



The Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden (PERSGA)

MARINE LITTER IN THE PERSGA REGION



April 2008



PERSGA – “*The Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden*” is an intergovernmental organization dedicated to the conservation of the coastal and marine environments in the region.

The Regional Convention for the Conservation of the Red Sea and Gulf of Aden Environment (Jeddah Convention) 1982 provides the legal foundation for PERSGA. The Secretariat of the Organization was formally established in Jeddah following the Cairo Declaration of September 1995. The PERSGA member states are Djibouti, Egypt, Jordan, Saudi Arabia, Somalia, Sudan, and Yemen.

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PREFACE

The Red Sea and Gulf of Aden enjoy beautiful and highly diverse habitats, yet they form a strategic passage for international navigation and their coastal cities are getting increasingly crowded. This results in serious concerns regarding marine litter-related problems. There are still no sufficient studies in the region on the extent of the risk of litter on the coastal and marine environment. However, there is increasing evidence that the accumulation of litter, mainly on beaches, is becoming a nuisance in several parts of the region. National and regional efforts to combat the problem, mainly by clean-ups and awareness-raising campaigns are numerous. But there is always a need for more. It is our intention to avoid any impacts that may result in irreversible degradation of the coastal and marine resources and lead to significant economic losses in tourism, fisheries and other coastal and marine activities.

Marine litter has been identified as one of nine ‘source categories’ by the Global Program of Action for the Protection of the Marine Environment from Land-Based Activities (GPA)/UNEP. It was recognized as a priority issue in UNEP’s Governmental Council/Global Ministerial Environment Meeting in March 2004. Inadequate regulations or poor enforcement of regulations, combined with weak public awareness allow marine litter problems to keep escalating. This has prompted PERSGA to consider marine litter as one of the main components of the Regional Programme of Action for the Protection of the Marine Environment from Land-Based Activities (RPA). Management of solid wastes including marine litter is highlighted in Article 7 of the Protocol Concerning the Protection of the Marine Environment from Land-Based Activities in the Red Sea and Gulf of Aden, signed by the PERSGA member countries in September 2005. The protocol includes a clear commitment to taking appropriate actions to eliminate solid waste dumping in the sea.

Cooperation between PERSGA and UNEP/Regional Seas Programme and UNEP/GPA has initiated a “Framework Document of a Regional Action Plan for Sustainable Management of Marine Litter in the PERSGA Region.” The main purpose of the document is to identify threats posed by marine litter to the coastal and marine environments, and to assess the current situation of marine litter management and efficiency of treatment, instruments, programmes and initiatives in the region. The present document comes as an outcome of the PERSGA/UNEP collaboration and proposes a series of national and regional actions and activities for avoiding, mitigating, managing and treating the consequences of the problems associated with litter in the coastal and marine environment.



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Secretary General
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The document was developed based on questionnaires prepared and filled in by respondents from the member countries of PERSGA; feedback and recommendations from representatives of the countries at the Regional Workshop organized in April 2007 to discuss the previous draft version of the RAP; available reports and documents; and comments made by key staff of UNEP/RSP and an international marine litter consultant. The comments and recommendations were considered in drafting this document.

Many thanks go to all national specialists and consultants who devoted time to provide the information and data. Sincere appreciation and gratitude are afforded to the key staff of UNEP/RSP (Ellik Adler, Alberto Pacheco) and Ljubomir Jeftic for their technical assistance and continued support during the preparation of this document.

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ABBREVIATIONS AND ACRONYMS

ARA	Aqaba Region Authority
ASEZA	Aqaba Special Economic Zone Authority
CBO	Community-based Organization
CBD	Convention on Biological Diversity
EEAA	Egyptian Environmental Affairs Agency
EC	European Commission
EPA	Environment Protection Authority (Yemen)
EPC	Environmental Protection Council (Yemen)
HEPCA	Hurghada Environmental Protection and Conservation Association
ICC	International Cleanup Campaign
ISESCO	Islamic Educational, Scientific and Cultural Organization
IMO	International Maritime Organization
IUCN	World Conservation Union
GEF	Global Environment Facility
GESAMP	Group of Experts on the Scientific Aspects of Marine Pollution
GPA	Global Programme of Action for the Protection of the Environment from Land-based Activities
LBA Protocol	Protocol Concerning the Protection of the Marine Environment from Land-based Activities in the Red Sea and Gulf of Aden
MARPOL 73/78	International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978
MWE	Ministry of Water and Environment (Yemen)
NAP	National Action Plan [for Sustainable Management of Marine Litter]
NCICZM	National Committee for Integrated Coastal Zone Management (Egypt)
NCWCD	National Commission for Wildlife Conservation and Development (Saudi Arabia)
NGO	Non Governmental Organization
NPA	National Programme of Action [for the Protection of the Environment from Land-based Activities]
PERSGA	Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden

RAP	Regional Action Plan [for Sustainable Management of Marine Litter in the PERSGA Region]
RPA	Regional Programme of Action [for the Protection of the Marine Environment from Land-Based Activities in the Red Sea and Gulf of Aden]
PME	Presidency for Meteorology and Environment (Saudi Arabia)
PPP	Public-Private Partnership
RSP	Regional Seas Programme
RSGA	Red Sea and Gulf of Aden
SEAP	Saudi Environmental Awareness Program
SAP	Strategic Action Programme for the Red Sea and Gulf of Aden
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme

EXECUTIVE SUMMARY

This document provides a Regional Action Plan (RAP) for combating the marine litter problem and achieving its sustainable management within the Red Sea and Gulf of Aden. The RAP is consistent with global, regional and national initiatives; it was developed to meet the need for proper management of coastal and marine litter in the region.

The strategies, objectives and priority actions in this RAP are based on an assessment of coastal and marine litter in the PERSGA region. The assessment is derived from: information gathered through a standard questionnaire distributed to the member countries of PERSGA; data available from previous regional and national surveys; and relevant reports and documents. Section 2 of this document provides an account of the status of coastal and marine litter in the PERSGA region regarding the following:

- Land and sea-based sources of coastal and marine litter, their types and relative quantities;
- Impacts of marine litter including ecological, socio-economic and health impacts;
- Identification of previous and current monitoring, awareness and management initiatives and capacities; with an assessment of needs and gaps in knowledge, institutional and legislative capacities.

Recognizing the severe level of threat, and based on the assessment of the current status of marine litter in the region, the RAP defines in Section 3 a set of priority actions pertaining to a number of objectives, organized around the following objective-based components:

- 1) Public Awareness and Education;
- 2) Legal and Institutional Frameworks; and
- 3) Research and Monitoring.

An overview of each component's theme is given, and the specific objectives and priority actions are identified. Setting priority actions was based on the status and impacts of marine litter and responses to the problem in the region.

The RAP will be coordinated at the regional level through PERSGA, in liaison with other national and international agencies. In each member country, implementation will occur through integrated networks of national and local working groups, government departments, NGOs and other stakeholders. Owing to the variability in institutional capacities and the difference in the manifestation of the marine litter problem among the countries, it is necessary for national action plans (NAPs) to be developed for each member country in accordance with this RAP. The NAP for each country will assist in:

- Designating the level of urgency for each specific priority action according to the country's needs;
- Indicating realistic budgets; this will depend on the range of activities to be undertaken to achieve any specific priority action in the respective country;
- Designing a phased approach to implementation, subject to the budget and available national capacity;
- Determining time-frames and setting performance indicators for results, outcomes and impacts of the NAP;
- Integrating the NAP into national strategies for the coastal and marine environment in the light of their strong interconnectedness to each other;
- Designating the national stakeholders involved and determining their roles.

In the final section (Section 4), integration and financing of the RAP is discussed and implementation and financing mechanisms are suggested. PERSGA is in need of resource mobilization to implement the RAP on a wide scale.

1. INTRODUCTION

Marine litter has been defined as ‘any manufactured or processed solid waste material (typically inert) that enters the marine environment from any source’ (COE & ROGERS 1997). Depending upon its composition, marine litter/debris may sink to the sea floor, drift in the water column, or float on the surface of the sea. It is a problem that affects beaches/coastlines and the sea floor at all depths and its impact is of global significance. Litter has been recognized as a serious pollutant for around 30 years, but has only gained widespread recognition in the past decade or so.

Box 1. Common sources of marine litter (SHEAVLY 2004)

A) Land-based litter: blows, washes, or is discharged into the water from land areas. Sources include recreational beach-goers and fishers; materials manufacturers, processors and transporters; solid waste disposal and processing facilities; sewage treatment and combined sewer overflows; inappropriate or illegal dumping; and public littering. Marine litter reaches the coastal and marine environment in several ways including:

- i. Sewer overflows and sewage treatment plants* —treatment facilities are prohibited from discharging plastics into the marine environment. However, materials can bypass treatment systems and enter waterways during times when runoff exceeds the handling capacity of the sewage treatment facility.
- ii. Shore-based solid waste management practices* —both legal and illegal waste handling practices contribute to the presence of marine litter. The inadvertent release of litter from coastal landfills and garbage from water transport, recreational beach and roadside litter, and the illegal dumping of domestic and industrial garbage into coastal and marine waters are practices contributing to the marine litter problem.
- iii. Indiscriminate litter* —every piece of litter has a person’s face behind it. How people handle the packaging from convenience items, food wrappings, beverage containers, and a host of other materials constitutes the foundation for one of the most pervasive pollution problems plaguing the world’s oceans and waterways.

