,050,000	985,000	915,000	130,000
40	EQUIPMENT						
45-01	Misc. Equipment	91,000	91,000				
45-02	Publications	30,000	15,000	15,000			
49	Component total	121,000	106,000	15,000			
50	MISCELLANEOUS						
51-01	Communication	10,000	2,000	2,000	2,000	2,000	2,000
52-01	Reporting costs	9,544	1,500	2,000	2,000	2,000	2,044
53-01	Miscellaneous	1,500	300	300	300	300	300
54-01	UNDP CUBA D.C (3%)	111,001	16,944	32,079	30,024	27,579	4,375
59	Component total	132,045	20,744	36,379	34,324	31,879	8,719
90	TOTAL	3,811,045	581,744	1,101,379	1,030,824	946,879	150,219
96-01	UNOPS SUPPORT (6,15%)	227,553	34,735	65,762	61,549	56,537	8,969
99	CUBA - PROJECT TOTAL	4,038,598	616,479	1,167,141	1,092,373	1,003,416	159,188

XII.2 Government Counterpart Contribution Budget

CUBAN GOVERNMENT COUNTERPART CONTRIBUTION BUDGET (In Cuban Pesos) (US\$1=Peso 1 @ official exchange rate)

BL	DESCRIPTION	TOTAL	2002	2003	2004	2005	2006
10	PERSONAL						
17	National Professionals						
1701	Management Team	3 525 000	705 000	705 000	705 000	705 000	705 000
1799	Sub total	3 525 000	705 000	705 000	705 000	705 000	705 000
19	Component total	3 525 000	705 000	705 000	705 000	705 000	705 000
20	CONTRACTS						
2102	Administration and supervision	392 000	272 000	120 000			
2103	Scientific information	25 000	15 000	10 000			
2104	Construction	7 920 000		2 335 000	1 965 000	1 950 000	1 670 000
2105	Demonstration project (zero-emission housing units)	490 000	60 000	180 000	100 000	90 000	60 000
29	Component total	8 827 000	347 000	2 645 000	2 045 000	2 040 000	1 730 000
30	TRAINING						
32	Misc. Training activities	560 000	112 000	112 000	112 000	112 000	112 000
39	Component total	560 000	112 000	112 000	112 000	112 000	112 000
40	EQUIPMENT						
4502	Technical equipment	2 915 000	329 000	862 000	862 000	812 000	50 000
4502	Non-technical equipment	56 000	56 000				
4502	Miscellaneous	7 000	7 000				
4599	Sub total	2 978 000	392 000	862 000	862 000	812 000	50 000
49	Component total	2 978 000	392 000	862 000	862 000	812 000	50 000

50	MISCELLANEOUS						
51	Communications	25 000	5 000	5 000	5 000	5 000	5 000
52	Reporting	30 000	6 000	6 000	6 000	6 000	6 000
54	Direct Costs	45 000	9 000	9 000	9 000	9 000	9 000
59	Component total	100 000	20 000	20 000	20 000	20 000	20 000
999	TOTAL CONTRIBUTION	15 999 000	1 576 000	4 344 000	3 764 000	3 689 000	2 617 000

ANNEX I

ORGANIZATIONAL STRUCTURE OF THE PROJECT MANAGEMENT UNITS/NATIONAL PROJECT OFFICES

Cuba National Project Office (NPO)

The Provincial Delegation of the Ministry for Science, Technology and Environment for the City of Havana (DCITMA) will be the national counterpart organ for the implementation of the Cuba component. It will oversee the National Project Office (NPO), with the support and under the supervision of the National Steering Committee (CND).

The NPO will establish linkages with the Provincial Administrative Council (CAP), the Popular Councils and NGOs, as well as with universities and the Research Centre of the City of Havana.

The Ministry of Science, Technology and Environment of Cuba will chair the National Steering Committee. Said Committee, which will meet on a periodic basis (every three months) will consist of an Executive Secretary (who will be the National Coordinator of the Project) and representatives of the Ministry of Foreign Investment and Economic Co-operation, the Ministry of Transportation, the Ministry of Construction, the Ministry of Economy and Planning, the National Institute of Hydraulic Resources, the Provincial Administrative Council, Provincial Directorate of Physical Planning, Provincial Directorate of Public Health and the Governmental Working Group for the Sanitation, Conservation and Development of Havana Bay, the Technical Center for Development of Construction Materials (MATCO) and the UNDP. It will also include other institutions such as the Institute of Tropical Geography, the High Polytechnical Institute "José Antonio Echevarría", the Center of Engineering and Environmental Management of Bay and Coastal Areas, the National Center of Research Hydraulics and Water Quality, Investments GAMMA and NGOs linked to the project.

