Policy options

This section aims to identify feasible policy options that target key components identified in the Causal chain analysis in order to minimise future impacts on the transboundary aquatic environment. Recommended policy options were identified through a pragmatic process that evaluated a wide range of potential policy options proposed by regional experts and key political actors according to a number of criteria that were appropriate for the institutional context, such as political and social acceptability, costs and benefits and capacity for implementation. The policy options presented in the report require additional detailed analysis that is beyond the scope of the GIWA and, as a consequence, they are not formal recommendations to governments but rather contributions to broader policy processes in the region.

In the GIWA region Caribbean Islands pollution was identified as the priority concern, originating from marine traffic and land-based sources. The Policy options section aims to describe the pollution issues that need to be resolved or mitigated, and will describe alternative courses of action that may be taken by policy-makers in the region. Each course of action will have a set of projected outcomes with the trade-offs of each action discussed. Specific policy actions are firstly evaluated for marine traffic, and then for land-based sources of pollution in Havana Bay.

Discharges from maritime traffic

Definition of the problem

Maritime traffic discharges significant quantities of pollutants, which increasingly degrade the marine environment and adversely affect the populations of the region. The causal chain analysis identified the following root causes of marine traffic related pollution:

- Geophysical and geopolitical characteristics: Intensive marine traffic in narrow channels and shallow waters.
- Economic: Due to a dependency on foreign sources of revenues; Lack of financial resources; insufficient investment in waste treatment facilities; lack of incentives to treat or dispose of waste at ports; and expansion of cruise industry.
- Knowledge: Lack of information availability; lack of monitoring of discharges; and limited public environmental awareness and education.
- Legal: Weaknesses in legislation and regulations.
- Governance: Unsustainable development strategies; lack of political commitment; lack of compliance with international agreements; and insufficient oil spill response planning and capacity.
- Technology: Lack of marine traffic control services and limited technological resources; and insufficient utilisation of recykling techniques.

Policy options will need to address some of the fundamental underlying root causes, such as the governance issues, while other more technical

root causes, such as lack of waste reception facilities, can be resolved within an improved legal and management framework. It was found that marine traffic related pollution is directly associated with deficiencies in the management of ship-generated waste, which is highly interlinked with the overall difficulties with terrestrial waste management. There is a need to integrate these two waste management systems. However, the lack of available land for the construction of sanitary disposal services and objections to the practice of incineration on a large-scale has created constraints to finding straightforward solutions to this problem.

Projects executed in the region concerning pollution from marine traffic

With regards to ship-generated waste in the Wider Caribbean region, the GEF-funded Wider Caribbean Initiative on Ship-Generated Waste (WCISW) Project was executed between 1994 and 1998. This project, implemented by the International Maritime Organization (IMO), was conceived as the first phase of a long-term process to clean up and protect the Caribbean Sea. The project's objective was "to provide a regional strategy for the ratification of Annexes I, II and V of MARPOL 73/78 by the 22 Wider Caribbean countries, by providing governments with: (i) information on the legal, technical and institutional measures required; and (ii) a forum for reaching a regional consensus on the actions to be taken" (GEF/UNDP/UNEP 1999).

The project envisaged that a second phase would build on this project's results "by investing in port reception facilities, waste management infrastructure, and institutional training programs with the ultimate goal of ending discharge of all ship-generated waste into international and territorial waters of the Caribbean Sea, protecting the environmental integrity of Caribbean coastal and marine systems" (GEF/UNDP/UNEP 1999).

The Organization of Eastern Caribbean States (OECS) Ship-Generated Waste Management Project was designed to take the WCISW Project's objective through to the implementation stage in the OECS sub-region (eastern Caribbean), providing for port reception facilities, waste management infrastructure and institutional training programmes to facilitate compliance with MARPOL 73/78 Annex V. These were precisely the follow-up activities highlighted as necessary in the Implementation Completion Report (ICR) for the WCISW Project (World Bank 2003). In the Caribbean Islands region such a follow up project to the WCISW Project has not been executed.

Construction of policy options

An initial list of policy options aimed at addressing the root causes of marine traffic related pollution was developed as follows:

- Increase regional cooperation among stakeholders to review and improve the legal framework of maritime traffic and its ability to be enforced properly;
- Lobby for the Caribbean Area to be created as a "Special Area" under MARPOL Annex II (oil) and IV (toxic waste);
- Foster help from the international community and from the cruise ship industry to finance proper waste treatment infrastructure;
- Provide education and awareness programmemes to local populations;
- Register coral reefs areas as protected marine parks where anchoring is not permitted and provide means for surveillance and enforcement;
- Create national level contingency plans for marine and environmental authorities;
- Improve national and regional planning and cooperation in verifying illegal discharges from vessels;
- Finance harbour-based waste treatment facilities via a prepaid pass to all Caribbean harbours for cruise lines;
- Create incentives for investment in local recycling of solid waste materials;
- Make waste unloading a mandatory and non-payable requirement at all major harbours in the region;
- Increase involvement of stakeholders benefiting directly from the inflow of tourists;
- Review the role of tourism in ensuring the preservation of coastal ecosystems;
- Study the negative impact tourism may have on ecosystems and thus how such activity should be managed to remain sustainable.

Performance of chosen policy options

Policy option 1
Providing sufficient waste receiving and treatment infrastructure at ports

In the Caribbean Islands region there has not been a follow up to the WSISW project as there has been in the Eastern Caribbean. There is a need to provide port reception facilities, waste management infrastructure and institutional training programmes to facilitate compliance with MARPOL 73/78 Annex V (dumping of solid waste).

This policy option will follow-up activities highlighted as necessary in the Implementation Completion Report (ICR) for the WCISW Project (June 25, 1999). The option is therefore based upon the success and lessons learned from the GEF OECS Ship-Generated Waste Management Project completed in 2003 for the Caribbean countries of Antigua & Barbuda, Dominica, Grenada, St. Kitts & Nevis, St. Lucia and St. Vincent & the Grenadines (World Bank 2003).