B) Ocean-based litter: Identified contributors and how discharged materials are transported include the following:

- i. Commercial fishing* —commercial fishing activities introduce marine litter into the oceans and waterways through intentional disposal, by discarding ship-generated trash overboard and by not retrieving excess gear, and through unintentional loss when gear wears out and is lost while deployed or the equipment operator makes a mistake and the gear breaks loose. Commercial fishing is associated with litter items such as nets and ropes, bags, and gill-net or trawl floats.
- ii. Recreational boaters* —some boaters discard trash overboard that contains food wrappers, beverage containers, various bags, monofilament fishing line and other related gear.
- iii. Merchant, military, and research vessels* —large vessels with extensive crew typically carry supplies for several months resulting in the daily production of solid wastes related to galley and operational activities, and materials used to cover containers and supplies; unsecured materials on deck can get loose and be blown overboard into the water.
- iv. Offshore petroleum platforms and supply vessels* —maritime activities related to undersea exploration and resource extraction may also contribute to the

marine litter problem. Similar to galley- and operational-type wastes associated with large vessels, activities on an oil/gas platform can result in the improper handling of trash generated from daily operations such as hard hats, sheeting, computer supplies, survey materials, as well as typical human-related trash produced by platform and supply vessel crews.

Ocean dumping is not a new phenomenon; it has been a practice for centuries. While habits of humans have not necessarily changed, the nature and quantity of marine litter has dramatically increased. Over the past 30 to 40 years, organic materials (once the most common forms of litter) have been replaced by synthetic products like plastics, as the primary material in solid waste. Durable and slow to degrade, items like beverage bottles, packing straps, and synthetic fishing line create a litter source with staying power. In addition, many of these items are highly buoyant, allowing them to travel in currents for thousands of miles, endangering marine ecosystems and wildlife along the way.

The widespread nature of coastal and marine litter, its inability to recognize borders, and the difficulties in identifying marine litter sources have made effective laws and regulative systems difficult to draft and even harder to enforce.

The Global Programme of Action (GPA) for the Protection of the Marine Environment from Land-Based Activities adopted in 1995, was developed for the protection of the marine environment from land-based activities. The GPA identified nine pollutant source categories and litter is one of them. The main objectives of the GPA on marine litter are:

- to establish controlled and environmentally sound facilities for receiving, collecting, handling and disposing of litter from coastal communities;
- to reduce significantly the amount of litter reaching the marine and coastal environment by the prevention or reduction of the generation of solid waste and improvements in its management, including collection and recycling of litter.

The Jeddah Convention of 1982, formally entitled "Regional Convention for the Conservation of the Red Sea and Gulf of Aden Environment," provides an important basis for environmental cooperation in the region. It was an outcome from a regional intergovernmental conference supported by the United Nations Environment Programme.

The regional intergovernmental conference also adopted a "Programme for the Environment of the Red Sea and Gulf of Aden (PERSGA)", and established a secretariat for the execution of the Programme in Jeddah. In addition, the conference produced two important instruments: (a) an "Action Plan for the Conservation of the Marine Environment and Coastal Areas in the Red Sea and Gulf of Aden"; (b) a "Protocol Concerning Regional Cooperation in Combating Pollution by Oil and Other Harmful Substances in Cases of Emergency." The provisions of the Jeddah Convention are complemented by those of MARPOL and the Basel Conventions.

PERSGA has taken the initiative to put together the "Preparatory and Fund Raising Phase" of the Regional Programme of Action for the Protection of the Marine Environment from Land-Based Activities in the Red Sea and Gulf of Aden (RPA/LBA). This initiative came about through coordination and with financial support from UNEP/GPA Coordination Office and the UNEP Regional Seas Programme. Two, integrated, key documents were produced. The first document, Part I, portrayed the "Road Map" for the Preparatory and Fund Raising Phase, while the second one, Part II, detailed the "Project Portfolio".

Management of marine litter in the PERSGA region is one of the proposed projects. This Regional Action Plan (RAP) for the sustainable management of marine litter has been prepared within the above mentioned framework.

The RAP strategies, objectives and actions are based on an assessment of coastal and marine litter in the PERSGA region. The assessment was derived from information gathered through a standard questionnaire (Annex 1) distributed to the member countries of PERSGA; data available from previous regional and national surveys; and relevant reports and documents. Section 2 of this document provides an account of the status of coastal and marine litter in the PERSGA region. The proposed strategies and actions of the RAP are given in Section 3.

2. STATUS OF MARINE LITTER IN THE PERSGA REGION

2.1 SOURCES OF MARINE LITTER

Marine litter is traditionally classified into *land-* or *ocean-based*, depending on its source. Other factors such as ocean current patterns, climate and tides, proximity to urban centres, industrial and recreational areas, shipping lanes, and commercial fishing grounds influence the type and amount of marine litter found along beaches, floating in the open ocean, or underwater.

According to GESAMP (1991), land-based sources account for up to 80% of the world's marine pollution. Much of the litter reaches the ocean from beach-based activities, being blown into the water or picked up by tides. More is carried by creeks, rivers, storm drains and sewers to ocean areas. Other litter comes from activities on the water, from small sailboats to large ships, offshore drilling rigs and platforms, and fishing piers (Box 1). While there are laws regulating the dumping of trash at sea and on shore, the global nature of litter, its inability to be confined within territorial boundaries, and the complexity of identifying litter sources have made effective laws difficult to draft and even harder to enforce.

In the PERSGA region, several sources of marine litter pollution were listed by respondents to the questionnaire. These include sewage treatment works, combined sewer overflows, fishing industry, aquaculture, municipal wastes, shipping, urban run-off, industrial discharge, oil refineries, oil rigs, fly tipping, and recreational and leisure activities. Quantitative estimates for the contributions of the different sources to the problem were not given by most PERSGA member countries. In Jordan the major source for marine litter is from recreational and leisure activities, contributing approximately 67% of the total quantity of marine litter discharged over three years (2003-2007), while shipping and port activities contributed 30% and the fishing industry only 3%. In Yemen, qualitative estimates indicate the fishing industry, urban run-off, shipping, oil rigs, agricultural and municipal wastes as the major sources of marine litter (Annex 2a).

Available reports (e.g., PERSGA/GEF 2001; PERSGA 2006) provide some further information on major sources of marine litter in the other member countries. In Djibouti, solid wastes are dumped on the shore. The household-waste dumping sites in Douada and Djibouti towns represent major sources of coastal and marine litter that reaches the sea via run-off. A similar situation is found on the northern coast of Somalia, especially in Bosaso, Berbera and Saylac towns. In Egypt, the major marine litter discharges were reported to be from urban and recreational garbage areas. In Sudan, solid wastes are dumped on the shore near human habitation, especially in Port Sudan, forming large garbage sites from which marine litter washes into the sea through run-off or due to winds. In Yemen, particularly near rural villages, the beaches have accumulated litter dumped by local inhabitants in the absence of effective collection services. In Jeddah, Saudi Arabia, while most beach sites are private, litter is often observed floating on inshore surface water in the vicinity of coastal resorts. Along the South Corniche however, which is visited by the public for recreational purposes and extends up to 50 kilometres from the city centre, the municipal cleaning services are not effective and many types of litter are dumped, mainly plastic items on the beach. In general, it is the local inhabitants that cause litter to accumulate on the beaches in the region.

Unfortunately some wadis are used as landfills and dump areas by both municipalities and people living in the area. This garbage and its associated litter may then be carried to the sea after rainstorms.

2.2 TYPES OF MARINE LITTER

Marine litter can be classified into a variety of different types or categories. A review of the available data on marine litter found worldwide indicates that the types of litter reflect our patterns of consumption (including food wrappers, beverage containers, cigarettes, etc.), transportation (boats and ships), and the materials used to harvest from the sea (fishing line/nets and gear).

In the PERSGA region diverse types of marine litter were reported from the coastal and marine environment (Box 2).

Box 2. A list of the principal types of marine litter found in the PERSGA region

- Plastics (fragments, sheets, bags, containers)
- Polystyrene (cups, packaging, buoys)
- Rubber (gloves, boots, tyres)
- Wood (construction timbers, pallets, fragments of both)
- Metals (drink cans, oil drums, aerosol containers, scrap)
- Sanitary or sewage related litter
- Paper and cardboard
- Cloth (clothing, furnishings, shoes)
- Glass (bottles, light bulbs)
- Pottery/ceramics
- Munitions (phosphorus flares)
- Fishing nets
- Abandoned/lost fishing gear

Broad estimates of the total and relative amounts of the different marine litter types are available for some PERSGA member countries, mainly from the results of the questionnaire (Annex 2a) and from some previous reports. From about 1.2 tonnes of marine litter collected in Jordan during 2003-2005, plastic and rubber together represented 59%, metals 18%, glass 15%, and the rest (fishing equipment, paper and others) 8%. In Yemen, qualitative estimates of the quantities of marine litter suggest that plastics and metals are also the dominant types. In Al Salif city (Plate 1) on the Red Sea coast, litter accumulates with piles of plastic bags. Along the inshore Hadramout (Gulf of Aden), over 25 types of litter, including rubbish and discarded fishing gear, were reported along one kilometre (MWE/EPA 2003). In Djibouti, litter and refuse consists mostly of plastics, glass bottles and discarded fishing nets. These occur throughout the Iles des Sept Frères and Ras Siyyan, especially in areas frequented by people. The distribution of coastal and marine litter in some marine protected areas (MPAs) in the region was reported by PERSGA prior to their declaration; Iles des Sept Frères and Ras Siyyan MPA in Djibouti (Figure 1), and Mukawwar Island and Dugonab Bay MPA in Sudan (Figure 2).

