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41

Marine Debris: Solid Waste Management Action Plan for the Wider Caribbean

UNESCO 1994

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EXECUTIVE SUMMARY

In spite of the fact that the severity and extent of the marine debris problem and some management solutions must now be considered as widely acknowledged in the Caribbean and that considerable progress has been made in the legal, educational and scientific fields during the last decade, major challenges still lie ahead in terms of remaining demands for co-ordination, development and strengthening activities in and among the numerous countries in the region as well as the need for further research in adequate scientific areas.

The basis for future action is determined by the fact that on 4 April, 1993, the Wider Caribbean was declared a "Special Area" under the MARPOL Convention, meaning that the vessels will have to store their wastes onboard and be able to discharge them at the first port, but before the Special Area Status can enter into force reception facilities must be provided in a majority of ports in the region.

The necessary changes in methods for minimization, reception and treatment of ship-generated waste can, however, only be economically viable if integrated with the local Waste Management system; specially since a considerable amount of marine debris originates from land-based sources.

In this connection it is important to keep in mind, that efforts to upgrade port reception facilities are generally viewed with suspicion by the public, specially in the smaller island countries, fearing that their country will be used as a dump site for hazardous and other waste from outside the country. Also limited financial resources, spatial constraints for adequate landfills, and lack of technical personnel restrict the capacity for dealing with domestic solid waste problems alone.

The collaboration of the local communities is vital since the implementation of a well functioning waste management system is a large programme, where consideration has to be given concerning problems whose solutions must inevitably involve the local inhabitants. For instance, if items are to be recycled, experiences from several recycling programmes tell us that the difficult part is not to put out bars and convince people to use them, but to develop a market for recycables so that they are really used instead of being dumped on a landfill. In the same way, one could ask the question where all the garbage from the cruisliners should go - is it really possible to develop a market from recycled goods big enough on a small island community. Many of the land-based sources for marine debris originates from non-point sources. Efforts to tackle this problem will have to deal with socio-cultural and economic variables, so that, combined with financial policy, public awareness initiatives will play an important role.

Obviously, the introduction of a sustainable waste management system in the Caribbean is a big task demanding both financial and human resources as well as collaboration and commitment among the community of the Wider Caribbean, but would also create a useful example for many other nations facing the problems in the near future.

The magnitude of the developing and implementing phase connected to the MARPOL Convention calls for an increase of existing co-operation among scientists, decision makers and the general public on a national as well as on a regional basis, and will therefore have to be accomplished in a co-ordinated manner by a competent body possessing the capability to carry out a multidiciplinary and international programme.

The purpose of this action plan is to specify and implement the primary actions and to create a coordinating mechanism between governments, international organizations, NGO's and others to seek solutions to the problem of the marine debris in the Caribbean needed to reduce and eventually eliminate, marine debris from the Caribbean shores and waters. The IOC-UNEP/CEPPOL Marine Debris Programme has convened three workshops on the subject to present and review data collected by scientists, discuss actions that can resolve the problem, and evaluate methods for achieving and monitoring results.

Eleven Action Items were developed during the Second Marine Debris Workshop, Merida Mexico, 17-19 August 1992. Five obtained funding almost immediately and are being carried out. During the Third Caribbean Marine Debris/Island Waste Management Conference, Nassau, Bahamas, 11-14 January 1994, 160 participants from 25 countries reviewed, made new recommendations and updated the Marine Debris/Waste Management Action Plan for the Caribbean. This action plan is fairly comprehensive. However, it does not reflect *all* of the activities necessary to combat the problem, nor does it list the activities in order of priority. Nevertheless, the major activity is the Wider Caribbean Initiative for Ship Generated Waste, a GEF-funded project to be implemented by the International Maritime Organization, and several other action items

have a supportive and or complimentary role. This document begins the process of an evolving Action Plan in which action items are designated, implemented, and then reassessed as progress in the Wider Caribbean is made. In future, new action items will be identified to meet the changing needs in the Caribbean.

Some of the listed activities are already underway but not yet completed. Others are included because they will guide responsible International Organizations, local government agencies and private sector organizations in allocating resources where they are most needed and in justifying future management strategies.

The Action Plan is a living plan, and it is anticipated that it will be continually revised and updated. This Action Plan is an outstanding example of co-operation in the region between UN bodies and programmes (IOC-IMO-UNEP and the World Bank) as well as other governmental/non-governmental organizations, and the industry involved. However, the point is of course to decentralize these actions as much as possible, taking into account the advantage of local solutions to this regional problem.

1. STATEMENT OF PURPOSE FOR DEVELOPING THE MARINE DEBRIS/WASTE MANAGEMENT ACTION PLAN

The purpose of this Action Plan is to specify the main activities needed to reduce, and eventually eliminate, marine debris from the Wider Caribbean shores and waters by guiding responsible International Organizations, local Governments and private sector organizations in allocating resources where they are most needed in order to justify management strategies. This Action Plan should prompt specific agencies and groups to become involved and co-ordinate needed actions in order to follow up pertaining programme areas related to marine debris/waste management of the UNCED Agenda 21, Chapter 17, namely:

(i) integrated Management and Sustainable Development of coastal and marine areas, including exclusive economic zones;
(ii) marine environmental protection;
(iii)strengthening international, including regional and sub-regional, co-operation and co-ordination;
(iv) sustainable development of small islands.

This Action Plan also serves to strengthen regional co-operation among UN Agencies (IOC, UNEP, IMO and the World Bank), governmental and non-governmental organizations, as well as the tourism and waste management industry; and to identify all parties and their objectives in relation to marine debris and waste management work.

For the Caribbean communities the Action Plan should serve two main purposes. First, it should reflect public willingness with regard to solving the problem. Second, it should indicate which activities are planned for controlling marine debris/waste management and serve as a baseline from which to measure the success of these activities over the next several years.

Marine debris in the coastal and ocean environment impacts severely on wildlife, aesthetics, coastal economies and overall environmental quality. Marine debris is a part of a large problem due to improper waste generation and management; lack of enforcement and legislation; lack of proper technologies; and above all lack of education on the subject. Bearing this in mind the Third Caribbean Marine Debris Workshop/Island Waste Management Conference, 11-14 January 1994, revised, updated and finalized the previous Draft Marine Debris/Waste Management Action Plan for the Caribbean and recommended IOC/IOCARIBE to take overall responsibility for the co-ordination of the plan and work in conjunction with other Intergovernmental, Governmental and Non-governmental organizations of the region, as well as directly with local governments and the industry involved.

The present document constitutes a review and background of CEPPOL Activity IV, Monitoring and Control of Pollution by Marine Debris; sources and state of pollution by marine debris; strategies for assessment, control and abatement and proposals for further action on the subject.