A lack of waste reception facilities at ports was identified as a major root cause leading to the illicit dumping of wastes by ships at sea. There is an urgent need to increase the capacity of the Caribbean countries to collect, dispose, treat and recycle waste generated by shipping, particularly cruise ships, in order to reduce public health risks and protect the environmental integrity of the islands and their coastal and marine systems. This should be achieved through the improvement of ship-generated waste management facilities and facilitating compliance with the "Special Area" designation of the Caribbean Sea from 1997 for MARPOL 73/78 Annex V on dumping of solid wastes. The policy option would aim to reduce marine pollution in the Caribbean Islands region by preventing and discouraging indiscriminate disposal of waste off-shore to significantly enhance public health and environmental quality by strengthening the countries' capacities to manage effectively and dispose of waste in an environmentally sustainable manner. The project will reduce the pollution of international and territorial waters caused by ship-generated solid waste by improving the collection, treatment and disposal of such waste. Improvements in collection and disposal will ensure that ship-generated waste is properly transported and disposed of at sanitary landfills.

This will require a combined effort at the regional and at the national level to provide waste reception facilities at all harbours in the Caribbean Islands region with facilities of sufficient capacity for waste collection and storage, to receive and treat wastewater, bilge water, toxic waste and solid waste.

By providing this infrastructure, ships have the option not to dump at sea, making the discharge of wastes fully illegal without the recourse that they were unable to offload wastes at ports. The discharge and treatment of waste should become a standard practice under port authority control. The treatment of such waste needs to be economically viable for the shipping operators and enforced where necessary in order to change their attitudes and behaviours. The 'Seasonal Regional Passport' has been identified as an effective scheme that will create a funding mechanism and generate economic incentives for both the port authorities to provide waste reception facilities and for shipping operators to offload wastes onshore (see Box 3).

Box 3 The cruise line seasonal passport.

An incentive for port authorities to invest in waste treatment infrastructure would be to create a Caribbean wide cruise ship "Caribbean Cruising Passport" (CCP) that would be sold at the beginning of the season and would allow access to a number of installations and harbour hosted facilities, including the treatment of their waste. This passport would allow the ports to receive income at the beginning of the season and therefore reduce the risk posed by the stability of international politics on the volume of tourists in the region – thus shifting the level of risk factor from the port authorities to cruise ship operators. Only a fraction of the port operations would be pre-financed and other facilities would still generate profits (recreational facilities, hotels, etc.).

Port authorities, rather than applying the polluter pays principle, may find that by cooperating and establishing a joint initiative such as the passport scheme, with a number of prepaid services such as waste discharge and treatment, they will not reduce the profitability of their operations, but will encourage cruise operators to cease discharging wastes into coastal waters. The charge for an annual passport and the mechanism for distributing the revenues received from the scheme would need to be determined in consideration of many parameters. However, the advantages of such a system would be the following:

- It would reduce the incentives for ships to dump their waste at sea;
- It would help finance the required infrastructure to treat waste and extend harbour capacity;
- It would create a de facto partnership between cruise lines and port authorities and facilitate dialogue on environmental issues;
- It would harmonise port charges around the region and eliminate price wars aimed at attracting more cruise operators to dock at specific destinations and would instead shift competitive differentials to the added value a port authority can offer the tour operators;
- It would provide some economic security for port authorities from fluctuations in international tourism markets.

The consideration lessons learned by OECS Ship-generated waste project (World Bank 2003) are taken into consideration when performing this policy option.

Political and legal framework

A legal framework to create and govern the operation of entities responsible for waste management and to define their relationship with government will ensure effectiveness of the policy option. The legal framework of the countries in the Caribbean Islands region may need to be updated to integrate waste management legislation, through for example, the enactment of a ship-generated waste bill. Ship waste management authorities may need to be created in countries that do not have sufficient institutional arrangements to implement the policy option.

Political feasibility (stakeholder analysis)

Any solution to the dumping of waste at sea would be jeopardised without the broad agreement and active participation of all countries in the Caribbean Islands region. Regional cooperation between port authorities and uniform implementation is necessary regarding the regulation, charging and practices for waste collection and treatment, so that a port's competitiveness is not jeopardised. For example, if a polluting port does not provide waste reception facilities, it will have an unfair competitive advantage over ports that insist that waste collection and treatment is payable and mandatory.

Figure 24 Cruise ships at the seaport of Nassau along New Providence Island, Bahamas.
(Photo: Corbis)

Regional agencies and other international agencies and donors, therefore need to work with the governments of the region, to assist in developing a coordinated strategy for ship-generated waste management at the regional and national levels. Regular meetings between stakeholders will assist in achieving regional coordination.

A lesson learnt from the OECS GEF project is that joint procurement can provide benefits, including economies of scale, harmonisation, speed of processing documentation, and efficient use of limited human and financial resources. However, experience in this project suggests that these benefits must be balanced with specific country concerns, situations and capacities. Another lesson learnt was that to achieve regional success in addressing ship-generated waste, flexibility and a realistic timetable should be employed when dealing with the multiple countries of the Caribbean Islands region, with varying development capacities and needs (World Bank 2003).

Port authorities need to have necessary incentives to encourage them to invest in waste reception facilities, as they are capital intensive and are not seen as profitable (see Root cause: Lack of investment in port waste reception facilities). If the ports are able to receive profits from the passport system they will be encouraged to develop waste reception facilities and enforce the application of the initiative.

Regulations aimed at cruise line operators are difficult to enforce at sea and cruise ships are reluctant to use waste reception facilities voluntarily due to their cost, and therefore to influence their practices it is recommended that a combination of financial incentives and stringent environmental regulations be employed. If the treating and recycling of waste is made cost-effective, the cruise operators will be encouraged to use facilities.