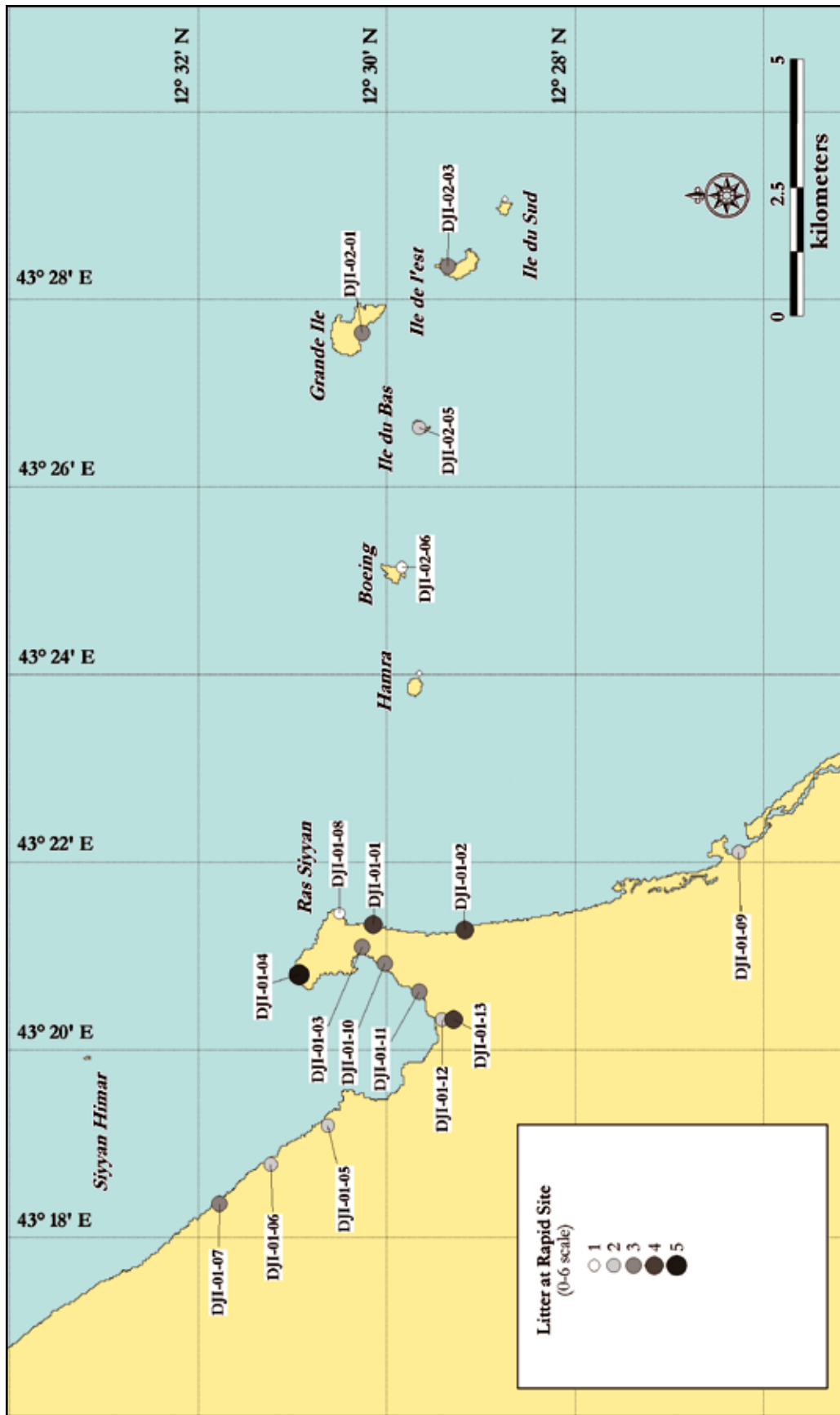


Figure 1: The distribution and abundance of marine litter in Iles des Sept Frères and Ras Siyyan MPA (Djibouti), 2002. (source: PERSGA 2002b).

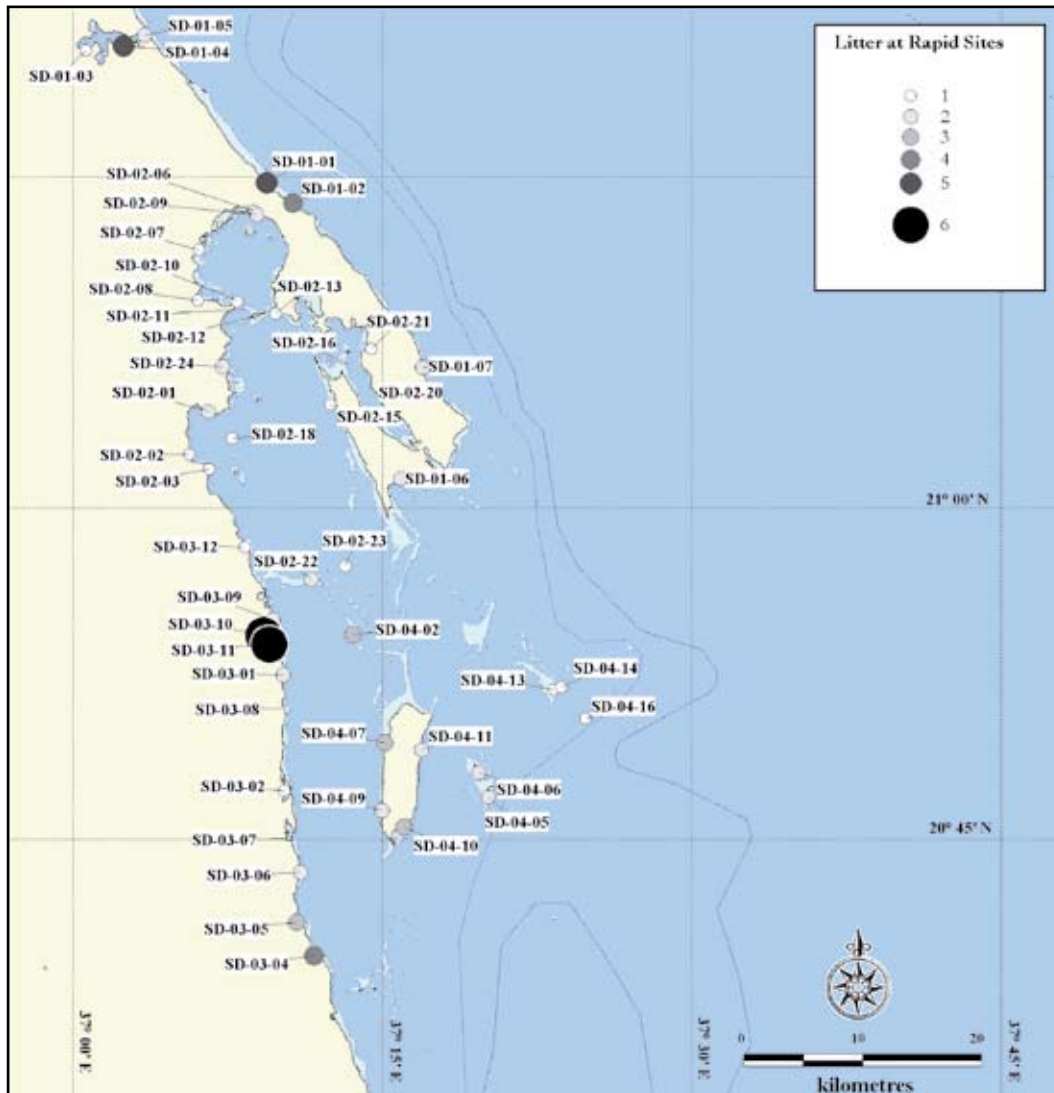


Figure 2: The distribution of litter in 2002 in Mukawwar Island and Dungonab Bay MPA prior to the MPA declaration in 2005 (source: PERSGA/GEF 2004a).

The lack of quantitative data on marine litter types and sources in the region is attributed to the lack of marine litter monitoring and research.

2.3 IMPACTS OF MARINE LITTER

2.3.1 Fishing Gear and Ghost Fishing

One source of marine litter that requires special attention is derelict fishing gear (ghost fishing), composed of both whole and incomplete sections of nets, in addition to discarded fishing lines and the plastic parts of traps and nets. Whether intentionally discarded or unintentionally lost during storms or fishing operations, derelict fishing gear poses serious threats around the world, trapping marine life, destroying coral reefs and other habitats, and even posing danger to humans. Currently, almost all fishing nets used outside of subsistence fisheries are made of synthetic fibres that are highly resistant to degradation. Though there is increasing recognition of the problem of ghost fishing few studies have been conducted

since 1994 (LAIST & LIFFMANN 2000). Limited evidence from studies conducted in the Atlantic suggests that discarded gear may be responsible for significant losses of some commercially valuable fish and crab species (LAIST 1997). Ghost nets are perpetual “killing machines” that never stop fishing (ESTEBAN 2002). Worldwide, this phenomenon is having an impact on the sustainability of already stressed fisheries. Lost fishing gear costs money to replace and can take a hefty toll on the marine environment and its inhabitants.

In the PERSGA region, the extent and impacts of ghost fishing are largely unknown. UNEP’s Asian Tsunami Force estimated that 500 fishing nets, 1,500 octopus crabs and 8,000 lobster traps were lost to the sea along the Yemeni Gulf of Aden as a result of the December 2004 tsunami. Fishers on the island of Socotra also lost approximately 174 fishing nets and 37 hook lines (UNEP 2005).

2.3.2 Breakdown of Plastic Products and their Toxicity

The amount of plastic in the marine environment has been shown to be greater than previously thought. Analysis of samples collected from three beaches in Northumberland showed that some contained more than 10,000 microscopic fibres per litre of sand (THOMPSON & HOARE 1997). Although the origin had not been identified, the fibres appeared worn and abraded and were probably being broken up into even smaller fragments by sand grains. Anecdotal evidence suggests that breakdown of plastic products may well be a potential source of toxic chemicals (DAY 1985). Plastic litter breaks down in the environment releasing chemicals (plasticizers and other polymer constituents) and particulates into the sea. Some of these substances may be persistent and others are known to exert adverse biological effects at very low concentrations.