2. SUMMARY OF RECOMMENDATIONS

The Second Marine Debris Workshop took place 17-19 August 1992 in Mérida, Mexico. The participants developed a draft eleven-step action plan. Among the actions carried out was the IOC-UNEP-USEPA-NOAA-Sea Grant-Clean Island International Third Caribbean Marine Debris/Island Waste Management Workshop, held 11-14 January 1994, Nassau, Bahamas which drew special attention to pollution from upland sources. This Workshop was attended by 160 participants from 25 countries and the previous draft action plan was revised and completed. Apart from the above workshop the first three listed actions have obtained funding and are being carried out. Some actions are complimentary and designed according to funding possibilities.

IOC/IOCARIBE is the co-ordinating body for activities carried out by a number of institutions, international organizations, NGO's, industry etc. These activities provide useful institutional networks and background information for the implementation of remedial actions such as the World Bank funded project on the Wider Caribbean Initiative on Ship-generated Waste. To further develop an integrated assessment and control programme for the marine debris the following actions are proposed:

(i) promote the active participation of more countries and agencies in the activities of the working group.

(ii) the Wider Caribbean Initiative for Ship-generated Waste;

(iii) develop a Wider Caribbean Strategy that integrates land-based solid waste management issues with those associated with vessel-generated marine debris.

(iv) design an effective and comprehensive marine debris communication network in the wider Caribbean; and create a database on entities in the region which clearly states their objective and work programme.

(v) develop a strategy for conducting a Marine Debris Outreach Campaign;

(vi) establish a region-wide Public Education Campaign and incorporate Marine Debris information in schools;

(vii) promote sound solid waste management practices in the Wider Caribbean;

(viii) assist Cruise and Merchant Shipping Lines to Comply with MARPOL 73/78;

(ix) Workshop on Options for Solid Waste Management;

(x) Wider Caribbean Coastal Cleanup Campaign;

(xi) conduct Pilot Economic Impact Studies of the Marine Debris in the Wider Caribbean;

(xii) promote accession to the MARPOL Treaty and ratification of Annex V;

(xiii) Marine Debris Area Wide Monitoring Project;

(xiv) promote pilot projects that demonstrate integrated approaches for reducing marine debris in areas of particular importance for ecosystem conservation;

(xv) Fourth Marine Debris/Waste Management Workshop.

3. BACKGROUND

3.1 MARINE DEBRIS - MORE THAN A LITTER PROBLEM

For centuries, the problems caused by various types of human-made pollution in the environment were not obvious; metal, glass and garbage dumped into the ocean sank; paper, cloth and other organic wastes decayed.

The quantities in the past were not excessive. During the last 25 years the pollution of the worlds oceans has become a matter of increasing international concern. Most of the pollution comes from land-based sources such as industrial wastes, run-off from agriculture, and water borne pollutants from urban areas. Nevertheless, a significant amount of pollution in the marine environment is caused by shipping and maritime activities in general. Garbage and sewage have traditionally been dumped into the sea without much thought.

Millions of people depend on marine and aquatic environments for their livelihood as well as pleasure. The tourist industry boasts pristine beaches and majestic cliffs to attract visitors and many of us escape noise and polluted cities to reach the calm and peaceful coast. But the ocean is in trouble. Encompassing 70 percent of the Earths surface, the oceans are threatened as humans use it as a receptacle for all types of waste.

Marine Debris ranging from plastic bags, milk jugs, and beach bottles to tyres, fishing lines and nets is fouling our beaches and polluting our oceans. Marine debris is killing marine wildlife, poses a health and safety hazard to coastal residents and tourists, and is expensive for coastal communities burdened with repeated clean-up costs.

In a number of countries quantities of industrial and municipal wastes generated on shore are disposed of by dumping at sea. Some of these materials can be assimilated by the marine environment without harmful effects. Materials such as radioactive wastes and some industrial wastes are of much more concern. Sometimes wastes are considered to be too dangerous to be disposed of on land and incineration at sea is considered as the best solution.

On 31 December, 1988 a change took place in the way mariners dispose of their trash. It was on this date that the requirements of Annex V of the International Convention for the Prevention of Pollution from ships (MARPOL 73/78) took effect. 48 countries have signed the treaty that prohibits dumping of plastic materials at sea and regulates the distance from shore that all materials may be dumped.

Effective implementation of Annex V will help mitigate the problems caused by marine debris, especially plastics. Some areas of the worlds ocean have been afforded additional protection and formally designated as "Special Areas" due to their unique oceanographic conditions, which prohibits the disposal of all plastics and regulates disposal of other types of waste materials including paper products, rags, glass, metal, bottles, crockery, dunnage, lining, and packing materials.

In November 1990 the Marine Environmental Protection Committee of the International Maritime Organization agreed in principle to Special Area Designation of the Gulf of Mexico and Wider Caribbean under MARPOL Annex V. Special Area designation was adopted in July 1991. The designation entered into force in April 1993.

Following the Special Area Designation ships travelling in these waters must abide by discharge regulations and party nations that border a Special Area are required to ensure that proper reception facilities are available. Not until these facilities are available will the prohibitions of Special Area designation take effect.

In nations bordering the Wider Caribbean there are diverse options about the extent of the marine debris problem. For instance, most of the islands in the Caribbean are not signatory to the MARPOL Treaty. In addition, information on types, sources and problems caused by marine debris in the Caribbean is yet not sufficiently available.

The Marine Debris Waste Management Action Plan outlines recommendations to reduce marine debris in the Caribbean. The document is broken into four major components: Background on CEPPOL activities for Marine Debris; The Problems, Sources and State of Pollution; Solutions, and Recommended Actions.

Trash in the ocean is a global problem which requires international co-operation to solve. But the root of the problem stems from individuals who fail to properly dispose of their trash. Whether the individual is a fisherman, captain of a cargo vessel, a boater or a beachgoer, it is the responsibility of each one of us to maintain a clean, healthy and sustainable ocean.

3.2 THE JOINT IOC-UNEP MARINE POLLUTION ASSESSMENT AND CONTROL PROGRAMME FOR THE WIDER CARIBBEAN CEPPOL

The Third Session of the IOC Sub-Commission for the Caribbean and Adjacent Regions (IOCARIBE), Caracas, Venezuela, 4-8 December 1989, and the Fifth Intergovernmental Meeting on the Action Plan for the Caribbean Environmental Programme, Kingston, Jamaica, 17-18 January 1990, approved the joint IOC-UNEP Marine Pollution Assessment and Control Programme for the Wider Caribbean Region - CEPPOL. This major comprehensive regional programme has addressed eight pollution problems of regional concern of which one (Activity IV) relates to marine pollution by petroleum and marine debris.

The CEPPOL Programme is mainly funded by UNEP (through the Caribbean Trust Fund and the Environmental fund), IOC and other counterpart contributions. The IOC/IOCARIBE and UNEP/CEP Secretariats are permanently identifying other funding sources for a successful implementation of the CEPPOL Programme. However, the funding is to be considered as seed funding and the full responsibility for funding the programme will gradually fall on the countries in the region.

