

Executive summary

The Caribbean Islands GIWA region 4 is located in the Wider Caribbean region, to the southeast of the Gulf of Mexico, west of the Atlantic Ocean and north of the Caribbean Sea. The region comprises the seas and islands of the Greater Antilles group, including the largest Caribbean islands of Cuba, Hispaniola (divided between Haiti in the west and the Dominican Republic in the east), Jamaica, Puerto Rico and the Archipelago of The Bahamas.

The Caribbean Islands region possesses a diverse and irregular coastline that gives rise to a unique ecosystem formed by the integration of coastal features including harbours, bays, beaches, rocky shores, estuaries, mangrove swamps, cays, and coral reefs. The rivers of the region have very short courses with limited flow rates, and there are relatively few lakes, which are of limited size. Groundwater is found mostly in fissured carbonated rocks; karstic aquifers are available throughout Cuba, Hispaniola and Jamaica and supply the local population with the bulk of their drinking water. Most of the island populations inhabit the coastal plains, which also support the majority of the economic activities. The marine-coastal interface is characterised by a high biodiversity, with a multiplicity of tropical ecosystems and landscapes, and a varied autochthonous flora and fauna. There is a complex interaction of three distinct ecosystems: coral reefs, mangroves, and seagrass beds.

The countries in the Caribbean Islands region show a number of similarities in terms of geology, geography, climate and colonial history. The Caribbean Islands region has an estimated population of 34 million, with Cuba being the most populous country, and also the largest in terms of area, and The Bahamas having the least populated country. The region has experienced considerable economic growth, with GDP per capita increasing by 35% between 1975 and 1995. The countries of the region are intermittently dependent on the inflow of foreign currency for their economic growth. For example, the predominant economic activity for many countries in region, particularly the Bahamas and Jamaica, is tourism.

Some governments in the region have begun to realise the importance of the environment; at the regional level, the Caribbean Action Plan was adopted in 1981. The Cartagena Convention, was adopted in 1983 as the legal instrument for the implementation of the Caribbean Action Plan. The Convention includes: the Oil Spills Protocol; the Specially Protected Areas and Wildlife (SPAW) Protocol; and the Land-Based Sources of Marine Pollution (LBSMP) Protocol. The governments of the nations and territories of the Wider Caribbean region established the Caribbean Environment Programme (CEP) in support of the Convention and its Protocols.

The GIWA assessment evaluated the relative importance of various impacts on the international aquatic systems of the Caribbean Islands region. The environmental and socio-economic impacts were assessed for present and future conditions, and overall impacts and priorities were identified. The assessment considered all the concerns as moderate. The priorities were therefore assigned based on common judgement built on discussion during the GIWA Workshop and from further assessment of the individual scores. The concerns for the Caribbean Islands region were ranked in descending order:

1. Pollution
2. Freshwater shortage
3. Habitat and community modification
4. Unsustainable exploitation of fish and other living resources
5. Global changes

The GIWA assessment ranked pollution as the priority concern due to its prevalence in many locations in the region and the magnitude of its impacts. Suspended solids were considered to be the most severe pollution issue. Human activities including deforestation, inadequate management of agricultural land, urbanisation, and various pollutants, have increased erosion rates and resulted in greater sedimentation and turbidity in streams, rivers and coastal waters. The prevalence of

suspended sediments has decreased biodiversity, severely degrading shallow coastal waters.

The predominant sources of nutrient contamination in the region include poorly or untreated sewage, agriculture and industrial activities. Eutrophication has been severe in the bays of the region, particularly Havana Bay and Kingston Harbour. Oil spills pose a significant threat, originating from the petrochemical industry, the transport of oil in tankers and from the extraction and refinement of petroleum. The countries of the region have inadequate solid waste collection systems, and as a result, many citizens dispose of their waste in mangrove swamps, drainage channels and along riverbanks, and consequently pollute rivers, streams, and eventually the coastal waters into which they drain. Furthermore, due to the expansion of industrial and mining activities and the increased application of agro-chemicals there has been greater contamination of surface water and aquifers by chemical toxins and heavy metals.