The little data available on coastal and marine litter in the PERSGA region suggest that plastic products are the most commonly encountered litter type in the coastal and marine environment. The concentration of persistent and toxic chemicals, released as the plastics slowly degrade, may increase due to the semi-enclosed nature, limited water circulation and exchange of the Red Sea.

2.3.3 Human Health and Safety

Items such as broken glass, medical waste, rope, and fishing line pose immediate risks to human safety. Discarded syringes and tampon applicators can indicate more serious water quality concerns that affect human health. Swimmers, divers and snorkelers can become entangled in submerged or floating litter. Medical and personal hygiene litter often enters the waste stream through direct sewage outflows or inadequate sewage treatment systems. These items can indicate the presence of invisible pathogenic pollutants such as streptococci, faecal coliforms, and other bacterial contamination. Consumption or contact with water polluted with these pathogens can result in infectious hepatitis, diarrhoea, bacillary dysentery, skin rashes, and even typhoid and cholera (SHEAVLY 2004).

The most pressing issue in the member countries of PERSGA is the poor management of wastewater. In some countries, coastal and marine litter poses risks to human health. The dumping of household/sanitary solid wastes on the shore and the discharge of untreated sewage represent a problem in several localities in the region (e.g., Djibouti, northern coast of Somalia). During periods of heavy rain, leaching of substances from rubbish dumps near the shore poses a hazard. This represents a source of contamination of ground and surface water supplies, and attracts insects which are the vectors of diseases. However, the impacts of coastal and marine litter on human health are still largely unknown in the region.

2.3.4 Aesthetic and Economic Impacts

The presence of marine litter along shorelines can lead to serious economic problems for regions that are dependent on tourism (BUXTON 1990). Such concerns can also lead to higher maintenance costs for resorts, parks and communities. Litter makes shorelines unattractive and hazardous, and can inhibit tourism. Marine litter is not only ugly and dangerous, it can also deplete a coastal community's finances through increased beach maintenance costs. The indirect costs, though, are perhaps even greater. Its presence discourages people from partaking in coastal activities such as recreational fishing, boating, swimming, or beach going. It deters tourists from visiting coastal areas.

Degradation of marine habitats and loss of their aesthetic values have been highlighted as among the most serious impacts of marine litter (PERSGA/GEF 2001). The attractive seascapes, coastal and marine life and favourable climate have encouraged the rapid development of the tourist industry along the coasts of the Red Sea and Gulf of Aden. Coastal tourism has been actively developed in Egypt and Jordan; Yemen and Sudan, are striving to promote their young tourist industries (PERSGA/GEF 2001).

Tourism is the third most important source of revenue in Egypt. In 2000, 22.2% of the country's total hotel capacity was located along the Red Sea coast (PERSGA/GEF 2001). Jordan has a growing tourism industry centred on Aqaba. In 2001, 66% of tourists entering Jordan visited Aqaba (PERSGA/GEF 2001, 2003). Given the economic importance of coastal tourism to the northern parts of Red Sea and the potential for the tourist industry in its central and southern parts, marine litter must be considered as a serious problem with significant impacts on the national economies in the region.

2.3.5 Wildlife Entanglement and Ingestion

Many forms of marine litter—including derelict fishing gear—pose numerous threats to wildlife. Litter that entangles a living creature can hamper its mobility, prevent it from eating, or suffocate it. Some types of litter can inflict lethal cuts and wounds. Monofilament line, fishing nets and ropes, six-pack rings, and strapping bands used for packing are some of the more harmful culprits related to entanglements. Birds, for example, often become entangled in trash they have selected for nesting. According to the U.S. Marine Mammal Commission, 136 marine species have been reported in entanglement incidents, including six species of sea turtles, 51 species of seabirds, and 32 species of marine mammals (MARINE MAMMAL COMMISSION 1996). Litter that has wrapped around limbs and fins can cause circulation loss and amputation, especially as the animal grows. Animals slowed down by trailing litter are more vulnerable to predators. Heavy plastic sheets and other large litter smother or trap benthic animals and drown those that must rise to the surface to breathe. Ingested, litter can lead to strangulation or digestive problems.

The Marine Mammal Commission (1996) also reports that ingestion incidents have been documented in six of seven species of sea turtles, 111 out of the world's 312 species of seabirds and 26 species of marine mammals. Sea turtles confuse floating trash and food bags with jellyfish, one of their favourite food items. Seabirds, too, are vulnerable to the unintentional ingestion of litter because of their indiscriminate eating habits. Many animals cannot regurgitate an item once it has been swallowed, and it often becomes lodged in their throats or digestive tracts. Litter that will not pass out of the stomach gives a false sense of 'fullness', causing some animals to stop eating and slowly starve to death.

The Red Sea and Gulf of Aden contain globally important feeding and nesting grounds for green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*) and loggerhead (*Caretta caretta*) turtles. Two other turtle species, leatherback (*Dermochelys coriacea*) and olive

ridley (*Lepidochelys olivacea*) are infrequently seen but no nesting has been recorded. Accumulated litter such as timber, discarded nets, solid wastes and plastics, has been reported as an important factor that can deter females from nesting (PERSGA/GEF 2004b). There are 31 Important Bird Areas (IBA), 17 true seabird species, including three endemic ones, and 14 other water bird species recorded from the Red Sea and Gulf of Aden (RSGA). Despite comprehensive survey efforts by PERSGA in the past few years, there is a shortage of data on the impacts of marine litter on turtles and seabirds in the region.

Marine mammals are under attack in the PERSGA region. Of the 15 species of marine mammals known to occur in the RSGA, two are Threatened species (Endangered or Vulnerable), five are dependent upon conservation actions to prevent their listing as Threatened, five are insufficiently known to assign a conservation status, and only three are considered Secure.

Dugongs are listed as Vulnerable by the IUCN and are protected in the region. The number of dugongs to be found off Jizan and Farasan Islands (Saudi Arabia) and in Mukawwar Island and Dungonab Bay MPA (Sudan) has declined, probably due to losses from accidental drowning in fixed fishing nets (PERSGA 2006). Though enough information is not available, it is quite reasonable to assume that entanglement in discarded nets may have contributed to the decline of dugong populations in the region.

The impact of marine litter (through entanglement or ingestion) on the threatened species in the region is largely unknown. However, one of the main issues for marine mammals in the region is accidental drowning (PREEN 2004; PERSGA 2006) suggesting possible impacts from ghost fishing.

2.3.6 Habitat Destruction and Alien Species Introduction

Litter affects the water quality of aquatic habitats and causes physical damage, such as abrasion or covering on coral reefs and smothering of seagrass beds. Lost fishing gear, in the form of nylon ropes, nets and fishing line, once entangled in coral reefs and other benthic communities can cause significant damage, with effects that can last for many years. Ropes and nets, twisting and moving with currents and tides, abrade, scour, break and destroy living corals. Ensnared litter may also cause increased siltation and turbidity reducing essential sunlight or smothering seagrasses.

Additionally, marine litter floating for great distances may act as transportation for invasive species. Marine litter drifting on ocean currents eventually becomes home to entire communities of encrusting and attached organisms—living rafts capable of carrying potentially harmful, non-native species of animals and plants to the far corners of the globe.

In the PERSGA region solid wastes (e.g., polythene bags, bottles and metal cans) are often dumped directly into mangrove stands or dumped nearby and transported in by wind and water, becoming trapped among stems and aerial roots, even blocking mangrove tidal channels (PERSGA/GEF 2004c). This problem is especially serious in several mangrove stands in Egypt and Yemen (PERSGA/GEF 2004c; PERSGA 2006). Similar impacts have been reported on coral reefs near diving centres and major fish landing and human settlement sites.

In Somalia, solid waste pollution is a major problem (PERSGA 2006). Near human settlements in the country, especially Bosaso, Berbera and Saylac, solid waste is dumped on the shore and in the sea. Such activities are likely to be locally detrimental to nearshore habitats and their associated species, in addition to degrading the visual amenity of the coastal zone.

2.3.7 Vessel Damage

Lost fishing gear invisibly floating just below the water's surface poses a significant risk to vessel operations. The entanglement of propellers and rudders by nets, ropes and other derelict gear has been documented. This leads to costly repairs, significant loss of operational time, and endangers both boat and crew safety. One of the most common causes of burned-out water pumps in recreational boats is from plastic bags blocking water intakes. A burned-out water pump in a recreational boat results in costly engine repairs and disablement of the vessel—a potentially dangerous scenario if the problem occurs at sea.

In many fishing areas of the Red Sea and Gulf of Aden, the lack of fisheries services, in terms of repairs of fishing gear and maintenance workshops for outboard engines and fibreglass boats, has been indicated as a limiting factor for any increase in fishing effort. Much of the equipment deteriorates due to lack of repair and maintenance (PERSGA 2002a). The true scope and frequency of damaging encounters between litter and fishing/recreational vessels is difficult to estimate as most incidents go unreported.

2.4 CURRENT MANAGEMENT AND MONITORING OF MARINE LITTER

In the PERSGA region, municipalities are the principal authorities responsible for the collection of garbage. However, it is obvious from the data provided in the questionnaire and previous survey reports that the quantities of garbage discharged in coastal rural and urban areas are far beyond the capacities of collection and management. In many coastal areas solid waste management is either inadequate or lacking altogether (PERSGA/GEF 2001). Upgrading solid waste and wastewater managements have previously been identified by the PERSGA member countries as important priorities for controlling land-based pollution (PERSGA/GEF 2001; PERSGA 2006).

A monitoring programme for coastal and marine litter exists in Jordan. In contrast, the other member countries lack such a programme.

2.5 PUBLIC AWARENESS AND MANAGEMENT INITIATIVES

Ineffective management practices aside, one of the major problems affecting marine pollution in the PERSGA region is the lack of public awareness and limited understanding of the environmental impacts of solid waste (PERSGA 2006). Threats to the environment have arisen rapidly in recent decades in conjunction with increasing urbanization and coastal development. Recognizing this, several initiatives have been undertaken at both regional and national levels.