3.2.1. CEPPOL Activity IV

Since 1979 IOC has been implementing a marine pollution research and monitoring programme in the Caribbean entitled CARIPOL. It has been directed towards monitoring of the pollution by petroleum hydrocarbons, which was identified by the IOC-FAO-UNEP International Workshop on Marine Pollution in the Caribbean and Adjacent Regions, Port of Spain, Trinidad & Tobago, 1976, as having the highest regional priority.

Since the beginning of the CARIPOL Programme more than 16,000 data points on pollution by petroleum have been reported to a regional data bank, located at NOAA, Washington DC. Intensive training programmes, scientific symposia and expert consultations, in combination with strong support from individual scientists, institutions and IOCARIBE Member States have made CARIPOL Programme an example, both at regional and global level. From the beginning three parameters were monitored: stranded beach tar, floating tar, and dissolved and dispersed petroleum hydrocarbons. Later, monitoring of petroleum hydrocarbons in marine sediments and organisms were included as CARIPOL phase II, as well as marine debris.

Standardized methods, monitoring and sampling manuals have been developed within the programme. The main emphasis has been to provide training to regional scientists and allow them to participate in expert meetings and scientific symposia; also, equipment has been provided through voluntary donations from IOC Member States. The CARIPOL Programme has, since 1990, been integrated in the joint IOC-UNEP Marine Pollution Assessment and Control Programme for the Wider Caribbean - CEPPOL, as its activity IV.

Marine Debris has been identified by regional experts as an environmental problem of primary concern, which was ratified by government representatives at the Third Session of the IOC Sub-Commission for the Caribbean and Adjacent Region in 1989. The direct potential economic impact is obvious as well as the danger for the biota.

In 1990 IOCARIBE initiated a Marine Debris Pilot Monitoring Project in region within the CARIPOL Programme co-ordinated by the University of Puerto Rico and with the participation of CINVESTAV, Mexico, and CIOH, Colombia, which has recently been published. A regional data base for the marine debris monitoring programme has been established at the IOCARIBE Secretariat. Based on recommendations from the CEPPOL Workshop on Monitoring and Control of Pollution by Oil and Marine Debris, monitoring activities have been extended to the Natural Resource Institute, Cayman Islands; Instituto de Oceanologia, Cuba; Caribbean Environmental Health Institute, St Lucia, and the University of the West Indies, Barbados.

Several activities related to marine debris were recommended at the CEPPOL Workshop and strong support was obtained from NOAA, EPA, Sea Grant and CMC. Within the framework of CEPPOL IV a Marine Debris Outreach Campaign is being carried out in the region and the promotion of accession to the MARPOL Treaty and ratification of Annex V as well as pilot economical impact studies is just starting.

4. THE PROBLEM, SOURCES AND STATE OF POLLUTION

4.1 STATE OF POLLUTION BY MARINE DEBRIS

As far as marine debris is concerned, the number of possible sources and the diversity of the debris itself makes it difficult to identify its source. In order to evaluate the impact and significance of the debris problem it is however necessary to determine its composition as far as possible.

The main potential sources, distribution and harmful effects constitutes the following:

4.1.1. Ocean Sources

The Caribbean Sea is boarded by 33 nations which largely depend on its health and beauty to generate income for their economies. There are countries and private sectors which use the Caribbean as a means of transportation, which cause sizable amounts of garbage to be discharged polluting this resource. Debris may also come from the Atlantic Ocean, which provides the bulk of surface seawater flowing into and through the Caribbean.

4.1.2 Fisheries

Fishing ranging from artisanal traps and gillnetting to shrimp fishing industries and longliners, and lately, illegal driftnet fishing are contributing to the increasing debris problem. Most commonly collected items related to fisheries include, outboard oil recipients, monofilament fishing lines, floats, polyethylene line, cyalumes (plastic canisters filled with fluorescent material), and plastic bottles used for traps. Other items collected, such as plastic bags, food containers and other household goods can not be quantified as coming from fishing vessels, but obviously may be used on board. The above mentioned items compromise about 5% in abundance and 10% in weight of the beached debris.

4.1.3 Shipping and Petroleum Industries

Items such as packing straps and dunnage are directly traceable to activities related to cargo shipping. However, as in fishing activities, the disposal at sea by these vessels of household products or containers cannot be tracked back to its sources. Relative abundance data places the input of cargo-related debris to about 1%.

Cruise ships produce sizable amount of garbage due to the nature of their operation. Before the implementation of MARPOL annex V, the cruise ship industry was probably the largest single source of marine debris in the Caribbean. Nowadays, at least within the US Coast guard jurisdiction there is no proof of cruise ship-related debris, but debris is still being dumped outside the jurisdiction of the signatory countries of MARPOL Annex V; the majority of the Caribbean countries are not signatory to the MARPOL Treaty.

Other ocean-based activities include oil rigs, petroleum exploration and research vessels to which items such as hard hats, pipe thread protectors and magnetic tape write protecting devices are related. These items constitutes up to 1% of beached debris.

THE AMOUNT OF LITTER DUMPED INTO THE OCEAN EVERY YEAR

MERCHANT VESSELS: The world fleet of vessels, excluding commercial fishing vessels, were cited as dumping at least 4,800,000 metal containers, and 300,000 glass containers into the sea every year. This does not include plastic items that are discarded such as strapping bands, plastic sheeting and rope.

WORLD NAVIES: The National Academy of Science (US) estimated that the world navies dump 163,170,000 pounds of trash into the ocean every year

COMMERCIAL FISHING VESSELS: The world's commercial fishing fleet dump 749,000,000 pounds of crew generated waste and 2,205,000 pounds of fishing gear into the ocean each year.

US RECREATIONAL FISHING AND BOATING: According to the US Coast Guard, recreational boaters dispose approximately 51.96 percent of all garbage dumped in US waters.

Source: US National Academy of Science

4.1.4. Land-based sources

There are significant sources of debris which are land-based and which have not received as much attention as offshore sources. Observations in the Mediterranean have made clear that most beached debris originates from land-based sources. Similar observations have been made in the Caribbean, where a conference on land-based sources of pollution in the Caribbean was convened on 21-25 March, 1994.

4.1.5 Urban Runoff

Debris from coastal urban developments is transported by rain to either storm sewers that drain at the sea or treatment plants that are overloaded by rainwater and bypass this debris and sewage mix to the sea through ocean outfalls.

4.1.6. Recreational Activities

The input of beached debris by people at recreation is the most observable form of debris input. A significant part of the garbage deposited on the beach is carried out to sea. This is evidenced by the lack of accumulation of debris on uncleaned beaches. A comparison of preliminary data between recreational and isolated beaches indicates a 50% difference in abundance.