Administrative feasibility

In accordance with the WSSD Plan of Implementation paragraph 60 c, support should be provided to small island developing states to develop capacity and strengthen "efforts to reduce and manage waste and pollution…" (WSSD 2002). International organisations, such as the GEF may be able to finance waste treatment infrastructure.

The design of a project for this policy option should take into account the flaws of the OECS GEF project. For example, the project design provided funds for the purchase of equipment to manage ship-to-dock

waste collection and transport. This effectively took over an existing and functioning private sector activity, without any consideration of the future role of the private sector. The system for collecting waste and transporting it by barge from shipside to dock was also not adequately designed, with limited attention paid to financial viability and capacity (World Bank 2003).

Pre-project design studies and evaluations must be undertaken by persons/firms who are not only competent in the technical content but who are also aware and sensitive to local nuances and local socio-cultural and political conditions. Project design and implementation also needs to take into account countries that are made up of multiple islands of different size, capacity and development needs.

There should be formal agreements with the port authorities or relevant authorities regarding the roles and responsibilities for collecting and disposing of ship-generated waste.

Cost recovery mechanisms can be used to minimise government subsidies, by securing payment for waste facilities from shipping and cruise line companies. By creating an easily enforceable permit such as the seasonal regional passport, ships would not have any incentive to evade waste reception facilities at harbours since they have already paid for the service. National governments will therefore avoid expenditure on surveillance and monitoring at sea. Lastly, the passport would generate revenues to cover costs of operation.

Efficiency

This policy option will create incentives for port authorities to invest in waste receiving and treatment infrastructure and also for cruise ships to use the facilities. This will consequently address the current deficiencies in ship-generated waste management. It is anticipated that such action will lead to a reduction in waste being discharge into the waters of the Caribbean Islands region without affecting the competitiveness of ports receiving cruise ships and other vessels.

Significant investment will be required in order for port reception facilities to be of an adequate standard and to ensure human resources have the necessary technical skills for maintenance and repair. The costs of collecting, treating and disposing of wastes within an integrated waste management system will also be considerable. However, the proposed passport system could provide a mechanism for the ports to receive a return on their investments. The subsequent improvements in environmental quality will increase the productivity of key economic sectors, particularly tourism and the fisheries. It is anticipated in the medium to long-term the policy option is economically efficient.

Policy option 2
Strengthening political and legal instruments: Regulating discharges, spills and accidents

The intensiveness of maritime traffic near the shores of most Caribbean islands (see Root cause: Geophysical and geopolitical characteristics) makes it imperative to have effective legal tools in order to regulate their activities and minimise the impacts on the region's populations and ecosystems. This policy option directly addresses the root causes of weaknesses in legislation and regulations, and also the lack of compliance with international agreements regarding marine pollution from shipping. The strengthening of legal frameworks, essentially at the national as well as the regional level, combined with the means of enforcing these regulations (see Policy option 3) will place tighter controls on the shipping industry and give enforcement agencies greater indictment powers. Misdemeanours towards the marine environment should no longer continue in Caribbean waters unchecked. Many ship-generated sources of pollution are the result of deliberate actions, perhaps indirectly due for example to inadequate facilities, but still knowingly permitting the pollution of ecosystems. It is the responsibility of governments to send the right signals to polluters on their determination to eradicate illicit dumping at sea.

National maritime legislation should be based upon MARPOL 73/78 which has been adopted by all the nations of the region. However, there are concerns regarding the applicability of Article 4 of the convention, which stipulates that violations and offences should be prosecuted under the jurisdiction of the Flag State (meaning Liberia or Panama in most cases) i.e. not the state where the pollution incident occurs. With an increasing number of maritime environmental accidents around the world, perhaps coastal states should have some jurisdiction. In practice, MARPOL Article 6 requires the cooperation of all involved parties to resolve the violation issues. The coastal state should thus, in theory, be able to fine polluters, however this needs further investigation and clarification.

If Article 4 does infer that countries victim of environmental accidents cannot receive compensation, it is suggested a revision to Article 4 should be called for at the international level. The countries of the Caribbean Islands region also have the option to create an exclusive economic zone with its own legislation on water. National territorial waters can be unified under a homogenous jurisdiction, such as in the EU or the United States. MARPOL violating boats will therefore, to avoid prosecution, have to commit their offences outside territorial waters, which will greatly reduce the impact of maritime pollution on coastal ecosystems.

If MARPOL Article 4 allows countries to fine offending vessels, national governments should include maritime waste disposal in their registry

of prosecution and heavily fine violators. National laws should also apply to the local fleet. This legal framework, should it be enforced, would allow a realignment of the economic balance between polluters and the polluted and provide necessary funding for recovery, clean-up, prevention, inspection and monitoring operations. If MARPOL Article 4 does not allow national governments to fine violating ships, they are powerless to regulate polluting vessels in their territorial waters. If national law is very specific about the penalties for waste dumping in Caribbean waters and that national institutions show their determination to enforce such law, most vessels will be deterred from infringing regulations.

Political and legal framework

This policy option proposes making a legislative framework to effectively control the shipping industry and give enforcement agencies greater indictment powers. Policy option 3 addresses the enforcement institutional weaknesses in order that the enhanced legislative framework can be effectively implemented.

Political feasibility (stakeholder analysis)

There may be difficulties amending Article 4 of the MARPOL convention, as many nations will be reluctant to change an otherwise relatively effective international agreement. The governments of the Caribbean Islands region may be disinclined to invest in enforcement agencies to effectively police the shipping industry, so as not to detract potential shipping companies from using their ports (See Root cause: Foreign dependency). However, the potential economic benefits from fining polluting vessels may provide an incentive for these nations to enforce international maritime law. There may be dissatisfaction within the shipping industry if national governments, other than their flag state, are given prosecuting powers. There would be concern that the judicial procedures of these countries would give an unfair hearing.