At the regional level some capacity building has been developed (via training workshops) in the following subjects:

- Management of solid wastes in industrial areas
- Coastal zone management
- Environmental impacts of development projects
- Improvement of wastewater management
- Environmental inspection

PERSGA has taken a leading step by formulating the "Preparatory and Fund Raising Phase" of the Regional Programme of Action for the Protection of the Marine Environment from Land-Based Activities in the Red Sea and Gulf of Aden. This initiative was undertaken in close coordination and with financial support from the UNEP/GPA Coordination Office and the UNEP Regional Seas Programme. Two integrated, key documents were produced. The first document, Part I, describes the "Road Map" for the Preparatory and Fund Raising Phase, while the second, Part II, detailed the "Project Portfolio". Management of marine litter in the PERSGA region is one of the proposed projects.

There have been other management responses and initiatives carried out by PERSGA that principally, or in part, take the problem of marine litter into account. These include development of Coastal Zone Plans, Regional Action Plans for key habitats and key species, Master Plans for Marine Protected Areas, hydrographic surveys and navigation aids to reduce risks of pollution, etc. The progress made in these fields is outlined in *The State of the Marine Environment Report* (PERSGA 2006).

PERSGA's environmental awareness programme concentrated on conservation including the production of an Environmental Education Learning Supplement, and implementation of 17 community participation projects including clean-up campaigns. Five public information centres and 150 school nature clubs have been established within the region. These activities, carried out through the Strategic Action Programme (1998-2003), have raised awareness of PERSGA and its concerns at the national, regional and international levels. Currently, national awareness projects are executed by PERSGA within its On-ground Activities Programme in Jordan and Djibouti.

National efforts addressing the marine litter problem are largely confined to the joint work with PERSGA in the activities described above (Annex 2c & 2d). Some added efforts, including clean-up campaigns, are noticeable in Egypt, Jordan, Saudi Arabia and Yemen.

In Egypt, occasional beach clean-up activities are undertaken. NGOs, mainly the Hurghada Environmental Protection and Conservation Association (HEPCA), the private sector (e.g., Coca Cola Company, Padi Intl. Ltd.) and volunteer citizens participate in such activities. In Jordan, daily beach clean-up activities and monthly clean-up dive campaigns are undertaken in the Aqaba Marine Park, besides participation in the Annual International Coastal Cleanup campaigns. The Saudi Environmental Awareness Program (SEAP) is responsible for conducting activities to raise awareness of the marine environment. In 2004 there were underwater clean-up campaigns. For example, in Jeddah there was a large, official, near-shore, underwater clean-up campaign launched jointly with the private sector and diving centres, including Desert Sea Divers. Some NGOs, such as Reef Chief, conduct awareness activities in the coastal areas of Saudi Arabia. Other community-based organizations (CBOs) such as Friends of the Environment, undertake similar activities in Yemen.

As a pioneer step in the PERSGA region, Yemen developed a NPA (National Programme of Action for the Protection of the Marine Environment from Land-Based Activities) in 2003 as a pilot project with financial support from the UNEP/GPA Coordination office. Litter was addressed as a high priority problem in the NPA. Beach clean-up campaigns were launched in the Gulf of Aden during the NPA development (Plate 1). School students, male and female, along with a local CBO took part in the campaigns which received national media coverage.



Plate 1: A clean-up campaign launched in Aden during Yemen's NPA Project, 2003.

Recently, PERSGA took an important step towards the development of this RAP. It dedicated its 2006 Annual Campaign Day (26 September) to marine litter, designing a poster (Plate 2) and launching beach clean-up campaigns in the member countries.

As noted in this section, there have been sporadic management and public awareness initiatives at both regional and national levels. However, there is a general lack of regional and national sustainable actions addressing marine litter.



Plate 2: The 2006 PERSGA Day poster with the slogan “No Litter Clean Coasts”.

2.6 LEGISLATION ADDRESSING MARINE LITTER

There would appear to be ample national legislation related to the coastal and marine environments of the PERSGA member countries (Box 3). However, the implementation of such regulations is grossly inadequate mainly due to lack of: —awareness, sufficient capacities, earnestness, and coordination between different authorities, in addition to a lack of sufficient updating of the laws.

Box 3. National laws and regulations pertaining to the marine environment in the member countries of PERSGA (source: PERSGA/GEF 2001, 2003)¹

Djibouti: There are 31 national laws, regulations, orders and decrees addressing protection of coastal and marine environments in Djibouti, including provisions on marine pollution, protection of endangered species, designation of protected areas (Moucha and Maskali Islands; Isles des Sept Frères, Ras Siyyan), and ratification of regional and international conventions and agreements.

Egypt: There are 14 national laws, regulations, orders and decrees pertaining to coastal and marine environments in Egypt. These concentrate on prevention of pollution, cleaning ports/territorial waters, fishery regulation, maritime transport, trade, navigation safety, protected areas and coastal zone management. Another set of institutional decrees ratify the country as signatory of some 22 regional and international conventions addressing the subject. Although several authorities are involved in implementing marine and coastal environmental legislation, the Egyptian Environmental Affairs Agency (EEAA), and the National Committee for Integrated Coastal Zone Management (NCICZM) are the principal players. The main objectives of the NCICZM (established in 1994) are to evaluate major projects, approve rehabilitation programmes, ensure presence of contingency arrangements, coordinate coastal activities and specify the mandates of the different authorities involved, and ensure balance between development projects and the carrying capacity of the ecosystems in the coastal zone. Twenty-one sites have been designated as protected areas, those located on the Red Sea comprising most of the Egyptian Red Sea coast.

Jordan: There are several national laws and regulations related to coastal and marine environments, including (year of enactment is given between brackets): Law of Environmental Protection No. 12 (1995), Jordan Specification Standards No. 202 (1982) & 893 (1994), Law of Aqaba Region Authority (ARA) No. 7 (1987), Port Services Fees Law No. 20 (1987) & No. 49 (1976), Agricultural Law No. 20 (1973), Aqaba Port Quarantine Law No. 32 (1972), and Shipping Law No. 51 (1961). Jordan is party to eight principal international conventions relevant to the protection of the Gulf of Aqaba. The Aqaba Special Economic Zone Authority (ASEZA), formerly known as ARA is the principal national authority responsible for development and management of the coastal zone.

Saudi Arabia: Twelve royal and ministerial decrees related to marine and coastal area environments have been developed. They include regulations regarding seaports and lighthouses, fisheries and living aquatic resources, pollution prevention, sewage treatment, environmental management, coastal construction and landfills, the regulatory authority of the Presidency for Meteorology and Environment (PME) and

¹ Extracted from SAP Country Reports (PERSGA/GEF 2001) and a document on national legislation (PERSGA/GEF 2003). Refer to the original documents for further details.

the foundation and authority of the National Commission for Wildlife Conservation and Development (NCWCD). Although several authorities are involved in guarding and implementing marine and coastal environmental legislation, PME and NCWCD are the most concerned. Saudi Arabia is also a signatory to 4 bilateral or regional, and 12 international agreements and conventions.

Somalia: Somalia had, before the collapse of the central government in 1990, around 10 national decrees and laws regulating port administration, fisheries, shipping and maritime transport. The country was also a signatory to 8 regional and international agreements and conventions. As the central government (implementing authority) has been absent since 1990 and the new entities are not recognized by the international community, this legislation is not now in effect.

Sudan: There are 27 federal and state laws and regulations related to protection of coastal and marine environments in Sudan. The country has also signed 43 regional and international agreements and conventions on the subject. According to the Federal Constitution, environmental policy and protection is a shared responsibility between the Federal Council for Environment and Natural Resources and the relevant councils in the different states.

Yemen: There are 14 principal laws and decrees related to coastal and marine environments. These address environmental protection from pollution and regulate fisheries, urban planning, land tenure, construction activities, urban planning, marine affairs, shipping, ports and harbours, tourism, free zones, mining, protected areas and ‘involved local authorities’. Yemen is signatory to 11 international agreements and conventions on the subject. According to Environmental Protection Law, the Environment Protection Authority (EPA) is the official government agency responsible for developing the general national policy for the environment and coordination with the concerned bodies which should adhere to, and are obliged to implement, decisions, resolutions and recommendations of the EPA.

An important step was taken towards a coordinated regional approach with the signing by PERSGA member countries in 2005 of the “Protocol Concerning the Protection of the Marine Environment from Land-Based Activities”, which represents an addition to the Jeddah Convention. This Protocol has Article 7 titled “Management of Solid Waste” (Box 4).

Box 4. Quotation of Article 7 (Management of Solid Waste) from the PERSGA LBA Protocol

Parallel to the Global Programme of Action, wastes or marine litter dumped in the coastal zone should be taken into consideration to avoid the risks imposed on marine life. Based on the Assessment Report, dumping solid wastes in the coastal zone of the Protocol Area represents a major cause of damage to coastal and marine habitats as well as the destruction of its aesthetic values. This ultimately results in negative impacts on coastal development, particularly the tourist industry. Incineration of wastes is a process that causes numerous persistent, toxic and biologically accumulative emissions.

Therefore, the Contracting Parties commit themselves as follows:

1. Taking all appropriate action to ensure elimination, to the greatest extent possible, of the solid wastes and litter reaching the marine and coastal environment by prevention or reduction of solid waste generation and by introduction of enhancements to waste treatment, including methods of collection and recycling and final disposal thereof.
2. Cooperating with each other, and with international organizations, on exchange of information relevant to the practices and experiences relating to solid waste management, recycling, reuse, and cleaner production processes.