4.2 DISTRIBUTION

The level of marine debris on a beach depends not only on the quantity of debris present in its waters, or degree of direct input by its visitors, but also the beach physiography, slope and exposure. However, distribution on beaches is directly related to the human impact, and the recreational beaches represent the highest identifiable input of debris to the nearshore environment. Although there is no information available regarding the quantification of marine debris in bays and estuaries in the Caribbean area, these represent potentially sensitive sites for the heavy accumulation of debris. Estuaries receive inland inputs from several activities such as the banana industry, where plastic bags are used for protection of the fruit. The practice of using rivers and creeks as dumpsites is evident in the region.

In the ocean floating and mid-water debris is mostly observed to be concentrated along drift lines, due to ocean circulation phenomena; this fact should be kept in mind for the design of pelagic debris sampling programmes.

The impression is that the overall quantities have decreased in the latter years, probably due to Annex V of MARPOL. However, items such as plastic sheeting used in cargo vessels and green polyethylene nets, which are not used by any known fishery in the area, have become a common sight.

There is a lack of information regarding the accumulation of the marine debris, both pelagic and demersal, on the bottom of the ocean. Debris with density higher than water can be expected to accumulate on the ocean bottom where it is less susceptible to photodegradation and more available to benthic organism.

4.3 DEGRADATION

Since polymers, in the form of plastics, such as polyethylene, nylon, polypropylene, epoxies and others, possess molecular structures not frequently encountered in nature, there are few and inefficient pathways for biodegradation. Mechanical breakdown reduces the possibility of damage but does not solve the problem. Photodegradation may play a significant role in floating or stranded debris which is not protected from solar radiation. It is obvious that, given the large input and slow degradation time, there is a net accumulation of plastic in the environment. Burial of beached debris is evident in depositional environments such as protected coves or beaches. It is significant to note that, once these synthetic polymers are buried, especially in anoxic sediments, they are less prone to mechanical, radiative or biological degradation. Other commonly found debris materials such as glass and metal also have low biodegradation rates.

ESTIMATED LIFE SPAN OF COMMON MARINE DEBRIS ARTICLES

(In years)

Polystyrene cup	500
Suntan lotion with loose cup	450-500
Aluminum can	200-500
Six pack ring	450
Plastic bag of bait	50

Source: Oregon Sea Grant

5. THE EFFECTS OF MARINE DEBRIS

5.1 AESTHETIC AND ECONOMIC IMPACT

The economies of many of the countries in the Caribbean are dependent upon the beauty and health of their ecosystems including their beaches, coral reefs, seagrass beds and others. A decrease in beauty and the increase of debris will obviously affect the tourist industry as well as fisheries negatively. The growing population, increase in wealth, and increased visitor densities may challenge their own interest. Marine Debris is also expensive for commercial and recreational fishermen and for recreational boaters. Debris may foul or damage active fishing gear and boats which translates into lost fishing time and expensive repairs. Also fishermen lose potential income when lost traps, nets or lines continue to capture commercially valuable species. Moreover, the perceived danger of fish contamination by floating pollution can have a drastic negative impact on fishing industry.

5.2 FLORA AND FAUNA

Marine debris is not only an eyesore on our beaches, it also kills wildlife. Debris is killing a number of marine species, many of which are already near extinction. Marine mammals and birds are known to ingest plastic and other debris which drives them to starvation. Ingested plastic may lodge in an animals's intestines and stomach, thus blocking its digestive tract. Large quantities of ingested plastics may cause a false feeling of satiation and lead to malnutrition and eventual death.

There are reports of mammals dying entangled in nets, but the actual mortality rate from entanglement is difficult to assess because many animals die at sea and are never observed. Fish are known to be affected by banned pelagic driftnets which are lost at sea but continue fishing for long periods, and by lost bottom traps.

Other damage may be obscured by the lack of appropriate studies and data on less widely observed biota and ecosystems. By carelessly leaving trash at the beach, throwing debris into rivers, tossing garbage overboard, or disposing of plastic items in storm drains, we are slowly killing our wildlife.

5.3 HUMAN HEALTH AND SAFETY

As well as having a detrimental impact on wildlife, marine debris poses health and safety dangers for humans. Boaters have reported life threatening situations resulting from plastic debris wrapping around propellers or clogging cooling intakes stranding the mariner. Also, the same debris that is entangling animals poses hazards for underwater divers. For example, divers may swim into a nearly invisible ghost net and become entangled. Marine debris on the beach, such as broken pieces of glass and rusty metal, are dangerous to the beachgoer. Furthermore, the health consequences of medical waste washups are unknown.

6. CONCLUSION

The severity of the levels of pollution by marine debris in the wider Caribbean can be ascertained by looking at the performed monitoring data compiled by the University of Puerto Rico as part of the CARIPOL Programme. The evidence compiled does not support the perception that offshore activities constitute the main source of debris. However, the generalized presence of discarded fishing materials is documented. It is evident that incorrect shoreside disposal practices represent the major source of beached debris. This indicates that in the study area the flow of debris from land to sea is more significant than the contrary. It has been pointed out that for some areas of the Caribbean and Gulf of Mexico, ocean-borne debris predominates and that methods for assigning debris to source are crude at best.

In order to enhance the appreciation of the debris problem in the Greater Caribbean current efforts have to be expanded to include a full scale intercalibration exercise and a range of sampling sites, which provide reliable information on the flux of debris through the region. Surveys designed to estimate the abundance of floating debris in the Caribbean are to be an integral part of the monitoring system. An area-wide monitoring programme will provide assessments of the amounts and types of debris entering the Caribbean region.

In order to implement the recommended actions, sufficient funding is crucial. It is also suggested that an *ad hoc* working group be established to help the IOCARIBE Secretariat in carrying out these actions.

Since a major threat to the beaches is from land-based sources, educating the public about the harm of marine debris is a priority. However, education must be conducted in conjunction with proper enforcement of the law, continued research and progressive legislative measures. The recommendations of the Marine Debris/Waste Management Action Plan should be implemented in the very near future to address a problem already pervasive throughout the Wider Caribbean.

7. GOALS AND STRATEGIES FOR ASSESSMENT, CONTROL AND ABATEMENT

The overall goal of the Marine Debris/Waste Management Action Plan for the Caribbean is to respond adequately to actions identified in Agenda 21, in particular Chapter 17, with the programmes related to marine debris, namely:

(i) Integrated management and sustainable development of coastal and marine areas, including exclusive economic zones;
(ii) Marine environmental protection;
(iii) Strengthening international, including regional, co-operation and co-ordination;
(iv) Sustainable development of small islands.

Within these goals is the need to eliminate the illegal disposal and careless loss of man-made solid waste in the marine and coastal environments of the Caribbean and to foster pride and stewardship and increase understanding of the marine and coastal resources among user groups in the Caribbean.