Administrative feasibility

To justify legislative changes there needs to the necessary infrastructure at ports adequately collect, treat and dispose of ship-generated wastes. Shipping companies also need appropriate incentives, other than regulatory mechanisms, to encourage them to voluntarily use waste reception facilities, so as to avoid resentment and instead foster partnerships between shipping and port authorities regarding the control of pollution.

Since the responsibility of enforcing the MARPOL and Cartagena conventions is given to national governments, they should also be the main provider of financial support for such operations. Nevertheless, governments have not allocated sufficient funds for the implementation of necessary enforcement instruments due to economic constraints and environmental issues being given a low priority in their political agendas. By applying the polluter pays principle, a small enforcement force could fine polluters and thus generate revenues, which in turn would finance its expansion. However, governments will have to resist corruption and not redistribute the funds to other governmental activities.

Efficiency

This policy option should address many of the weaknesses in regulations and legislation identified in the causal chain analysis, by giving more power to nations to prosecute vessels polluting in their territorial waters. It will strengthen the legislative framework provided by MARPOL 73/78 Annex V in order to place further pressure on the shipping industry to dispose of their waste in a responsible and appropriate manner, whilst ensuring they minimise the risk of spills and accidental release of contaminants from their vessels.

Legislation will not alone prevent ships from polluting the Caribbean Sea, and although the countries of the Caribbean Islands region will have more power to prosecute offending vessels it is unclear whether they would take advantage of new legal instruments. In addition, stricter legislation may increase the reluctance of the shipping industry to cooperate with environmental initiatives.

Policy option 3
Strengthening of institutions responsible for enforcement of maritime regulations

Appropriate enforcement of laws and conflict resolution mechanisms are needed, in order to fulfil the objectives of maritime environmental legislation. There has been a failure to enforce legislation due to corruption and the misuse of enforcement powers, which often leads to mistrust and poor relationships with the public, and consequently a lack of cooperation (see Root cause: Weaknesses in legislation and regulations, and lack of compliance with agreements). There is a need to build capacity in enforcement agencies to tackle these fundamental problems, through training programmes and the acquisition of appropriate staff and technologies. Once these agencies have adequate capacity they will be able to ensure strict adherence to legislation. For example, increased monitoring will reduce the falsification of oil record books and ensure onboard pollution control and monitoring devices are operational and fully maintained in accordance with MARPOL Annex I (oil or bilge dumping) or Annex V (waste discharge).

There are a variety of surveillance techniques that can be employed to detect pollution offences. Most oil discharge violations are detectable if the oil is at concentration higher than 15 ppm, which is the maximum

allowed by MARPOL. The detection can be made by airplane, coastal towers, or by observing the oil slick in the wake of vessels from another boat. These techniques require a significant budgetary allocation that has not been received to date. More recent techniques involving satellite observations are more reliable. Satellites can give real-time imagery in order to identify the nature, quantity and extent of the waste being discharged from a boat, track escaping boats and record in video the timing and length of the discharge. Access to the paid services of the observation satellites by the countries of the Caribbean Islands region or by a regional organisation would allow effective and timely detection of pollution offences and accidental spills, at a lower premium than other techniques. These technologies can provide evidence that can be used when prosecuting MARPOL violating vessels, and its efficiency will subsequently deter other polluters.

Regional cooperation in enforcing Annex I, IV and V of MARPOL 73/78 (oil pollution, oil discharges, waste discharge) will bring mutual benefits for every country in the region, due to the transboundary nature of marine pollution. Regional enforcement of the convention will prevent ships violating the convention avoiding enforcement agencies. A regional approach would also facilitate multi-lateral exchange of information on recorded violators, through basic technologies such as a regional database. Such stringent and integrated management would make it difficult to evade prosecution and would be extremely dissuasive of any attempt to violate the agreement.

Although no large-scale enforcement agency is foreseen in the near future, the establishment of an organisation to facilitate coordination between the various enforcement bodies of each nation would ensure greater integration. Prior to integration, national maritime enforcement agencies should enforce regulations within their own territorial waters.

Political and legislative framework

Currently, the nations of the Caribbean Islands do not have the power to prosecute a vessel from a flag state outside of the region and therefore have little incentive to pursue offending vessels. The strengthening of the regulatory framework, as outlined in Policy option 2, will therefore need to complement this policy option.

Political feasibility

Government commitment to enforcing maritime regulations may prove difficult to maintain, as the environmental, economic and health benefits that will be achieved by reducing ship-generated pollution will only be realised in the long-term. The enforcement agencies may be reluctant to accept institutional reforms and unwilling to utilise new technologies. A regional organisation may be interested in utilising satellites to improve coordination and environmental monitoring in the region. The region's countries will have access to pollution monitoring satellite technologies whilst benefiting from economies of scale and cost-efficiency.

Administrative feasibility

The countries of the Caribbean Islands region lack the funding, the training and the technology to efficiently monitor MARPOL violations (see Root cause: Limited technological resources). However, an enforcement agency may use the fines paid by offending vessels to become self-sustaining and finance its own expansion, and eventually acquire capabilities to enforce maritime law beyond national territorial waters. However, strengthening the enforcement agencies may prove difficult whilst corruption is prevalent, and as a result investments may not achieve their intended objectives.

An appropriate organisation would need to be identified or created to coordinate any regional initiative. Coordination may prove problematic due to the multiplicity of the various maritime enforcement agencies and their differing procedures and abilities. In many countries there is an absence of such agencies.

Efficiency

The strengthening of institutions responsible for enforcement of maritime regulations will ensure vessels navigating the waters of the Caribbean Islands region, abide by international maritime law. In strengthening the capacity of enforcement agencies there will be greater monitoring of illegal discharges.