3. STRATEGIES AND ACTIONS

3.1 APPROACH AND FRAMEWORK OF ACTIONS

The strategic approach, objectives and actions for this Regional Action Plan (RAP) were identified on the basis of assessment of the status and management of coastal and marine litter in the region. The RAP is consistent with global, regional and national initiatives; it was developed to meet the needs for proper management of coastal and marine litter in the region.

To assist the implementation of the RAP, the framework for action is constructed of the following three objective-based key components:

1. Public Awareness and Education,
2. Legal and Institutional Framework, and
3. Research and Monitoring.

For each component, an overview of the component theme is given, and the objectives and priority actions are then identified. Setting priority actions was based on the status and impacts of marine litter and the response to the problem in the region.

The RAP will be coordinated at the regional level through PERSGA, in liaison with other national and international agencies. In each member country of PERSGA, implementation will occur through integrated networks of national and local working groups, government departments, NGOs and other stakeholders. As there are clear differences in institutional capacities and in the manifestation of the marine litter problem among the countries, it is necessary to develop national action plans (NAPs) for each member country in accordance with this RAP. The NAP for each respective country will assist in:

- Designating the level of urgency for each specific priority action according to the country's needs;
- Indicating realistic budgets—which will depend on the depth and range of activities to be undertaken to achieve any specific priority action;
- Drawing a phased approach to implementation, subject to the budget and available national capacity;
- Indicating time-frames and performance indicators for results, outcomes and impacts of the plan;
- Integrating the plan into national strategies for the coastal and marine environment in the light of their strong interconnectedness to each other;
- Designating the national stakeholders involved and their roles.

3.2 ACTIONS

3.2.1 Awareness and Education: Overview, Objectives and Actions

Overview

Awareness and education are essential tools contributing to environmental protection. Reducing marine litter will require preventing litter from reaching the coastal and marine environments in the first place. Raising public awareness and encouraging people to choose better options is an important part of the response of governments to the issue. While education and clean-up initiatives have made a substantial contribution to improving the ocean environment, the litter, trash and garbage that continues to accumulate on beaches and in the oceans indicates that many people have not yet changed their behaviour. This situation is regularly encountered in the PERSGA region.

The participation of all sectors of society is an essential requirement for the development of sustainable policies in the region. It requires the development of education projects, transparent and participatory decision-making procedures and open rules on access to administrative and judicial procedures. In many countries NGOs, civil society and the private sector are involved in the development and implementation of both national and regional policies aimed at rehabilitating and protecting the marine ecosystem and the sustainable use of its natural resources. Though often strongly challenged by non-profit organizations, the most forward-looking government officials have welcomed them as observers to many of their meetings.

Coastal clean-up campaign programmes are common in many countries of the world. They have proven to be effective in the removal of litter from the marine environment and to be excellent tools for data collection for the assessment and monitoring of the status of coastal and marine litter.

Historically, PERSGA had a public awareness component within the eight objective-based components of the Strategic Action Programme (SAP), carried out between 1999 and 2003. Some awareness materials were produced: "A Letter to the Beach Visitor" and "Clean-up Dive Instructions". Many local school environmental clubs, established through the SAP, took part in clean-up campaigns launched jointly with NGOs and other stakeholders. The awareness programme has continued but with fewer activities and is in need of enhancement. It can form the basis of future awareness and education programmes addressing the problems of coastal and marine litter.

This RAP component has **three objectives**. The aim of these objectives is to reduce and/or prevent the accumulation of litter on beaches and in the sea through the involvement of a wide range of stakeholders including rural coastal communities. A set of priority actions are listed under each objective that will lead to the desired results.

Objective 1: To raise public awareness of the impact of marine litter on coastal and marine environments.

Actions:

- I. Produce and distribute appropriate awareness materials (leaflets, posters, T-shirts, caps, video and documentary radio and TV programmes, etc.) on the importance of the protection of the coastal and marine environments from litter (in Arabic, English and French) for :
 - Children, school students, urban coastal communities on: impacts of littering on beaches on coastal environments and human health;
 - Fishermen on: impacts of abandoned fishing gear on marine resources and habitats (ghost fishing);
 - Diving centres and divers on: impact of littering in the sea on marine resources and habitats;
 - Interested specialists and policy makers on: negative effects of marine litter and the importance of actions for the protection of the marine environment from litter.
- II. Organize local awareness workshops and seminars on the impact of marine litter for separate target stakeholders (e.g., schools, fishing communities, private sector, and decision makers).
- III. Encourage participation of local media and press in the awareness activities on marine litter in the region.

Objective 2: To clean-up litter from the coastal and marine environment.

Actions:

- I. Develop a regional clean-up programme for the PERSGA region.
- II. Establish regional clean-up groups and local team members within each member country for:
 - Beach clean-up campaigns
 - Underwater clean-up campaigns
 - Watershed clean-up campaigns (wadis and drainage areas).
- III. Develop regional membership strategies for clean-up campaigns within the PERSGA clean-up programme.
- IV. Establish and launch a yearly regional clean-up campaign within the framework of the annual PERSGA work plan.
- V. Promote voluntary clean-up campaigns in the member countries.
- VI. Encourage involvement of local municipalities in the clean-up campaigns.
- VII. Foster participation of the PERSGA school clubs in the clean-up campaigns.
- VIII. Liaise with the International Cleanup Campaign (ICC) regarding the organization of campaigns and the development of public awareness materials.

Objective 3: To educate several stakeholder groups on marine litter issues.

Actions:

- I. Develop a regional, sustainable, education programme for protection of the marine environment from litter in the PERSGA region.
- II. Prepare educational materials for school teachers on protection of the coastal and marine environment from litter.
- III. Promote:
 - Development of an educational programme for cruise line passengers on MARPOL and the Special Area designation of the region;
 - Implementation of local municipality/council cleaning education efforts within the local programmes aimed at cleaning the city and at building community pride.
- IV. Provide further education and training to ship owners, ship operators, crews, port users, fishermen and recreational boat users, with regard to their responsibilities to prevent marine pollution.
- V. Work with the international travel industry to educate consumers about the importance of the MARPOL treaty in the protection of the marine environment.

3.2.2 Legal and Institutional Framework: Overview, Objectives and Actions

Overview

Effective legislation and adequate institutional capacities are considered as essential components for proper management of marine litter. There is a need for development and enforcement of legislation for the protection of the coastal and marine environment from litter in the PERSGA region. Strengthening capacity of governmental institutes is a necessary action for this purpose.

The member countries of PERSGA should have specific legislation and institutional capacity to deal with litter and the problems associated with litter accumulation. It is recommended that regulations be adopted to:

- Give a sense of responsibility to those who intervene to maintain public places or are in possession of waste (administrators of public domains, producers, transporters, or those responsible for waste treatment and disposal);
- Allow for classification of waste by nature and origin;
- Promote the use of biodegradable packaging materials especially for objects intended to be abandoned in the wild (agriculture, balloons) or used on ships and platforms;
- Require regular and specific follow-up of waste from production to disposal;
- Require the introduction of national and regional solid waste management plans;
- Establish enforcement procedures on the coastal zone (period and frequency of clean-up according to zones, frequency of the collections adjusted to the rate of filling);
- Impose severe penalties on offenders through the application of the “polluter pays” principle, and prepare the necessary legal context to be able to apply this principle.

Legislation dealing with the marine environment will often mandate a line ministry or executive agency to prepare management or development plans and establish procedures for granting authorizations. Usually, the executive agency or official responsible will have wide discretion as to how these duties are performed. However, in some instances it may be helpful to stipulate various general principles that the executive agency or official must take into consideration. This technique has the advantage of requiring important but legally imprecise principles to be formally considered. The disadvantage is that the enforcement of such provisions may be difficult, particularly where non-governmental organizations and members of the public do not have legal standing to challenge the validity of plans and administrative decisions in court.

Management of the shipping industry is believed to play a vital role in the reduction of wastes into the marine environment. The PERSGA region has been identified as a “Special Area²” by the International Maritime Organization (IMO), the body that is responsible for the MARPOL Convention.

² The PERSGA region approximates but does not correspond exactly to the geographical boundaries described in the MARPOL convention. Though designated as a “Special Area”, this will not come into force until the countries in the region have notified IMO that the necessary conditions, such as port reception facilities for wastes, have been complied with.

Annex V (prevention of pollution by garbage from ships) of MARPOL 73/78 prohibits disposal of plastics at sea and restricts at-sea disposal of other vessel-generated trash. It also requires shore reception facilities for plastics and other trash brought to shore for disposal. Recreational boating facilities, along with other ports and terminals, are required to have a trash reception facility that is capable of receiving trash from those vessels that do business with them. Vessels 26 feet or longer must display a placard that explains MARPOL. Annex V covers all kinds of vessels including fishing vessels and leisure crafts. There is a need for all countries in the region to become signatories to this convention and its protocols.

The PERSGA Protocol concerning the Protection of the Marine Environment from Land-based Activities (LBA Protocol) Article 7 Management of Solid Wastes (see Box 4) emphasizes actions to be taken for disposal of wastes or marine litter. It is recommended that the appropriate ministries in the member countries highlight these commitments in order to better manage the marine litter problem.

At the institutional level, it is recommended that financial and fiscal incentives relating to investment or exploitation be adopted to encourage the privatization of waste collection, transport and treatment.

Cooperative partnerships among the private sector, local agencies and NGOs should be encouraged. This approach ensures that environmental objectives are well integrated with those of economic stability and other social/cultural goals of the PERSGA region. The approach also builds support for action within civil society and the private sector that is economically dependent on the natural resources of the region. This should help them to be part of an integrated system to solve problems related to pollution from marine litter, either at the regional or at the national level.

PERSGA, as an intergovernmental organization, can play a role in the development of legislation on marine litter within the legal framework of the Jeddah Convention 1982 and the LBA Protocol. It can support the member countries in the development of national legislation and the institutional frameworks to manage marine litter at the national level.