The root of many waste-management problems is the generation of an enormous amount of products for very short use. Wrapping and packing materials consist of a considerable amount of the total solid waste produced. Inadequate collection and final disposal options often lead to open dumping or uncontrolled landfills, with serious environmental implications. Several solutions have been applied to treat and manage solid waste, but few strategies have been developed to reduce the generation of waste at source, reutilization of products, or recycling of material. The best solution is, of course, reduced generation of waste at source, which is the only solution which really has a potential to save natural resources, reduce cost and efforts in waste management, etc. However, this option is most often considered as unrealistic. Options such as recycling of material and use of energy by burning of waste is preferable.

Control and abatement of marine-based sources of debris and garbage are closely tied to conventions for the prevention of oil pollution. Control of ocean based sources of oil and garbage pollution, primarily from tankers and other ships, but also offshore production facilities is achieved through adherence to and enforcement of MARPOL 73/78 and its Annexes, and the International Convention on the Prevention of Marine Pollution by Dumping of Wastes.

In all cases, responsibility for enforcement lies with the individual state involved. Signatory states are also bound by MARPOL 73/78 to provide adequate reception facilities, not only for oily wastes, but also for chemicals wastes, cargo residues, garbage and sewage. Funds have now been allocated for the survey of port reception and waste disposal facilities in the context of designating the Wider Caribbean as a Special Area under Annex V.

The Action Plan aims to accomplish the above goals by four main strategies: monitoring/assessment, co-operation/enforcement, technology/pollution prevention, and public outreach. We can divide the possible solutions under the following three categories:

7.1 LEGISLATION AND ENFORCEMENT

As discussed above there is legislation pertaining to most ocean-based sources. Nevertheless, there are many countries which lack the law and infrastructure necessary to provide alternatives to potential shore based sources. The development of port reception facilities is a pre-requisite for enforcement. Port and environmental agencies should monitor the disposal of the garbage received and assure proper management of landfills. It is clearly undesirable that countries establish port reception facilities without appropriate final disposal alternatives.

7.2 TECHNOLOGY

There are two approaches to tackling the problem on debris. First, is to develop and use degradable plastics which would have a shorter lifespan and would be less harmful to the environment. Second, is to establish recycling programmes in which all sectors of the economy should join forces to make it profitable. There is also the possibility of incineration of certain wastes.

7.3 EDUCATION AND ATTITUDE CHANGES

The introduction of educational programmes is probably the most important strategy, and should be directed at all levels; schoolchildren, beachgoers coastal managers, industry groups and, of course, ship-related personnel.

Alternative options such as waste reduction at source, re-utilization of products and recycling of material should be promoted.

8. RECOMMENDED ACTIONS

The Third Caribbean Marine Debris Workshop/Island Waste Management Conference recommends the following actions to reduce marine debris in the Caribbean and Adjacent Regions. Each action includes background information, a list of action items and implementation timeframe, as well as the lead implementing organization. Implementation very much depends not only upon availability of funding, but also the lead organizations' willingness and effort. These recommendations need to be addressed in the near future to begin tackling a problem with region-wide implications.

The Action Items pertaining to this Action Plan target all three possible solutions. However, since most of the items include more than only one measure for abatement and control, they are not listed under any category.

Action 1: Promote the active participation of more countries and agencies in the activities of the Working Group

Background
In order to succeed, this Marine Debris Action Plan must have the active participation of all the countries in the Wider Caribbean. The trans-boundary movement of pollutants and debris make this imperative. In this regard, the participation of individuals and agencies from the Central American Coastal States, the Dutch and French Islands, Venezuela, the Dominican Republic and Haiti have not been evident.

Objective
Develop a strategy for promoting the active participation in this Action Plan of agencies, groups, and/or individuals from all the countries in the Wider Caribbean.

Action Items
(i) Identify key individuals or groups that could serve as contact points;
(ii) Send the focal points the relevant information and materials;
(iii) Invite the interested individuals and/or groups to the next Workshop.

Lead Implementing Organization	IOC/NJSGMAS/CMC
Implementation Timeframe	1994 - next meeting
Cost of Action	USD 5,000 - 6,000
Possible Funding	IOC

Action 2: Wider Caribbean Initiative for Ship-generated waste

Background
While most developed countries have ratified MARPOL 73/78, the record for ratification by the developing countries of the WCR is relatively incomplete. Among the 29 countries of the WCR only 14 have ratified the mandatory annexes, and 11 have ratified Annex V. The status of ratification of Annexes III and IV is less significant since Annex IV has not yet entered into force and Annex II is relatively simple to implement. The incomplete record of ratification is directly attributed to the requirements under MARPOL 73/78 for countries to provide adequate port reception facilities for receiving ship-generated waste, and the need to implement national legislation to enable enforcement of the Convention. For the developing countries of the WCR, the economic burden is significant without the assistance of the international community, and the technical expertise to deal with associated legislative, institutional and enforcement issues is often lacking.

Objective
The proposed initiative would provide technical assistance, studies and coordination to address all aspects of MARPOL 73/78 with a special emphasis on Annex I, II and V. Ending the discharge of ship wastes into international and territorial waters of the Wider Caribbean Seas is expected to protect the environment integrity of coastal and marine systems in the WCR which contribute significantly towards the economic well being of the affected countries. Towards this objective, the Initiative would promote and appropriate national/regional and institutional framework to facilitate compliance with MARPOL 73/78, the installation of physical reception facilities at all major ports/marinas and the improvement of the overall national waste management systems throughout the WCR.

Lead Implementing Organization	IMO
Implementation Timeframe	1994-1997
Cost of Action	M. USD 5.5
Funding	GEF

Action 3: Develop a Wider Caribbean Strategy that integrates land-based solid waste management issues with those associated with vessel-generated Marine Debris to support the Wider Caribbean Initiative for Ship-generated Waste

Objective

To date, virtually all attention has focussed on vessel-generated marine debris. We now recognize that the problem is much broader and that meaningful solutions can only be obtained by integrating solid waste interests into the marine debris issue. To this end a strategy should be developed in concert with National Governments, regional agencies, NGOs, international donors and other interests.

The strategy should capitalize on existing information such as the land-based point source inventory (IOC-UNEP/CEPPOL Programme); the information gathered and programmes developed by U.S. EPA; the Center for Marine Conservation, GTZ, PAHO.WHO, SWAC, etc.; the research conducted by regional scientists and solid waste authorities.

The strategy should also consider infrastructure needs; infrastructure financing; education and outreach programmes and additional research needs including composting and recycling.

Action Items

1. Support the acquisition of information, such as through Island Waste Audits;
2. Compile available information about land-based sources of marine debris in the Wider Caribbean;
3. Compile and prepare list of materials that might serve for future educational and outreach purposes with these new audiences;
4. Continue identification and quantification of land-based sources.

