Conclusions and recommendations

This report presents the results of the GIWA assessment of the transboundary waters of region 4 Caribbean Islands. The assessment considered pollution as the priority concern of the region. Pollution is mainly caused by the discharge of ship-generated, municipal and industrial solid waste and wastewater (including sewage), run-off from agricultural fields, and contamination from oil and gas extraction, refining and transport. Pollution is a common problem that is degrading the region's marine and coastal environment, and aversely affecting the economic activities of the region.

Despite the region's tropical climate with relatively high rainfall, freshwater shortage is becoming an increasing concern. This can be attributed to increasing demand as result of rapid population growth and the expansion of water intensive economic activities such as irrigated agriculture and tourism. Saline intrusion has occurred in many of the region's aquifers as a result of overabstraction, and is predicted to increase due to sea level rise and further exploitation.

A variety of human activities have modified critical habitats, such as coral reefs, mangroves and sea grass beds. This has been primarily attributed to the clearance of land for coastal developments, pollution (land-based sources and from marine activities), destructive fishing practices and tourism activities.

Fisheries resources in the region have been affected by the intensity and nature of fishing activities, and the destruction and modification of habitats. Most commercially valuable species are being overexploited and as competition between small-scale fisheries intensifies, increasingly destructive fishing methods are being employed.

In the Caribbean Islands region, impacts from global changes are not considered at present to be critical, as the impacts have not been permanent. However, the region, comprised of Small Island Developing States (SIDS), is considered to be particularly vulnerable to future climatic changes. Predicted increases in sea temperature may cause further coral bleaching, and sea level rise will exacerbate coastal erosion and flooding events. The natural capacity of ecosystems to adapt to climate changes may have been weakened by stresses placed on them by the other GIWA concerns.

The Causal chain analysis (CCA) performed 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 hot-spot which has experienced significant environmental degradation as a result of land-based sources of pollution.

The root causes behind pollution were identified to serve as a foundation for the selection of policy options. Maritime traffic contributes significant quantities of pollutants to the marine environment of the Caribbean Islands region with vessels discharging for example oily residuals, suspended solids and solid waste, which has increasingly threatened the environmental and socio-economic integrity of the islands. This has been partly attributed to the inadequate and underinvested waste reception facilities at ports in the region.

Additionally, the region is traditionally vulnerable to shipping collisions and accidents due to the intensity of marine traffic transiting its narrow channels and shallow waters. However, the countries have not responded to this risk with adequate contingency plans and response capabilities. Although all countries have signed the MARPOL agreement, due to weak national legislation and poor enforcement, governments have not fulfilled their obligations by ensuring vessels abide by international maritime laws. The lack of measures aimed at tackling ship-generated pollution stems from a legacy of under investment in relevant institutions needed to effectively manage waste and the general low priority given to environmental issues by governments of the region.

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. Major economic growth during the 1970s and 1980s led to the uncontrolled development of Havana Bay. There were insufficient provisions to cope with the increased waste resulting from economic and demographic growth. The Havana sewage system is antiquated with domestic and industrial wastes discharged untreated or inadequately treated into rivers and directly into the Bay. The adoption of cleaner technologies by industries has been hindered by 30 years of importing highly polluting Soviet Union technology and economic restrictions imposed by the US trade barrier.

Although the Cuban Government has signed international agreements which have laid down a legal framework for tackling these pollution concerns, current laws and regulations lack cohesion and are often outdated and not enforceable. Management is highly fragmented and there is an absence of an overall institution responsible for the rehabilitation of the Bay. Furthermore, stakeholders are not consulted during the planning and implementation of many developments.

The policy option analysis described alternative courses of action that may be taken by policy makers in the region, and discussed the projected outcomes and trade-offs of each action. From an initial list, policy options were selected that addressed specific or multiple root causes identified in the CCA.

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

1. Providing sufficient waste receiving and treatment infrastructure at ports;
2. Strengthening political and legal instruments: regulating discharges, spills and accidents;
3. Strengthening of institutions responsible for enforcement of maritime regulations.

Policy option 1 aims to provide port reception facilities, waste management infrastructure and institutional training programmes to facilitate compliance with MARPOL 73/78 Annex V. This will significantly enhance public health and environmental quality by strengthening the countries' capacities to manage and dispose of waste in an environmentally sustainable manner. The provision of waste reception facilitates will give shipping companies the option not to dump their waste at sea.

Policy option 2 aims to strengthen political and legal instruments in order to effectively regulate discharges, spills and accidents. This option intends to give greater indictment powers to enforcement agencies. To support a stricter legislative framework, it is recommended that capacity should be built in the relevant enforcement agencies in order to effectively monitor pollution incidents and to enforce maritime regulations (Policy option 3).

It is anticipated that the provision of sufficient waste reception facilities and additional pressure placed on the shipping industry by a strengthened legislative framework and enforcement capability, will reduce marine pollution in the Caribbean Islands region by preventing and discouraging indiscriminate disposal of waste off-shore.

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

4. Create a Havana Port Authority;
5. Develop sewage treatment and collection infrastructure;
6. Converting industries to environmentally sound technologies.

Policy option 4 proposes creating a Havana Port Authority to oversee and coordinate the rehabilitation of the Bay. The Authority would have political power and authority over existing institutions concerned with the management of Havana Bay. It 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 protocol to the Cartagena Convention on land-based pollution. 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 aims to replicate previous sewage treatment projects implemented in the Havana region. The development of sewage treatment infrastructure will reduce the quantities of untreated or insufficiently treated domestic sewage entering the Havana Bay, in order to improve its environmental quality and the health status of the Havana population. This will subsequently limit the contribution the Bay makes to the pollution load of the waters of the Caribbean Islands region.

Policy option 6 aims to promote the adoption of Environmentally Sound Technologies (ESTs) by industries to significantly improve their 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 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.

In addition, other countries in the Caribbean Islands region face many of the same environmental problems found in the Bay. Thus, some of the policy options for Havana Bay may be replicable at other sites in the region.

The policy options are a preliminary analysis of conceptual ideas and actions that are currently being considered. Therefore, although they are promising, more detailed assessment of the options is necessary.