This RAP component has **seven objectives** that aim to reduce and then eliminate the dumping of litter in the coastal and marine environment and to strengthen government capacity to manage marine litter. Under each objective a set of priority actions to be undertaken in order to achieve the objective, are listed.

Objective 1: To regulate litter pollution and impacts on the coastal environment.

Actions:

- I. Support the Contracting Parties' commitments to Article 7 of the PERSGA LBA Protocol.
- II. Adopt regional regulatory systems for managing coastal and marine litter in the region.
- III. Assess the effectiveness of national legislation and of local municipality services for household garbage and litter collection, and its disposal.
- IV. Encourage the amendment of existing national policy and by-laws concerning littering in urban and rural coastal areas.

- V. Advise on policies and issues related to management of garbage release both in national plans on watershed management and in integrated coastal zone management plans.
- VI. Promote:
 - Development and enforcement of a public register of legal notices, offences and fines for littering within each member country;
 - Update of regulations for landfills in some member countries to include controls to prevent the release of trash into watercourses and wadis;
 - Enforcement of fines or punishment for the private sector and people littering on beaches and in wadi basins.
- VII. Work with UNEP/GPA Coordination Office and UNEP/Regional Seas Programme (UNEP/RSP) when a country needs assistance setting strategies and policies and/or development of appropriate legislation for protection of its marine environment from coastal litter and land-based sources.

Objective 2: To regulate marine litter pollution and its effects on the sea.

Actions:

- I. Continue to encourage member countries to ratify the MARPOL convention.
- II. Promote enforcement of Annex V of the MARPOL convention by the member countries that have ratified the convention.
- III. Assess the availability and effectiveness of existing national laws and by-laws regarding garbage and litter pollution caused by tour boats, local fisheries and trawlers.
- IV. Promote introduction and enforcement of ship waste management plans.
- V. Advise member countries on methods to address littering in their national plans on navigation management and port control management.
- VI. Promote:
 - Development of effective, comprehensive, national port waste management plans;
 - Establishment of a system for passenger and crew reporting of potential (or suspected) MARPOL violations;
 - Enforcement of fines or punishment for the private sector and people littering the sea.
- VII. Work with IMO and UNEP/RSP when a member country needs assistance with the development of appropriate legislation for the protection of the marine environment from litter.

Objective 3: To promote coordination of the PERSGA Initiative on Marine Litter.

Actions:

- I. In coordination with the PERSGA Focal Points, appoint national agencies to manage and control activities at the country level.
- II. Develop a regional Interagency Task Force on Marine Litter.
- III. Implement a coordinated and continuous region-wide clean-up campaign programme.
- IV. Coordinate with the UNEP/GPA Coordination office and UNEP/RSP on the Global Initiative and ICC to standardize and harmonize activities in the region.

Objective 4: To share information and exchange experience on marine litter.

Actions:

- I. Enhance the PERSGA database with information and data on marine litter from each member country.
- II. Set up a regional clearing-house mechanism/node within the PERSGA web site.
- III. Disseminate information and the experience of member countries through the web site.
- IV. Share experience with other web sites, including the UNEP/GPA node.
- V. Exchange relevant information and experience with other regional organizations and international organizations, including UNEP Global Initiative on Marine Litter and the International Cleanup Campaign.
- VI. Promote regional and international sharing and expansion of waste minimization and recycling strategies within the cruise line industry.

Objective 5: To develop capacity building on marine litter management.

Actions:

- I. Promote development of a regional training programme for protection of the coastal and marine environment from litter.
- II. Provide regional courses on marine litter for member countries within the training programme of PERSGA.
- III. Support the organization of national and local training courses on marine litter in the member countries.
- IV. Provide on-the-job training to nationals and locals during the assessment and study of marine litter in each member country.

Objective 6: To build Public-Private-Partnerships (PPP).

Actions:

- I. Build partnerships with the private sector to develop a regional awareness programme on marine litter in the PERSGA region.
- II. Encourage:
 - Several local private sector organizations to take part in clean-up campaigns in each member country;
 - Local non-profit organizations to build partnerships with the private sector for implementation of national and local clean-up campaigns.
- III. Involve non-profit organizations in the activities of the awareness programmes in each member country.
- IV. Advise member countries on the importance of building partnerships with the private sector to achieve a national sustainable clean-up campaign programme within the framework of the regional clean-up campaign programme.
- V. Promote participation of diving centres in underwater clean-up campaigns.
- VI. Promote the participation of coastal resorts in beach clean-up campaigns.
- VII. Adopt and introduce an applicable systematic programme aimed at encouraging PPP.
- VIII. Develop a regional PPP Action Plan.

Objective 7: To develop National Action Plans on marine litter.

Actions:

- I. Develop a set of regional guidelines for the development of National Action Plans on Marine Litter (NAP-ML).
- II. Appoint a national agency, in consultation with the Focal Points in each country, to be the responsible for development of the NAP-ML.
- III. Initiate development of the NAP-ML in each member country.
- IV. Support the member country in the process of NAP-ML development.
- V. Promote approval by and implementation of the NAP-ML in each member country.

3.2.3 Research and Monitoring

There is a need for research and monitoring to clearly understand the status of the coastal and marine litter problem in the PERSGA region. Several research studies and regular monitoring programmes should be implemented for this purpose.

Indeed, surveys for litter on beaches and in the sea are important activities that should be carried out in the region. Beach-focused surveys and sea-focused surveys can provide important information on types, sources and problems of litter in the region. By selecting particular pilot sites and then monitoring the types and abundance of litter, it is possible to determine the quantity and sources of the material so that remedial action can be more appropriately focussed.

Monitoring of coastal and marine litter has been undertaken around the world for several years. The objectives of monitoring are as follows:

- To provide information on the types, quantities and distribution of marine debris;
- To provide an insight into the problems and threats associated with an area;
- To identify sources of coastal and marine litter;
- To explore public health issues relating to marine debris;
- To increase public awareness of the condition of the coastline.

The types and quantities of litter that accumulate on beaches vary from those in the sea. The sources of coastal and marine litter vary from country to country within the region. The level of economic activity and the efficiency of municipal services in each country contribute to this difference. Consequently, several research studies need to be undertaken in the region. These include, but are not limited to, the following:

- Assessments of litter (types, quantities, locations) found in coastal and marine environments;
- Identification and ranking of litter sources;
- Capacity of relevant institutes dealing with litter;
- Evaluation of legal and institutional frameworks;
- Effects of coastal litter on human health;
- Socio-economic impacts caused by coastal and marine litter; and,
- Investigation of measures that might reduce impacts from marine litter.

Methods of marine litter survey involve drawing transects on beaches where marine litter are counted, weighed and their nature defined. Surveys should be carried out at set time intervals and use the same methodology throughout the member countries of the PERSGA region. This enables proper monitoring (both self and external), consistency and valid comparisons between sites and countries, and provides the necessary scientific rigor to detect changing trends and to develop mitigation measures. In practice, it is difficult to use the same monitoring method over very different areas. A standardized methodology for monitoring coastal and marine litter needs to be developed for the region.

Litter can significantly affect local communities and individuals that depend on coastal areas for their livelihood. It can damage vessels, burden coastal communities with exorbitant clean-up costs, and discourage tourist visits, leaving local merchants facing economic hardship. Furthermore, once a tourist area is perceived to be polluted it is very difficult to dispel that image.

Pilot economic assessments should be conducted to evaluate the impact of marine litter in coastal areas of PERSGA. These studies should, in addition to the above tasks, take into

consideration the loss of wildlife and the aesthetic impact, as economic factors. Pertinent social and 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 PERSGA region. Undertaking these studies should be one of the region's high priority actions.

This RAP component has **six objectives**. They focus on understanding the status of coastal and marine litter in the PERSGA region in terms of impacts and management. A set of priority actions are listed under each objective.

Objective 1: To assess priority sources and types of marine litter in the region.

Actions:

- I. Develop a regional survey programme to investigate the types, sources and extent of marine litter accumulation on beaches and in the sea from country to country.
- II. Record the quantity of garbage.
- III. Conduct studies of trash and garbage in urban run-off and litter “hot-spots” throughout the region in order to characterize the most significant products contributing to the problem.
- IV. Investigate the extent and impacts of fishing gear (ghost fishing) on the marine environment in each member country.
- V. Develop standardized research protocols and provide baseline documentation on the quantity of plastic accumulation rates in deeper waters, including source identification and trend analysis.
- VI. Address issues relating to the dumping of litter:
 - On beaches—caused by uncovered trucks, coastal resorts, urban communities and illegal dumping;
 - In the sea—caused by ships, tour boats, local fishing boats, trawlers and fishing gear;
 - In basin watershed areas—washing to the shore after rainstorms.

Objective 2: To understand impacts of litter on the coastal and marine environment.

Actions:

- I. Design a Regional Mainland Coastal Litter Survey Group with national team members from each member country.
- II. Conduct a regional study on the impact of accumulation of mainland coastal litter on shoreline profiles, intertidal areas, shallow seagrasses and mangroves.
- III. Conduct a regional study on the impact of accumulated litter, including fishing gear, on coral reef communities.

Objective 3: To investigate effects of coastal and marine litter on human health.

Actions:

- I. Search for records of human health affected by litter that has accumulated on beaches or in the sea within the region.
- II. Conduct research regarding the potential bioaccumulation, or other ecosystem impacts, of plastic additives.
- III. Involve local practitioners in the research.

Objective 4: To assess socio-economic impacts of marine litter in the region.