Lead Implementing Organization IOC, SWAC, Shipping Industry

Implementation Timeframe 1994 - 1996

Cost of Action USD 50,000

Possible Funding WB, IMO, IOC, UNEP

Action 4: Design an effective and comprehensive Marine Debris Communications Network in the Wider Caribbean; and Create a Database on entities in the region which clearly states their objectives and work, including Intergovernmental Organizations, NGOs, industry, etc.

Background

Emerging technology permits instantaneous communication of information throughout the Wider Caribbean and the world. An effective communications network should employ the latest technology as well as more widely available traditional modes of communication. To date, databases have not been shared, informational networks have been narrowly focused, and dissemination of information has been haphazard.

Objective

Provide an efficient and easily accessible communications network containing data in English and Spanish for distribution to the broadest possible marine debris interests.

This database will serve any organization or industry that wishes to have access on information dealing with Marine Debris/waste management issues in the Caribbean.

Action Items

(i) Survey and collect existing information on regional and sub-regional networks, institutions, programmes, projects and resources;
(ii) Design a means of periodic updating;
(iii) Establish Internet or an E-mail bulletin board and advertise these to interested institutions and individuals;
(iv) Co-ordinate activities through IOCARIBE;
(v) Identify public and private funding agencies to ensure continuity and stability of the Network;
(vi) Produce a format of sendouts that would be used;
(vii) Create the database;
(viii) Make it available through Omnet/Internet.

Lead Implementing Organization IOC, Sea Grant, Eastern Caribbean Center, World Bank

Implementation Timeframe 1995-1997

Cost of Action USD 40,000 in year, USD 20,000 in following years

Possible Funding Sea Grant, World Bank, IOC and the contracting party

Action 5: Develop a strategy for conducting a Marine Debris Outreach Campaign in the Wider Caribbean

Background

Education has long been recognized as a partial solution to the marine debris problem. In 1984 when the first international workshop took place, scientists, fishermen, conservationists among others determined that education would be the most effective first step in addressing the marine debris problem.

Education and outreach efforts by national agencies, public interest groups and private industry among others need to be well coordinated. The development of educational materials, presentation package, and media campaigns require coordination in order to minimize duplication of effort and present a consistent message to the public.

The development and distribution of educational materials in the United States were key to the mobilization of public support and legislative interest to address the marine debris problem. As a result, on 31 December 1987, the United States ratified Annex V of MARPOL. Since Special Area Designation of the Wider Caribbean will have a direct impact on U.S States and Territories, there is a need at this time to facilitate the extension of the marine debris awareness created in the United States to other nations in the Gulf of Mexico and the Wider Caribbean.

Objective

Develop a strategy for conducting a marine debris outreach campaign in the Wider Caribbean that will create awareness of the marine debris problems specific to those and build support for ratification of Annex V and Special Area Designation.

Action Items

To meet the above objective the Contractor shall:

(i) identify the types and most probable sources of marine debris that constitute the greatest hazard to living marine resources, shipping, and the economies of coastal areas in the Gulf of Mexico and Wider Caribbean;

(ii) identify what arguments would be effective in gaining a response from the sources identified in Item 1 to reduce their contributions to the marine debris problem;

(iii) identify marine debris educational material currently in use that would be appropriate for source groups that contribute to marine debris problem in the Wider Caribbean;

(iv) recommend new educational materials necessary to create awareness of the marine debris problem and build support for the special area designation of the Wider Caribbean;

(v) identify key individuals/groups in the region that could serve as a network for gathering and distributing educational information and other materials on marine debris;

(vi) integrate the findings from Item 1 through 5 into a logically and economically coordinated marine debris educational plan for the region.

Implementation

The Contractor, CMC (Center for Marine Conservation) started the implementation of this Action with a period of performance of twelve months. The Contractor will submit a final report, summarizing their findings and recommendations. In addition, the IOCARIBE Secretariat is actively supporting this item in close co-operation with CMC.

Lead Agency IOCARIBE/CMC

Cost of Action 50,000 USD

Funding: NOAA/EPA

Action 6 Establish a Region-wide Public Education Campaign and incorporate marine debris information in schools

Background

Current efforts in the US in marine debris education have contributed statewide to considerable progress in addressing the marine debris problems. The programmes are conducted by government agencies, community groups and conservation organizations and involve both public and private companies at local and nationwide levels. There is no greater opportunity to influence appropriate values regarding marine debris than through the public education system.

Objective

With the developed strategy in Action Item 1 address NGOs in all the countries and encourage boards of education and teachers to distribute marine debris education materials.

Action Items

(i) Use existing or develop new pamphlets, posters and stickers for distribution in Spanish, English, French and Dutch, to coastal areas, marine recreational firms, supply stores and NGO's.

(ii) Distribute marine debris education materials to educators through presentations, educator associations, conferences and environmental education organizations.

Lead Implementing Organization	CMC/ECC/IOCARIBE
Implementation Timeframe	1993-1995
Cost of Action	50.000 USD
Possible Funding	NOAA, EPA

Action 7: Promote sound solid waste management practices in the Wider Caribbean

Background

The amount of plastics, bottles, cans and glass found on Wider Caribbean beaches indicate that people are improperly disposing their personal wastes. Documented environmental problems include aesthetic degradation, harm to marine life, and promotion of dumping. Waste reduction, reuse and recycling education can be an integral part of solving the marine debris problem. Specifically, promoting recycling at water-front facilities and beach areas will reinforce proper disposal in all countries and some countries can reduce waste-handling costs as well as the environmental impacts. However it is recognized that different levels of applicability for recycling exist for continental and insular states and therefore a need to develop appropriate strategies for each of these groups is necessary.

Objective

Develop appropriate strategies for promoting waste reduction, reuse and recycling in continental and insular Caribbean states, and as far as possible establish programmes in the Wider Caribbean.

Action Items

(i) Include waste reduction, reuse, recycling and composting in the marine debris educational campaign.

(ii) Include a message about waste reduction, reuse, recycling and composting on the marine debris interpretive displays or signs located at beach accesses and marinas.

(iii) Promote the establishment of a recycling programme for beverage containers and operational waste, such as nets, cardboard and scrap metal at waterfront facilities where appropriate.

(iv) Develop appropriate strategies for waste reduction, reuse and recycling for continental and the insular Caribbean.

Lead Implementing Organization	CMC, IMO, IOC, SWAC
Implementation Timeframe	1994-1996
Cost of Action	10-15,000 USD to develop materials each year
Possible Funding	IMO, NOAA, IOC

Action 8: Assist Cruise and Merchant Shipping Lines to comply with MARPOL 73/78

Background

Due to a large number of passengers, cruise ships generate significant amounts of trash. In compliance with MARPOL Annex V, cruise ships and merchant vessels of signatory nations are prohibited from disposing of plastics at sea. Upon Special Area designation of the Wider Caribbean, all vessels will be required to retain all wastes including plastic metal, glass, paper and other materials. Caribbean nations that accept these wastes in their ports are faced with problems of limited landfill space and waste handling facilities. By minimizing the amount of trash generated by vessels and recycling as much as possible, the impact of these wastes on Caribbean nations would also be reduced.