Demand for freshwater has grown rapidly in the region as a result of demographic growth, and from industrial, agricultural and tourism expansion. In many countries there have been significant reductions in river discharges and a loss of deltaic wetlands and riparian vegetation. At the same time, human activities are polluting existing water supplies. Furthermore, the overabstraction of water from aquifers is exacerbating salt water intrusion of groundwater supplies.

The economic activities in the region, particularly fishing and tourism, are highly dependent on habitats such as coral reefs, mangroves and sea grass beds. These habitats are being impacted by human activities, by for example destructive fishing practices and the discharge of ship-generated wastes into the marine environment, land-based sources of pollution, land clearance for coastal development; and tourism activities from for example damage caused by anchors and divers.

Large numbers of small-scale fishers intensely exploit the fishery resources for a source of food and employment, and to supply the tourist and export markets. These pressures have led to the widespread depletion of these resources including lobster, finfish, conch, and small pelagics, and as a result many local fisheries had collapsed by the mid-1980s. In addition fishers are using increasingly destructive methods to fish the declining resource.

The region, due to its morphology and geophysical location, is very vulnerable to the impacts of global changes, and the associated natural disasters, such as storms and hurricanes, including El Niño Southern

Oscillation (ENSO) events. The impact of ENSO events on coral reefs is particularly significant, since the survivability of reefs is dependent on temperature and salinity stability in coastal waters. The natural capacity of ecosystems to adapt to future climate changes may have been weakened by anthropogenic stresses.

The Casual chain analysis determined the root causes of the prioritised pollution concern by performing separate analysis on land-based sources of pollution and marine traffic related pollution. For the latter, the entire region was studied, but only Havana Bay was selected as a demonstrative hotspot which has experienced significant environmental degradation as a result of land-based sources of pollution.

Maritime traffic contributes significant quantities of pollutants to the marine environment within close proximity of the coastline, and has increasingly threatened the environmental and socio-economic integrity of the islands.

The root causes behind maritime traffic in the Caribbean Islands region were as follows:

- *Geophysical and geopolitical characteristics:* The region is traditionally vulnerable to shipping collisions and accidents due to the intensity of marine traffic transiting its narrow channels and shallow waters.
- *Economic:* The economies of the Caribbean Islands region are dependent on income from foreign sources, and often countries accept a certain amount of environmental violations in order to secure preferential tariffs. All of the countries in the Caribbean Islands region lack the hard currency necessary to execute environmental projects and to invest in waste management infrastructure at ports. The cruise industry is expanding rapidly, but there are no economic incentives for cruise ships to dispose of their wastes at ports.
- *Knowledge:* There is a lack of readily available information and monitoring of discharges for policy makers to make informed decisions to address marine traffic related pollution. The general public continues to lack a sufficient understanding of the relationship between development and environmental protection, and of the short and long-term benefits and disadvantages of economic and environmental protection measures.
- *Legal:* There are weaknesses in legislation and regulations at both the national and international level. There is a generous margin for ships to avoid compliance with the MARPOL agreement, for example, it is difficult for the polluting vessels to be arraigned in a court by the country where the pollution impacted, as violations and offences should be prosecuted under the jurisdiction of the Flag State.

- *Governance:* Governments in trying to achieve rapid economic growth, implemented unsustainable development strategies. Environmental policies, often take a low priority when they appear to impede short-term economic development. National governments often fail to meet their executive responsibilities of the MARPOL agreement, largely due to a lack of political commitment in addressing pollution from marine traffic. Despite the potential risk of a large spill, governments have not responded with adequate contingency planning and response capabilities.
- *Technology:* The Caribbean countries lack the funding, training and technology to efficiently monitor MARPOL violations, and there is a general absence of marine traffic control services including navigation aids and surveillance.