There would need to be significant investment in pollution surveillance equipment in order to adequately monitor pollution. For example, satellite services although very effective, are nevertheless expensive and it would make more sense that such services be negotiated in bulk and made available to a larger number of countries with the same concern. However, despite considerable initial investments, capital raised by fining offending shipping companies make the policy option economically feasible in the medium to long-term.

Pollution in Havana Bay

Definition of the problem

The GIWA assessment, in accordance with previous UNEP-sponsored assessment programmes (e.g. UNEP 1999b), identified land-based activities as the primary source of coastal pollution and destruction of coastal habitat such as coral reefs and mangroves. Havana Bay, Cuba, was identified as a location particularly degraded as a result of land-based sources of pollution.

The Causal chain analysis identified the root causes of water pollution in the Havana Bay as:

- Economic: Rapid and uncontrolled economic growth; trade restrictions have narrowed the market for Cuban products and restricted investments in the country; limited funding opportunities for infrastructure renovation.
- Knowledge: Lack of monitoring and assessment; limited public awareness of benefits of protecting the environment.
- Legal: Weak legislation and lack of compliance with regional agreements.
- Governance: Weak institutional frameworks for the integrated management of Havana Bay; limited stakeholder participation.
- Technology: Obsolete sewage infrastructure; lack of appropriate efficient and cost effective pollution prevention technologies.

Policy options need to address important organisational, structural, managerial, and political failures that have led to poor planning, limited access to technology and equipment and a lack of resources available for enhancing the Bay environment. The absence of sewage disposal services and treatment in all the countries in the Caribbean Islands region is a key priority needing urgent attention.

Due to the magnitude of the pollution problem and the circulation by marine currents, the problem of pollution in one bay becomes the transboundary problem of a much larger region. Management has traditionally not considered the transboundary nature of pollution, and subsequently mitigation initiatives have focused on addressing domestic impacts, rather than those occurring outside of national jurisdictional limits in international waters. There is a growing realisation of the negative externalities imposed by the release of transboundary contaminants, and the value to the region of demonstrating national approaches to the mitigation of these contaminants. Cuba, like other countries in the region, is seeking to introduce abatement programmes for these pollutants (GEF/UNDP/UNEP 1999).

The Cartagena Convention for the Protection and Development of the Marine Environment in the Wider Caribbean region (UNEP 1983) provides a legal framework to address transboundary pollutants. Under Article 4, parties are invited to, individually or jointly, take measures "to prevent, reduce and control pollution and ensure sound environment management". Although this agreement provides a framework to tackle transboundary pollution, Cuba lacks the capacity to implement and enforce its obligations.

Governmental initiatives aimed at addressing land-based sources of pollution in Havana Bay

At the regional level, a protocol to the Cartagena Convention on land-based sources of marine pollution (LBS Protocol) was adopted in 1999. The contracting parties to the Convention have utilised various studies on contamination in the Wider Caribbean in developing this protocol, with an aim towards regulating the sources most impacting the Wider Caribbean region. The main body of the LBS Protocol sets forward general obligations, institutional responsibilities, and procedures for acceptance and ratification. Specific technical annexes establish priority source categories and activities and contaminants of concern in the convention area; factors to be used in determining effluent limitations; and management practices, and specific obligations applicable to specific pollution sources in the region. The LBS Protocol also obligates the signatories to develop national plans to implement best management practices for non-point sources and to implement coastal zone management programmes. Cuba has not ratified the Protocol.

The Cuban government has also demonstrated its commitment to reversing degradation trends in Havana Bay through the implementation of a series of initiatives aimed at addressing contamination problems in the Bay. The most significant activities may be summarised as follows (GEF/UNDP/UNEP 1999):

- A pollution-intensive old alcohol distillery has been deactivated;
- Construction of sewage treatment plants in the Quibu River Basin and the Almendares River Basin;
- The design of a new submarine outfall in Playa del Chivo;
- Plans for the management of solid wastes and oil spills in Playas del Este;
- Construction of a ship waste incinerator;
- Supply of equipment for the port cleaning unit, including oil skimmers and barges for liquids and solids;

- Construction of a solid waste trap to clean the Luyano River;
- Planning and design of waste treatment plants for the Luyano and Martin Perèz river basins, and the Tadeo stream;
- Design of a solid waste management system for Havana Bay;
- Design of a comprehensive management system for solid and liquid ship waste.

Additionally, in 1998 the Cuban Government established a Governmental Working Group concerned with sanitation, conservation and development in Havana Bay. The group is chaired by the Ministry of Transportation and the Government of the City of Havana and the Ministry of Science, Technology and Environment are vice-chairs. This group are acting as a port authority until the new rules and regulations are approved. (GEF/UNDP/UNEP 1999). Cuban environmental protection and biodiversity projects are financed by the National Fund for Environment created following the promulgation of Article 67 of the Law of the Environment and in the Joint Resolution No. 1/99 of the Ministries of Finances and Prices and of Science, Technology and Environment (Sardiñas 2001).

Major projects executed in Havana Bay

Most of the projects implemented so far have been initialised by the Cuban Government and funded by either GEF, development agencies of foreign governments (such as Canada's CIDA) or NGOs. Projects in Havana Bay regarding urban and water rehabilitation include:

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

This programme was implemented in 1998 by UNDP with GEF funds in cooperation with the governments of Colombia, Costa Rica, Cuba and Jamaica. The Cuban component of the project included an assessment phase and an initial phase of clean-up that included treatment, dredging, solid waste removal, monitoring and capacity building. This project was expected to last for 15 years but became the project Demonstration of Innovative Approaches to the Rehabilitation of Heavily Contaminated Bays in the Wider Caribbean.