Objective

To support the cruise line industry and merchant shipping efforts to develop and implement strategies to minimize the amount of trash generated by vessels promote recycling and proper waste handling, thereby minimizing the impacts of these wastes on Caribbean nations.

Action Items

(i) Promote sharing and expansion of waste minimization and recycling strategies within the cruise line industry.

(ii) Promote waste minimization and recycling practices.
(iii) Promote the development of an education programme for cruise line passengers on MARPOL and Special Area Designation.
(iv) Establish a system for passenger and crew reporting of potential (or suspected) MARPOL violations.
(v) Work with the international travel industry to educate consumers about the importance of the MARPOL Treaty in the protection of the marine environment.

Lead Implementing Organization

Education Contractor for IOC/IOCARIBE, Shipping Industry Associations, IMO.

Implementation Timeframe 1994-1996

Cost of Action USD 30,000

Possible Funding NOAA-IOCARIBE-cruise line industry

Action 9: Workshop on Options for Shipboard Solid Waste Management

Objective
To bring naval architects, the shipping industry and other commercial interests together to discuss environmentally sound points for handling solid waste regulated under MARPOL Annex V.

Action Item
The effective control of marine debris in the Wider Caribbean will require attention on an international level, for example, US beach surveys sample debris from 33 countries. Securing the co-operation of Caribbean and foreign governments and fleets will require a long-term commitment of financial and organizational resources. Although laws and programmes designed to prevent marine debris exist, they may not be fully enforced. Law enforcement is insufficient to implement current statutes. One key aspect for reducing marine debris is to reduce sources both land-based and shipborne. Utilization of alternative and new technologies for managing solid wastes on board ships is critical to this objective.

Lead Implementing Organization IOC,IMO, Coast Guards

Implementation Timeframe 9 Months

Cost of Action USD 35,000

Possible Funding EPA, IMO, WB, Coast Guards

Action 10: Wider Caribbean Coastal Cleanup Campaign

Background

In 1990, more than 108,000 volunteers participated in the Center for Marine Conservation National Beach Cleanup in U.S. In addition, international participation included Canada, Mexico and Japan. In 1991, the Center for Marine Conservation launched an International Beach Cleanup and is seeking groups to participate in this effort. The Center for Marine Conservation is particularly interested in identifying and working with Caribbean nations as part of a Caribbean Beach Cleanup Campaign.

Objectives

(i) Increase public awareness of the marine debris problem in the Caribbean.
(ii) Utilize volunteer beach cleanups as a means for collecting data on types and quantities of marine debris in the Caribbean.
(iii) Remove debris from Caribbean beaches.
(iv) Identify and establish a network of groups in the Caribbean to address the marine debris problem.

Action Items

(i) Identify Caribbean beach cleanup groups (partly already done by IOCARIBE).
(ii) Provide assistance and advice to cleanup groups.
(iii) Develop and distribute multilingual, Dutch and French data cards for collection and analysis.
(iv) Compile information on cleanups and data findings in a final report.
(v) Distribute reports of cleanup groups.
(vi) Results of these cleanups will also be shared with local, regional and international agencies, marine industry groups and the scientific community to develop solutions to the marine debris problem.

(vii) This campaign will also be used to educate citizens as to where marine debris should be given appropriate solid waste management after cleanup campaigns, and to make recommendations to governments as to how to handle this solid waste and the disposal of such wastes.

Lead Implementing Organization CMC

Implementation Timeframe 1994

Cost of Action 100,000 USD

Possible Funding Center for Marine Conservation

Action 11: Conduct Pilot Economic Impact Studies of the marine debris in the Wider Caribbean

Background

Marine Debris affects the communities and individuals dependent on marine areas for their livelihood. It can damage vessels, burden coastal communities with exorbitant cleanup costs, and turn away tourists leaving local merchants at a loss. Further, once a tourist area is perceived to be polluted it is very difficult to dispel that image. Therefore, pilot economic assessments should be conducted to evaluate the impact of marine debris in coastal areas. These studies should, in addition to the above tasks, take in to consideration the loss of wildlife and aesthetic impact as economic factors.

In addition a Cost/Benefit analysis of recycling at waterfront facilities and beaches should be conducted. Economic studies would be useful for policy makers, waste management planners, tourism and industry planners, and others who are formulating coastal and waste management policies in the Wider Caribbean.

Objective

Conduct pilot economic studies in order to assess the economic impact of marine debris in coastal areas and on vessels.

Action Items

(i) Compile existing studies which relate to the economic impact of marine debris.

(ii) Conduct a pilot economic impact study for a specific island or country where consideration should be given to:

a) cost of vessel repair, towing charges, and lost fishing or operational time due to marine debris encounters;
b) cost to private owners, cities and regional authorities to maintain clean beaches;
c) loss of tourism and related revenue due to debris-covered beaches;
d) cost and benefit analyses of implementing recycling programs at waterfront facilities and beaches.

Lead Implementing Organization IOCARIBE

Implementation Timeframe Being carried out

Cost of Action 30,000 USD

Possible Funding SAREC

Action 12: To promote accession to the MARPOL Treaty and Ratification of Annex V

Background

Entry into force of MARPOL Annex V in 1988 provides the opportunity for coastal states to assure protection of their coast from ship source persistent wastes. Within the Wider Caribbean only 11 of 28 nations have ratified Annex V. However, due to ocean currents and international ship traffic full control of ship source garbage pollution in the Wider Caribbean Region cannot be achieved until all Coastal and Island States accede to the MARPOL Treaty and ratify Annex V. As more states ratify Annex V, the zones in which ships may continue to discharge garbage will be limited to those of Non-Party Nations; potentially concentrating pollution in the waters of these nations.

Objective

Develop a multilateral presentation including slide program and packet of information on the problem of marine debris, background on MARPOL Annex V, Special Area Status, benefits of ratifying Annex V. To get MARPOL protection for Wider Caribbean.

Actions Items

(i) Develop materials;
(ii) Identify meetings to attend;
(iii) Distribute program to relevant groups;
(iv) Coordinate education program with other Actions.

Lead Implementing Organization IMO

Implementation Timeframe Being implemented

Possible Funding IOC, GEF

Action 13: Marine Debris Area Wide Monitoring Project

Background

The Marine Debris Monitoring Programme has completed its first phase in which four institutions in the region participated. In order to enhance perception of the debris problem, the sampling network has to be expanded to also include stations which provide information on levels of marine debris flowing from the Atlantic Ocean, inclusion of surveys designed to study the input of debris by countries in the region to determine by Newton nets and direct observations, the abundance of floating debris in the Caribbean.