The National Project Coordinator will also be the Head of the National Project Office and the Executive Secretary of the National Steering Committee. His/her function will be to ensure and monitor the implementation of project activities, technical and others, in the country. He/she will interact with the UNDP, UNOPS and UNEP in aspects of concern to each of these agencies. The Cuban Minister for Science, Technology and Environment has designated her Delegate in the Province of the City of Havana as National Coordinator of the Project.

TERMS OF REFERENCE

NATIONAL PROJECT OFFICE (CUBA)

CUB/99/G31-Demonstration of Innovative Approaches to the Rehabilitation of Heavily Contaminated Bays in the Wider Caribbean (Havana Bay)

The Delegate of the Ministry of Science, Technology and Environment (CITMA) in Havana Province, who is designated by the Minister of CITMA, will act as general project coordinator for the National Project Office. This office will be the national counterpart for the implementation of project activities and will be composed of a team of specialists who will contribute to the management of the project. Furthermore, the National Project Office will interact with centers of higher education and research centers of the City of Havana. It will also establish links with the Provincial Administration Council (CAP), the Popular Councils and NGOs.

Structure of the National Project Office

• National Coordinator	1
• Chemical engineer	2
• Hydraulic engineer	1
• Architect	1
• Geography specialist	1
• Biochemistry specialist	1
• Technology specialist	2
• Project Management specialist	1
• Economist	1
• Expert in architecture and informatics	1
• Electrical engineer	1
• Information specialist	1
• Law specialist	1
TOTAL	15

During project execution this team of specialists will meet monthly to monitor the implementation of project activities. Every three months, the NPO will hold working sessions with the National Steering Committee, which will be created in accordance with the project document.

The salaries, per diems and other expenditures of this team will be covered by the Cuban counterpart contribution of this project.

ANNEX II

TERMS OF REFERENCE

SUBCONTRACT FOR ADMINISTRATION AND SUPERVISION

CUB/99/G31-Demonstration of Innovative Approaches to the Rehabilitation of Heavily Contaminated Bays in the Wider Caribbean (Havana Bay)

Requirements:

A company with experience in advisory and consulting services in specialized scientific and technological areas, in particular environmental sciences, environmental impact analyses, and in the operation of treatment plants for waste water and integrated environmental solutions.

The company should preferably be Cuban or an international company located in the country.

Duration of assignment: 5 years

Tasks:

1. Supervise project execution through periodical reports
2. Participate in periodic progress evaluations with the Cuban counterpart
3. Supervise the construction and start-up of operation of the zero-emission housing demonstration units
4. Review the preparation and execution of contracts for the construction, installation and start-up of the waste water treatment plant
5. Supervise the construction and start-up of the plant through site visits and liaison with the various parties involved in the construction
6. Supervise the operation and maintenance of the treatment plant during the first six months after initial start-up

ANNEX III PROJECT PROGRESS PLAN

Quarter/Year (1/2002-4/2006)

Code	Component/Activity	1/02	2/02	3/02	4/02	1/03	2/03	3/03	4/03	1/04	2/04	3/04	4/04	1/05	2/05	3/05	4/05	1/06	2/06	3/06	4/06
1	Wastewater treatment in Havana																				
	Project mobilisation	■																			
1.1	Treatment plant, including nutrient																				
	Pre-design report	■																			
	Detail design/tender documents		■	■																	
	Tendering/contracting				■	■															
	Construction and commissioning							■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Operation and maintenance																		■	■	■
1.2	Sludge treatment																				
	Pre-design	■																			
	Detail design/tender documents		■	■																	
	Tendering/contracting				■	■															
	Construction and commissioning							■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Operation and maintenance																			■	■
2	Demonstration projects for recycling																				
2.1	Zero emission housing unit																				
	Planning/detail design/contracting	■	■																		
2.2	Construction of sewage treatment			■	■	■	■														

ANNEX IV

CARTAGENA CONVENTION – LBS Protocol

Domestic Wastewater

A. Definitions

For the purposes of this Annex:

1. "Domestic wastewater" means all discharges from households, commercial facilities, hotels, septage and any other entity whose discharge includes the following:
 - (a) Toilet flushing (black water);
 - (b) Discharges from showers, wash basins, kitchens and laundries (grey water); or
 - (c) Discharges from small industries, provided their composition and quantity are compatible with treatment in a domestic wastewater system.

Small quantities of industrial waste or processed wastewater may also be found in domestic wastewater. (See Part D - Industrial Pretreatment.)