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

This GEF-UNDP project is a follow up to the Pilot Phase PRIF project called Planning and Management of Heavily Contaminated Bays and Coastal Areas in the Wider Caribbean. The project sites are Havana Bay (Cuba), Puerto Limon (Costa Rica), Cartagena Bay (Colombia) and Kingston Harbour (Jamaica). As a follow-up to the PRIF and ongoing baseline, the GEF project is leveraging national co-financing to help Cuba and Jamaica overcome a number of key barriers to the adoption of best practices that limit the contamination of their national and adjacent international waters. The project is implementing 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, Kingston Harbour and the adjacent Wider Caribbean. It will further strengthen and/or help create new institutions responsible for the rehabilitation and sustainable management of the two bays (GEF/UNDP/UNEP 1999).

Luyano River Water Treatment Project

The Cuban government, UNDP and GEF are currently running a rehabilitation project around the Luyano River, which includes the construction of a wastewater treatment plant. As part of the initiative, the Government of Norway is providing funding through UNDP for construction of "zero emission" homes near the Bay that release no pollutants. UNDP has supported ongoing efforts to clean up the Bay since 1994. The Government of Belgium has also provided funding for the clean up through UNDP, and Japan is also considering making a contribution.

Revitalisation of the Metropolitan Park of Havana (Parque Metropolitano de la Habana)

This joint Cuban-Canadian initiative involved the planning, implementation, monitoring and evaluation of one of Havana's largest environmental projects. The project, which ran from 1995 and was completed in 2002, aimed to revitalise a 700 ha area around the lower basin of Almendares River, a large urban river highly polluted by industrial dumping, solid waste and sewage discharges, and sedimentation caused by deforestation. Using community-based strategic planning approaches, the project engaged civil society in planning and built local government-community partnerships for implementation as well as authority strengthening. The Canadian International Development Agency (CIDA) was the main funding partner for this project. The Canadian Urban Institute, the Cuban Group for the Integrated Development of the Capital and Oxfam in Canada and in Belgium were the main implementing organisations (Canadian Urban Institute 2003).

Construction of policy options

An initial list of policy options aimed at addressing the root causes of pollution in Havana Bay was developed as follows:

- Create a Port Authority in Havana Bay with governance and executive powers over the enforcement of land use and environmental regulations around the Bay;

- Monitor environmental concerns and development around the Bay;
- Undertake a comprehensive assessment report on sewage contamination;
- Import sewage treatment technology and appropriate training with assistance from international organisations;
- Disseminate information and establish awareness campaigns on bay environmental issues;
- Strengthen the legal framework regulating medical waste management in order to promote appropriate medical waste disposal;
- Import cleaner industrial processes and technologies;
- Strengthen the framework regulating industrial operations by introducing new and enforceable environmental standards;
- Investigate the use of recycling technologies to be employed by waste management in Havana;
- Construct a plan of action for the full implementation of the Cartagena Convention;
- Investigate a possible taxation scheme for the tourism industry to contribute to the financing of waste disposal infrastructure in Havana;
- Create a board of stakeholders and experts to discuss issues and make recommendations regarding the management of activities in the Bay. The Board will issue recommendations to: (i) the Port Authority (if created); (ii) the Havana district government; and (iii) the national government.

Performance of chosen policy options

Policy option 4
Create a Havana Port Authority

There is a need to develop and strengthen national environmental institutions responsible for the management of the Havana Bay (GEF/UNDP/UNEP 1999). There is currently a fragmentation of responsibilities that makes coordination difiicult and there is no organisation that can oversee the rehabilitation of the Bay (see Root cause: Weak institutional frameworks for the integrated management of Havana Bay).

This policy option would create a Havana Port Authority through the merger of the various managerial and regulatory organisations concerned with the management of the Bay. The Authority would have political power and authority over existing institutions involved in the rehabilitation of Havana Bay. The new inter-institutional organisation should contain relevant stakeholders and can become the focal point for communications with funding and implementing organisations, and to serve as liaison on the technical aspects of the implementation of the LBS Protocol. The Port Authority should support Cuba's national action programme aimed at reducing contamination in the Bay.

The Authority would be entrusted with environmental control and sustainable development of the Havana Port, facilitating an integrated approach, in order to prevent sector domination in the administration of environmental initiatives. Stakeholders in the management of the Bay should be encouraged through the Authority to develop environmental awareness, necessary skills and capabilities, in order to improve the environmental management of Havana Bay. Unifying governance over harbour operators under a single Port Authority would create more incentives to reduce environmental degradation caused by shipping operations in the Bay. It would also be liable to protect environmental standards and responsible for monitoring, managing and planning all activities in and around the Bay. The organisation once established will be able to effectively plan and coordinate projects aimed at reversing the environmental degradation trends in Havana Bay.

Legal and institutional framework

Legislative and regulatory changes may be necessary to enhance the coordination of institutional mechanisms. Recommendations will be needed regarding changes in existing legislation to enhance the integration and coordination of the relevant institutions, projects and programmes concerned with rehabilitating Havana Bay. The policy option should be implemented in accordance with the Cartagena Convention and its protocols.

Political feasibility (stakeholder analysis)

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. It has placed a high priority on implementation of the Caribbean Action Plan, and, as a sign of commitment to regional action, has ratified the Cartagena Convention but not the LBS Protocol. However, there is a risk that the government may not realise the long-term benefits of an integrated approach and that stakeholders are not actively engaged.

Consultations should be undertaken with relevant stakeholders during the planning and development of a new Authority. The institutional framework will be strengthened by involving the different stakeholders in constructive discussions and through establishment of appropriate incentive structures. Information about the policy option should be

disseminated to stakeholders and the public. However, the participation of stakeholders may prove problematic given Cuba's highly centralised political system, with key decisions traditionally made at the national level.