The following policy options were discussed for marine related pollution in the entire Caribbean Islands region:

- *Policy option 1: Providing sufficient waste receiving and treatment infrastructure at ports:* 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 for MARPOL 73/78 Annex V wastes. This policy option will follow-up activities highlighted as necessary in the implementation completion report (ICR) for the WCISW Project (June 25, 1999).
- *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 makes it imperative to have effective legal tools in order to regulate their activities and minimise their impact on the region’s populations and ecosystems. 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.
- *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 is a need to build capacity in enforcement agencies through training programmes and the acquisition of appropriate staff and technologies. There should be greater utilisation of surveillance techniques to detect pollution offences in order to prosecute polluting shipping

companies and to deter others. Once enforcement agencies have adequate capacity they will be able to ensure strict adherence to legislation.

Havana Bay is a well-documented example of where land-based pollution from the surrounding urban and industrial landscape has contaminated the coastal and marine environment, with transboundary consequences for the entire region. The root causes behind land-based pollution were as follows:

- *Economic:* Major economic growth during the 1970s and 80s led to the uncontrolled development of Havana Bay. The adoption of cleaner technologies by industries surrounding the Bay has been hindered by 30 years of importing highly polluting Soviet Union technology and economic restrictions imposed by the US trade barrier. Furthermore, Cuba lacks the necessary funds to update the Havana sewage system, and improve industrial and waste treatment infrastructure.
- *Knowledge:* Monitoring, control and, to a lesser degree, assessment activities are still weak and insufficient. Although there are highly qualified personnel, there continues to be a lack of resources, and scientific activities are not integrated, with insufficient certification of laboratories. In general, the public lack an understanding of the importance of preserving the environment and are not aware of the international implications of the pollution problem in Havana Bay.
- *Legal:* The degree to which legal instruments are applied in the practical management and control of environmental pollution in Havana Bay is generally weak. Although Cuba has signed the Cartagena agreement on land-based pollution, the government has allocated insufficient human and financial resources to meeting its obligations.
- *Governance:* Management is highly fragmented and there is an absence of an overall institution responsible for the rehabilitation of the Bay. Stakeholders are not consulted during the planning and implementation of development projects.
- *Technology:* There are currently inadequacies in the infrastructure for the gathering, treatment and final disposal of domestic sewage. Industries lack appropriate, efficient and cost effective pollution prevention technologies.

The following options were discussed for land-based sources of pollution in Havana Bay:

- *Policy option 4: Create a Havana Port Authority:* The Port Authority would be created to plan, oversee and coordinate the rehabilitation of the Bay. It would have political power and authority over existing institutions concerned with environmental management in Havana Bay. The new institution can become the

focal point for communications with funding and implementing organisations, and serve as a liaison on the technical aspects of the implementation of the LBS Protocol. The institution, once established, should have the capacity to implement further environmental initiatives, for example policy options 5 and 6, and facilitate stakeholder participation in future programmes.

- *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'. The policy option aims to 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.
- *Policy option 6: Converting industries to environmentally sound technologies:* The adoption of Environmentally Sound Technologies (ESTs) by industries should significantly improve their environmental performance relative to technologies currently employed in Greater Havana. ESTs will reduce their contribution to the pollution of Havana Bay and its inflowing rivers by disposing all residual wastes in a more environmentally acceptable way than the technologies for which they are substitutes. It is anticipated that such technologies will also offer a commercial advantage to industries, by using less resources, and by recycling more of their wastes and products.

The provision of sufficient waste reception facilities and additional pressure placed on the shipping industry by strengthened legislative framework and enforcement capability, can reduce marine pollution in the Caribbean Islands region by preventing and discouraging indiscriminate disposal waste off-shore. The policy options presented for Havana Bay may be replicable at other sites in the region as other countries in the Caribbean Islands region face many of the same environmental problems found in this bay.