2. "Class I waters" means waters in the Convention area that, due to inherent or unique environmental characteristics or fragile biological or ecological characteristics or human use, are particularly sensitive to the impacts of domestic wastewater. Class I waters include, but are not limited to:
 - (a) waters containing coral reefs, seagrass beds, or mangroves;
 - (b) critical breeding, nursery or forage areas for aquatic and terrestrial life;
 - (c) areas that provide habitat for species protected under the Protocol Concerning Specially Protected Areas and Wildlife to the Convention (the SPAW Protocol);
 - (d) protected areas listed in the SPAW Protocol; and
 - (e) waters used for recreation.
3. "Class II waters" means waters in the Convention area, other than Class I waters, that due to oceanographic, hydrologic, climatic or other factors are less sensitive to the impacts of domestic wastewater and where humans or living resources that are likely to be adversely affected by the discharges are not exposed to such discharges.
4. "Existing domestic wastewater systems" means, with respect to a particular Contracting Party, publicly or privately owned domestic wastewater collection systems, or collection and treatment systems, that were constructed prior to entry into force of this Annex for such Contracting Party.
4. "New domestic wastewater systems" means, with respect to a particular Contracting Party, publicly or privately owned domestic wastewater collection systems, or collection and treatment systems, that were constructed subsequent to entry into force of this Annex

for such Contracting Party, and includes existing domestic wastewater systems which have been subject to substantial modifications after such entry into force.

5. "Household systems" means on-site domestic wastewater disposal systems for homes and small commercial businesses in areas of low population density, or where centralised collection and treatment systems of domestic wastewater are not economically or technologically feasible. Household systems include, but are not limited to, septic tanks and drain fields or mounds, holding tanks, latrines and bio-digesting toilets.
7. "Wastewater collection systems" means any collection or conveyance system designed to collect or channel domestic wastewater from multiple sources.

B. Discharge of Domestic Wastewater

1. Each Contracting Party shall:
 - (a) Consistent with the provisions of this Annex, provide for the regulation of domestic wastewater discharging into, or adversely affecting, the Convention area;
 - (b) To the extent practicable, locate, design and construct domestic wastewater treatment facilities and outfalls such that any adverse effects on, or discharges into, Class I waters, are minimised;
 - (c) Encourage and promote domestic wastewater reuse that minimises or eliminates discharges into, or discharges that adversely affect, the Convention area;
 - (d) Promote the use of cleaner technologies to reduce discharges to a minimum, or to avoid adverse effects within the Convention area; and
 - (e) Develop plans to implement the obligations in this Annex, including, where appropriate, plans for obtaining financial assistance.
2. Each Contracting Party shall be entitled to use whatever technology or approach that it deems appropriate to meet the obligations specified in Part C of this Annex.

C. Effluent Limitations

Each Contracting Party shall ensure that domestic wastewater that discharges into, or adversely affects, the Convention area, is treated by a new or existing domestic wastewater system whose effluent achieves the effluent limitations specified below in paragraphs 1, 2 and 3 of this Part, in accordance with the following timetable:

Category	Effective Date of Obligation (in years after entry into force for the Contracting Party)	Effluent Sources
1	0	All new domestic wastewater systems

Category	Effective Date of Obligation (in years after entry into force for the Contracting Party)	Effluent Sources
2	10	Existing domestic wastewater systems other than community wastewater systems
3	10*	Communities with 10,000 - 50,000 inhabitants
4	15	Communities with more than 50,000 inhabitants already possessing wastewater collection systems
5	20	Communities with more than 50,000 inhabitants not possessing wastewater collection systems
6	20	All other communities except those relying exclusively on household systems

* Contracting Parties which decide to give higher priority to categories 4 and 5 may extend their obligations pursuant to category 3 to twenty (20) years (time frame established in category 6).

1. Discharges into Class II Waters

Each Contracting Party shall ensure that domestic wastewater that discharges into, or adversely affects, Class II waters is treated by a new or existing domestic wastewater system whose effluent achieves the following effluent limitations based on a monthly average:

C. Parameter	Effluent Limit
Total Suspended Solids	150 mg/l*
Biochemical Oxygen Demand (BOD ₅)	150 mg/l
pH	5-10 pH units
Fats, Oil and Grease	50 mg/l
Floatables	not visible

* Does not include algae from treatment ponds

2. Discharges into Class I Waters

Each Contracting Party shall ensure that domestic wastewater that discharges into, or adversely affects, Class I waters is treated by a new or existing domestic wastewater system whose effluent achieves the following effluent limitations based on a monthly average:

D. Parameter	Effluent Limit
Total Suspended Solids	30 mg/l*
Biochemical Oxygen Demand (BOD ₅)	30 mg/l
pH	5-10 pH units
Fats, Oil and Grease	15 mg/l
Faecal Coliform (Parties may meet effluent limitations either for	Faecal Coliform: 200 mpn/100 ml; or a. <i>E. coli</i> : 126 organisms/100ml;

faecal coliform or for <i>E. coli</i> (freshwater) and enterococci (saline water).)	b. enterococci: 35 organisms/100 ml
Floatables	not visible
* Does not include algae from treatment ponds	

3. All Discharges

- (a) Each Contracting Party shall take into account the impact that total nitrogen and phosphorus and their compounds may have on the degradation of the Convention area and, to the extent practicable, take appropriate measures to control or reduce the amount of total nitrogen and phosphorus that is discharged into, or may adversely affect, the Convention area.
- (b) Each Party shall ensure that residual chlorine from domestic wastewater treatment systems is not discharged in concentrations or amounts that would be toxic to marine organisms that reside in or migrate to the Convention area.

D. Industrial Pretreatment

Each Contracting Party shall endeavour, in keeping with its economic capabilities, to develop and implement industrial pretreatment programmes to ensure that industrial discharges into new and existing domestic wastewater treatment systems:

- (a) do not interfere with, damage or otherwise prevent domestic wastewater collection and treatment systems from meeting the effluent limitations specified in this Annex;
- (b) do not endanger operations of, or populations in proximity to, collection and treatment systems through exposure to toxic and hazardous substances;
- (c) do not contaminate sludges or other reusable products from wastewater treatment; and
- (d) do not contain toxic pollutants in amounts toxic to human health and/or aquatic life.

Each Contracting Party shall endeavour to ensure that industrial pretreatment programmes include spill containment and contingency plans.

Each Contracting Party, within the scope of its capabilities, shall promote appropriate industrial wastewater management, such as the use of recirculation and closed loop systems, to eliminate or minimise wastewater discharges to domestic wastewater systems.

E. Household Systems

Each Contracting Party shall strive to, as expeditiously, economically and technologically feasible, in areas without sewage collection, ensure that household systems are constructed, operated and maintained to avoid contamination of surface or ground waters that are likely to adversely affect the Convention area.

For those household systems requiring septage pump out, each Contracting Party shall strive to ensure that the septage is treated through a domestic wastewater system or appropriate land application.

F. Management, Operations and Maintenance

Each Contracting Party shall ensure that new and existing domestic wastewater systems are properly managed and that system managers develop and implement training programmes for wastewater collection and treatment system operators. Managers and operators shall have access to operators' manuals and technical support necessary for proper system operation.

Each Contracting Party shall provide for an evaluation of domestic wastewater systems by competent national authorities to assess compliance with national regulations.

II.

G. Extension Period

1. Any Contracting Party may, at least two years before the effective date of an obligation in categories 2, 3, 4 or 5 of the timetable in Part C above, submit to the Organisation a declaration that, with respect to such category, it is unable to achieve the effluent limitations set forth in paragraphs 1 and 2 of Part C above in accordance with that timetable, provided that such Contracting Party:
 - (a) has developed action plans pursuant to Part B, paragraph 1(e);
 - (b) has achieved the effluent limitations for a subset of the discharges associated with those categories, or a reduction of at least 5 percent of total loading of pollutants associated with those categories; and
 - (c) has taken actions to achieve those effluent limitations, but has been unable to achieve those limitations due to a lack of financial or other capacity.
2. With respect to a Contracting Party that has submitted a declaration pursuant to paragraph 1 above, the effective date of an obligation in the timetable in Part C for categories 2, 3, 4 or 5 of that timetable shall be extended for a period of five years. The five-year period shall be extended for a maximum of one additional five-year period if the Contracting Party submits a new declaration prior to the expiration of the first period, and if it continues to meet the requirements set out in paragraph 1 above.
3. The Contracting Parties recognise that the complete fulfillment* of the obligations contained in this Annex will require the availability and accessibility of financial resources.

ANNEX V**ACRONYMS/ABBREVIATIONS**

APR	Annual Project/Programme Review
BOD	Biochemical oxygen demand
CBO	Community based organisation
COD	Chemical oxygen demand
ECD	Environmental Control Division
GEF	Global Environment Facility
MGD	Million gallons per day
NGO	Non-government organisation
O&M	Operation and maintenance
PHA	Public Health Act
POP	Persistent Organic Pollutant
PPER	Project Performance Evaluation Report
PS	Pump station
PSO	Private sector organisations
Ton	Metric ton, 2205 lbs.
Tot-N	Total nitrogen
Tot-P	Total phosphorous
TPR	Tri-Partite Review
TSS	Total suspended solids
UNDP	United Nations Development Program
WWTP	Wastewater treatment plant