Administrative feasibility

The policy option would require financing from funding agencies, such as the GEF, as well as from Cuba in kind. An implementing agency and focal point for the planning and implementation of the policy option would need to be identified. Such a policy option would require significant investment for necessary infrastructure, technical staff and training costs. The Port Authority could operate under both the Ministry of Transport and the Ministry of Environment (CITMA).

Strategic planning studies should be used to ascertain the functional structure, training, adequate management necessary for the successful creation of the Port Authority. Assessments will need to determine the precise linkages between environmental and socio-economic systems, which the design and planning of the newly formed Port Authority can be based upon.

Efficiency

This policy option primarily addresses the root causes of weak institutional frameworks for the integrated management of Havana Bay, but will also act as a focal point for the implementation of international agreements (partly addressing Root cause: Weak legislation and lack of compliance with regional agreements). Additionally, the creation of the Authority will facilitate stakeholder involvement (see Root cause: Lack of stakeholder participation). The main objective will be a strong national environmental institution responsible for management of the Havana Bay.

The creation of a new institution is often costly and logistically challenging. However it is anticipated, that these costs will be justified by the resultant environmental and economic benefits.

Policy option 5
Develop sewage treatment and collection infrastructure

Local authorities should be actively encouraged to fully participate and implement future sewage infrastructure improvements, based upon the demonstrations and the success of the sewage treatment plant, constructed as part of the GEF project entitled "Demonstrations of Innovative Approaches to the Rehabilitation of Heavily Contaminated Bays in the Wider Caribbean" (GEF/UNDP/UNEP 1999). The treatment technologies used in the GEF project could be modified as necessary, and may be replicated in other districts of Havana Bay. Future sewage treatment plants should be designed and operated in accordance with the Global Programme of Action for Land-based Activities (GPA) and any regional standards adopted by the Contracting Parties resulting from adoption of the LBS Protocol to the Cartagena Convention. Improvements in the environmental status of Havana Bay can be achieved by building upon the GEF project by transforming it into a national or regional programme.

The World Summit on Sustainable Development (in Johannesburg 2002) identified the special needs of Small Islands Developing States (SIDS) within its Johannesburg Plan of Implementation. Section VII which included a recommendation to "Provide support to Small Island developing States to develop capacity and strengthen efforts to reduce and manage waste and pollution and building capacity for maintaining and managing systems to deliver water and sanitation services in both rural and urban areas" (WSSD 2002).

In the SIDS situation it is frequently not realistic to try and develop a centralised sewage treatment system. The capital cost of such a system is high and the maintenance is intensive and expensive. In Cuba, the obsolete domestic sewage system makes it difficult for it to be directly linked up to a central system. There are feasible and cost-effective alternatives, which can be developed on a community-by-community basis that, are very simple to maintain. The technology for this is also highly applicable to individual resorts and hotels (GEF 2004b). These approaches and mechanisms, once developed and proven, could be of tremendous advantage to other countries in the Caribbean Island region with similar problems. Cuba has several ongoing development programmes for alternative, environmentally sound technologies related to wastewater treatment. Demonstrations of more sustainable and cost-effective technologies, which are expected to be applicable to other countries in the region, are urgently needed (GEF/UNDP/UNEP 1999).

Legal and institutional framework

The implementation of the GEF project was the responsibility of the Ministry of Science, Technology and Environment, through its Delegation for the City of Havana, and coordinated 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 (GEF/UNDP/UNEP 1999). If Policy option 4 is developed, the newly formed Port Authority will have the institutional capacity in environmental management to implement the policy option in cooperation with the above institutions, which will now have greater capacity following the

completion of the GEF project. The policy option should be coordinated with and fulfil the relevant articles and protocols of the Cartagena Convention.

Political feasibility (stakeholder analysis)

The Government of Cuba has demonstrated its commitment to addressing pollution from the discharge of domestic sewage. It is anticipated that the government would wish to improve its sewage system further. There may be conflicts among institutions/stakeholders of various national and local authorities. However, Cuba does not have any major political conflicts.

Public education and awareness campaigns will be necessary to ensure the public are motivated to participate in such a project. The inclusion of stakeholders in the design and implementation of the policy option would ensure the longevity of the project. The demonstration already undertaken by the GEF project included a high level of stakeholder participation, and disseminated information to the public and relevant stakeholders.

Administrative feasibility

Cuba does not possess the necessary financial resources to implement such a policy option. There will be a need for international funding. Appropriate technologies should be employed which require low equipment and high labour, while still utilising a commercial technology for sewage treatment plants with nutrient removal. The increasing tourist revenues anticipated from the improved conditions in the Bay may act as an incentive for the government to invest in further sewage treatment works.

Project activities should be constantly reviewed and effective information exchange of experience and know-how from the GEF sewage treatment works and the new sewage infrastructure developments proposed in this policy option. In accordance with Article 7 of the LBS Protocol, an Environmental Impact Assessment should be undertaken during the planning and implementation of any project.

Efficiency

This policy option primarily addresses the root causes of obsolete sewage infrastructure and the lack of appropriate efficient and cost effective pollution prevention technologies. It will also encourage stakeholder involvement and increase the public profile of environmental issues and demonstrate the benefits that can be achieved by controlling pollution. Ultimately the policy option will reduce the quantities of untreated or insufficiently treated domestic sewage entering the Havana Bay, in order to improve the environmental quality and health status of the Bay, and to limit the contribution it makes to the pollution load of the waters of the Caribbean Islands region. Such a sewage infrastructure project would require considerable financing, but it is anticipated that there is an urgent need to address this pollution issue.

Figure 25 View of Havana Bay.
(Photo: CIMAB)

Policy option 6
Converting industries to environmentally sound technologies

This policy option is based on guidelines made by the UNEP International Environmental Technology Centre (UNEP/IETC 2003).