To ensure that data collected by this network is generally useful to measure debris throughout the region, a comprehensive intercalibration of the data collection method is necessary.

Objective

Conduct an area-wide monitoring programme which can provide an assessment of the amount entering the Caribbean and provide the information to the IOCARIBE Data Bank.

Action Items

(i) Design, intercalibrate and establish uniform procedures for sampling and analysis.
(ii) Select monitoring sites.
(iii) Collect data on stranded marine debris throughout the Caribbean Region based on the intercalibration.
(iv) Determine level of marine debris entering from the Atlantic ocean by the use of Newton nets, and direct observations by research cruise.
(v) Compile data and produce a report on the subject.

Lead Implementing Organization IOC

Implementation Timeframe 1995-1996

Cost of Action USD 30,000

Possible funding IOC-UNEP-IMO-NOAA

Action 14: Promote pilot projects that demonstrate integrated approaches for reducing marine debris in areas of particular importance for ecosystem conservation.

Background

Integrated approaches are increasingly being used in the Wider Caribbean region to address environmental and economic issues affecting areas of particular importance for conservation, tourism and recreation. Reduction of marine debris will require creative implementation of activities involving the interaction of natural and human systems, such as targeted education to foster supportive attitudes and communication among coastal and upland communities, community-based activities (e.g. beach, roadside and streambed cleanups), technical measures, research and monitoring related to debris deposition and management, enforcement of laws and regulations related to waste management, development of financial, outreach and institutional mechanisms that foster co-operation among interested public and private entities.

Objectives

To plan and implement co-operative demonstration projects that represent the varied ecological, economic, institutional and cultural conditions of the Wider Caribbean region. These projects will integrate education, scientific, technological, protection and economical development activities to achieve reduction of marine debris in important conservation areas.

Action Items

(i) Identify coastal and marine areas in the Wider Caribbean region that are recognized as potentially successful models for integrating conservation, tourism, economic development and local participation (e.g. Montego Bay, Jamaica, St. John, US Virgin Islands, Saba and Netherlands Antilles) and identify appropriate local agencies that can conduct the pilot project.

(ii) Select areas, prepare plans and secure funding for pilot projects that will build up successful models of integrated conservation, tourism and economic development that incorporate and encourage local participation in order to achieve sustained reduction of marine debris.

(iii) Implement plans.

Lead Implementing Organizations IOCARIBE, The Nature Conservancy, CMC

Implementation Timeframe 1995-1997

Cost of Action USD 25,000 per area

Possible Funding NOAA-WorldBank(GEF)
UNEP-Foundations

Action 15: Fourth Marine Debris Workshop with emphasis on Education and Public Awareness

Objective:
The Third Workshop served to recognize the relative contributions of land-based sources to the marine debris problem. It also served to call attention to: (i) the broader solid waste collection and disposal problems of the region; and (ii) the need to educate residents of upland and nearby coastal areas concerning the problem, its land-based causes and possible solutions.

It is likely that the means for building such awareness are not the same as those the network has used to call attention to the ship-generated problem. A Fourth Workshop therefore should focus on "educating the educators" on the most effective means for working with such non-traditional, non-marine audiences.

A special effort should be made to ensure the participation of educators from the region.

Action Items

(i) Designate a steering committee well representative of the parties involved;
(ii) Develop a Draft Agenda;
(iii) Assign responsibilities;
(iv) Prepare a report.

Lead Implementing Organization IOCARIBE

Implementation Timeframe 18 months

Cost of Action USD 60,000

Possible Funding USEPA, IOC,
Sea Grant/NOAA

LIST OF ACRONYMS

CARIPOL	Marine Pollution Monitoring Programme in the Caribbean
CEP	Committee on Environmental Protection
CEPPOL	Joint IOC-UNEP Marine Pollution Assessment and Control Programme for the Wider Caribbean Region
CINESTAV	Centro de Investigaciones y Estudios Avanzados (Mexico)
CIOH	Centro de Investigaciones Oceanográficas e Hidrográficas (Colombia)
CMC	Center for Marine Conservation (USA)
EPA	Environmental Protection Agency (USA)
GEF	Global Environmental Facility
GTZ	Agency for Technical Co-operation (Deutsche Gesellschaft für Technische Zusammenarbeit), Germany
IMO	International Maritime Organization
IOC	Intergovernmental Oceanographic Commission
IOCARIBE	IOC Sub-Commission for the Caribbean and Adjacent Regions
MARPOL 73/78	International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto
NJSGMAS	New Jersey Sea Grant Management Advisory Service
NOAA	National Oceanic and Atmospheric Administration (USA)
PAHO	Pan American Health Organization
SAREC	Swedish Agency for Research Co-operation with Developing Countries
SWAC	Solid Waste Association for the Caribbean
UNEP	United Nations Environment Programme
WB	World Bank
WHO	World Health Organization (UN)

20	A Focus for Ocean Research : The Intergovernmental Oceanographic Commission - History, Functions, Achievements	E,F,S,R
21	Bruun Memorial Lectures, 1979 : Marine Environment and Ocean Resources	E,F,S,R
22	Scientific Report of the Intercalibration Exercise of the IOC-WMO-UNEP Pilot Project on Monitoring Background Levels of Selected Pollutants in Open Ocean Waters	(out of stock)
23	Operational Sea-Level Stations	E,F,S,R
24	Time-Series of Ocean Measurements. Vol. 1	E,F,S,R
25	A Framework for the Implementation of the Comprehensive Plan for the Global Investigation of Pollution in the Marine Environment	(out of stock)
26	The Determination of Polychlorinated Biphenyls in Open-ocean Waters	E only
27	Ocean Observing System Development Programme	E,F,S,R
28	Bruun Memorial Lectures, 1982 : Ocean Science for the Year 2000	E,F,S,R
29	Catalogue of Tide Gauges in the Pacific	E only
30	Time-Series of Ocean Measurements. Vol. 2	E only
31	Time-Series of Ocean Measurements. Vol. 3	E only
32	Summary of Radiometric Ages from the Pacific	E only
33	Time-Series of Ocean Measurements. Vol. 4	E only
34	Bruun Memorial Lectures, 1987 : Recent Advances in Selected Areas in the Regions of the Caribbean, Indian Ocean and the Western Pacific	Composite E/F/S
35	Global Sea-Level Observing System (GLOSS) Implementation Plan	E only
36	Bruun Memorial Lectures 1989 : Impact of New Technology on Marine Scientific Research	Composite E/F/S
37	Tsunami Glossary - A Glossary of terms and Acronyms Used in the Tsunami Literature	E only
38	The Oceans and Climate : A Guide to Present Needs	E only
39	Bruun Memorial Lectures, 1991 : Modelling and Prediction in Marine Science	E only
40	Oceanic Interdecadal Climate Variability	E only
41	Marine Debris: Solid Waste Management Action Plan for the Wider Caribbean	E only