This policy option aims to promote to industries the adoption of Environmentally Sound Technologies (ESTs) to significantly improve the environmental performance relative to technologies currently employed in Greater Havana. By employing ESTs industries will reduce their contribution to the pollution of Havana Bay and its inflowing rivers including the Luyano and Martin Perez rivers. In addition these technologies will allow industries to use resources in a more sustainable manner, recycle more of their wastes and products, and handle all residual wastes in a more environmentally acceptable way than the technologies for which they are substitutes. As stated in Chapter 34 of Agenda 21, ESTs protect the environment, are less polluting, use resources in a sustainable manner, recycle more of their wastes and products, and handle all residual wastes in a more environmentally acceptable way than the technologies for which they are substitutes (UNCED 1992).

ESTs in the context of pollution are process and product technologies that generate low or no waste, for the prevention of pollution. They also cover end of the pipe technologies for treatment of pollution after it has been generated. Encouraging the adoption and use of ESTs would require a combination of voluntary approaches and a regulatory framework that fosters both innovation and environmental accountability. The Cuban government would have to enact policies that lower the costs and stimulate a demand for ESTs, in order for industries to adopt such technologies.

The World Summit on Sustainable Development (WWSD 2002) identified the special needs of SIDS within its Johannesburg Plan of Implementation. Section VII which included a recommendation for the international community to transfer environmentally sound technologies and provide assistance for capacity building. Additionally, at an Inter-Regional Preparatory Meeting (The Bahamas, January 2004) leading up to the Review of the Barbados Programme of Action for SIDS (BPoA +10) a primary need of SIDS was that the international community should provide support to SIDS for the development, transfer and implementation of appropriate technologies.

This policy option could be designed and implemented by CITMA, the Municipality of La Havana and the Havana Port Authority. Such programme would include an awareness campaign aimed at industries to give them the opportunity to convert on a voluntary basis and at the local population of Havana Bay, so that greater pressure is placed on industry to convert to cleaner technologies. The programme would be targeted at industries such as energy, cargo transport, food processing, paper, and medical centres.

Legal and institutional framework

Cuba's ability to access cleaner and more efficient technologies has been hindered by a reliance on highly polluting Soviet technology for 30 years, and US economic restrictions (See Root cause: Economic and political particularities). There is also reluctance from industries to adopt cleaner technologies on a voluntary basis, due to the economic costs involved.

Therefore legislation and incentives may be required to ensure industries are financially able to adopt these technologies and that they are available to import. To guide this process, actions are urgently needed to establish policy objectives and priorities within a strategic framework which are supportive of environmentally sound technologies, ultimately leading to their adoption and use. Policy measures should consider a mix of approaches to motivate action and penalise inaction within an overall policy framework that considers both positive and negative drivers for voluntary action.

The Cuban government has already established economic mechanisms for the prevention of pollution through the Law of the Environment in its Chapter IX, Articles 61 to 64, and in accordance with it, Resolution No. 13.99 of the Ministry of Finances and Prices was promulgated. This Resolution establishes the reduction or exemption from duties on the import of technologies and equipment for the control and treatment of polluting effluents (Sardiñas 2001).

Political feasibility (stakeholder analysis)

The Cuban government has demonstrated its commitment to promoting the use of environmentally sound technologies through the promulgation of Resolution No. 13.99. Broad-based consultations with experts and stakeholders are necessary to ensure the long-term acceptance and commitment to such a programme. Governments, the private sector and the public must all be involved.

The feasibility of industries adopting technologies may prove problematic and therefore policies that lower costs and stimulate a demand for ESTs may be necessary to achieve environmental benefits. Appropriate education and awareness campaigns would strengthen the ability of communities to demand producers to take action to control the quantities of pollution released during production. Adoption by industries of ESTs will thus be more likely.

Administrative feasibility

The environmental performance of the new technologies employed in Havana Bay will be influenced by factors such as the availability of supporting infrastructure and human resources for the management, monitoring and maintenance of the technology.

Appropriate technology and associated equipment should be employed, which is relatively simple to operate and suitable for local maintenance and repair. Simpler technologies and equipment are less dependent on specific components and are generally more adaptable to market fluctuations than advanced technologies. The adoption of cleaner technologies may be less problematic in Cuba than in many developing countries due to the number of highly qualified scientists, that can adapt technologies to suite the specific needs of industries in Havana. The adoption and use of the technologies must reflect local circumstances and meet the local needs and priorities of Havana Bay, to increase the likelihood of successful application.

In order that the industries of Havana Bay have the necessary technical and management skills, capacity building should be undertaken including local governments, institutions and stakeholders, industrial organisations and users. Policy makers need to have adequate capacity to identify, assess, evaluate and select appropriate ESTs for industries. Currently the link between economic development and environmental technologies is not well understood by these policy makers in Cuba.

Efficiency

It is anticipated that the adoption of environmentally sound technologies will result in a reduction in industrial pollution entering the Havana Bay and thus improve water quality and reduce the impacts on the ecology and the people of the Bay. The use of cleaner technology would minimise the volumes and hazards of gaseous, liquid and solid wastes; reduce the risk of accidents involving chemicals and processes; and consume less raw materials, water, and energy; and use substitute chemicals and processes that are less hazardous to human and ecological health (Fitzgerald 2003). These technologies will also allow industry to recycle what was previously waste and generate revenues by supplying other industries and sectors. Investments by industries in the use of ESTs could be relatively modest in comparison to overall capital investments.

Through international exchange of experiences and technologies, other contaminated bays in the Caribbean Islands region, such as Kingston Harbour (Jamaica), may adopt similar environmentally sound technologies based on demonstrations in Havana Bay.

However, the new technologies can have negative impacts on the environment as well as positive. Widespread use of new materials and large production processes can lead to unpredicted health impacts. In order to observe significant environmental improvements, a programme of converting industries to cleaner technologies would have to be sustained after the initial implementation of the policy option.