Actions:

- I. Compile existing studies that relate to the social and economic effects of coastal and marine litter.
- II. Conduct a pilot social and economic study on the effects of coastal and marine litter for a member country, where consideration should be given to:
 - Costs of vessel repair, towing charges, and ghost fishing or operational time lost due to marine litter encounters;
 - Costs to private owners, cities and regional authorities to maintain clean beaches;
 - Loss of tourism and related revenue due to litter accumulated on beaches and on the sea bed/coral reefs;
 - Cost/benefit analyses for implementing recycling programmes at waterfront facilities and on beaches;
 - Loss of aesthetic values and use of beach sites by local people due to litter accumulation.

Objective 5: To monitor litter accumulation in the marine environment of the region.

Actions:

- I. Develop and adopt a regional monitoring programme for marine litter in the PERSGA region.
- II. Adopt the upcoming monitoring methodologies of UNEP, where applicable, for the PERSGA regional monitoring programme.
- III. Develop regional standard methods for study and monitoring of litter in the region to be used by each member country.
- IV. Establish a Regional Litter Monitoring Working Group with team members from each member country.

- V. Promote the development of national and local monitoring programmes for the management of coastal and marine litter.

Objective 6: To investigate mitigating and protective measures for reducing dumping of litter in the coastal and marine environment.

Actions:

- I. Assess, within each member country, the capability of the municipality services and the facilities at ports for garbage and litter collection.
- II. Conduct studies on litter that composts and/or degrades.
- III. Analyze cost/benefits of litter recycling in one or two member countries.
- IV. Conduct primary research in order to develop country-wide anti-litter campaigns.
- V. Encourage local marine institutes and specialists to conduct research on several applicable protective and regulatory measures for protecting the coastal and marine environments from litter arising from urban or rural areas.
- VI. Conduct research to determine whether messages regarding the costs of litter clean-up are effective in motivating behavioural changes.
- VII. Investigate the flexible mechanism and approaches of regular participation of civil-society, volunteers and the private sector in clean-up campaigns.
- VIII. Evaluate the applicability of national existing awareness programmes concerning coastal and marine litter.

4. INTEGRATION AND FUND RAISING

The activities described in this RAP should be integrated with other programmes and projects of PERSGA. They should also be included in existing national environmental programmes to enhance such activities at the national level. Actions at the national level would rely mainly on national and local funding. However, it should be emphasized that protection of the marine environment from litter cannot be achieved through government actions alone or by depending entirely on public funds.

PERSGA could include some activities of this RAP within its work plan. Regional training workshops on coastal and marine litter can be held within its annual training programme. It can also include the awareness activities within the annual PERSGA Day to raise awareness of the marine litter issue within the member countries. PERSGA can also support the countries to organize such training courses at the national level.

At the regional level, it will probably need to develop a private finance initiative. However, for effective implementation of this RAP over a wide scale there is a need for international cooperation.

Financial resources will need to be mobilized from relevant international agencies. There is a need to enhance cooperation with UNEP/GPA, UNEP/RSP and the UNEP Global Initiative on Marine Litter to ensure support schemes within their framework.

In general, the financial resources would include:

- Central government budgets of the member countries;
- International donor agencies, e.g., GEF, UNEP, UNDP, ISESCO, and NGOs;
- The private sector, e.g., Coca Cola Company;
- Sales of recyclable litter products;
- Sales of TV documentaries, books, images, CDs, etc.;
- Donations and grants;
- Fines from illegal activities and compensation for discharges of solid wastes.

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ADDITIONAL RECOMMENDED READING

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ANNEXES

**ANNEX 1:
THE QUESTIONNAIRE ON MARINE LITTER
DISTRIBUTED TO THE MEMBER COUNTRIES
OF PERSGA**

**Regional Programme of Action for The Protection of the Marine Environment from
Land-Based Activities in the Red Sea and Gulf of Aden (RPA-LBA)**

Preparatory and Fund Raising Phase

Part II: Portfolio of Project Proposals

(3)

Questionnaire on

Evaluation and Assessment of Marine Litter in the PERSGA Region

April 2006

1. Outline the main marine litter management activities taking place in your country including beach clean-ups, participation in International Coastal Cleanup Day, etc.
2. Outline any evidence of the negative impact of marine debris including lost and abandoned fishing gear on marine and coastal ecosystems; e.g., costs of beach clean-up exercises, damage to ecosystems, etc.
3. Outline any information on the types, quantities and distribution of marine debris in your country. Please use the list below as an assistant:

The following list represents the main types of litter found in the marine environment:

- Plastics (fragments, sheets, bags, containers, oil and water bottles) high distribution
- Polystyrene (cups, packaging, buoys)
- Rubber (gloves, boots, tyres)
- Wood (construction timber, pallets, fragments of both)
- Metals (drink cans, oil drums, aerosol containers, scrap)
- Sanitary or sewage related debris (tampons, condoms)
- Paper and cardboard
- Cloth (clothing, furnishings, shoes)
- Glass (bottles, light bulbs)
- Pottery/ceramics

4. What are sources of marine debris in your country? What are the quantities from each source? Use the list below as an assistant:

The major sources include:

- Sewage treatment works
- Combined sewer overflows
- Other industrial discharges
- Urban run-off
- Shipping
- Oil rigs
- Ministry of Defence munitions
- Derelict structures (piers, wrecks, etc.)
- Agricultural waste
- The fishing industry
- Fly tipping
- Aquaculture
- Municipal waste
- Recreational and leisure usage

5. Describe the methods used for monitoring coastal litter in your country.
6. What are the legislation and coastal management policies in your country?

7. Do you have any records on public health issues relating to marine debris?
If yes, please list and make a commentary.

8. Are there any national programs for increasing public awareness of the condition of the coasts? If yes, please list and make a commentary.

9. Are there any national, sub-regional or regional projects and programs for the management of marine litter? If yes, please list and make a commentary.

***Important Note:* Please support your information with quantitative and qualitative data as much as possible.**

ANNEX 2A: TYPES, SOURCES AND QUANTITIES OF MARINE LITTER IN THE PERSGA MEMBER COUNTRIES

Country	Types	Quantities	Sources	Quantities
Egypt	<ul style="list-style-type: none"> • Plastics (fragments, sheets, bags, containers) • Polystyrene (cups, packaging, buoys) • Rubber (gloves, boots, tyres) • Wood (timbers, pallets, fragments of both) • Ship and shipping remains • Metals (drink-, oil-, aerosol- containers, scrap) • Drilling rig remains • Paper and cardboard • Cloth (clothing, furnishings, shoes) • Bottles, light bulbs • Hydrocarbon remains 	n.d.	<ul style="list-style-type: none"> • Sewage treatment works and from ships' drains • Shipping • Oil refiners • Derelict structures (piers, wrecks, etc.) • Fishing industry 	n.d.
Saudi Arabia	<ul style="list-style-type: none"> • Plastics (sheets, bags, containers) • Polystyrene (cups, packaging, buoys) • Rubber (gloves, boots, tyres) • Wood • Metals (drink-, oil-, aerosol- containers, scrap) • Paper and cardboard • Cloth (clothing, furnishings, shoes) • Glass bottles • Pottery/ceramics etc. 	n.d.	<ul style="list-style-type: none"> • Oil rigs • Shipping • Fishing industry • Recreational and leisure usage 	n.d.

Yemen (quantities were estimated as H: high, M: moderate, and L: low)	<ul style="list-style-type: none"> • Plastics (fragments, sheets, bags, containers) • Polystyrene (cups, packaging, buoys) • Rubber (gloves, boots, tyres) • Wood (timber, pallets, fragments of both) • Metals (drink-, oil-, aerosol- containers: scrap) • Sanitary or sewage debris (tampons, condoms) • Paper and cardboard • Cloth (clothing, furnishings, shoes) • Glass (bottles, light bulbs) • Pottery/ceramics 	<ul style="list-style-type: none"> • H • M • M • M • H • M • L • M • M • L 	<ul style="list-style-type: none"> • Sewage treatment works • Combined sewer overflows • Other industrial discharges • Urban runoff • Shipping • Oil rigs • Ministry of Defence munitions • Derelict structures (piers, wrecks, etc.) • Agricultural waste • Fishing industry • Fly tipping • Aquaculture • Municipal waste • Recreational and leisure usage 	<ul style="list-style-type: none"> • L • L • M • H • H • H • L • M • H • H • L • L • H • M
Jordan (Types, quantities as totals for years 2003-2005 in Kg; source quantities as percentages of the total)	<ul style="list-style-type: none"> • Plastics • Glass • Metals • Paper • Rubber • Fishing equipment • Others 	<ul style="list-style-type: none"> • 355 • 184 • 219 • 9.5 • 369 • 32 • 52 	<ul style="list-style-type: none"> • Shipping • Port activity • Fishing industry • Recreational and leisure usage 	<ul style="list-style-type: none"> • 10 • 20 • 3 • 67
Sudan	<ul style="list-style-type: none"> • Plastics • Sheets • Bags • Containers 	<ul style="list-style-type: none"> n.d. 	<ul style="list-style-type: none"> • Municipal wastes • Industrial discharge • Shipping • Recreational and leisure usage 	<ul style="list-style-type: none"> n.d.
Djibouti	<ul style="list-style-type: none"> • Plastics • Metals • Paper and cardboard 	<ul style="list-style-type: none"> Most is biodegradable; 15-20% are plastics 	<ul style="list-style-type: none"> • Sewage treatment works • Urban run-off • Shipping • Recreational and leisure usage 	<ul style="list-style-type: none"> n.d.
(n.d.: No information or data were provided by the respondent)				

ANNEX 2B: IMPACTS OF MARINE LITTER

Country	Negative Impact
Egypt	<ul style="list-style-type: none"> • Litter piles of different types were observed on beaches, development projects and at all mangrove protectorates. • Chronic dense and dry hydrocarbon beds (north of Hurghada) posing impacts and threats to mangroves stands. • Decline in fish communities including declines in commercial species. • Destruction of natural nurseries in many tidal flat zones, as well as coral reef fishes deserting their original locations. • Obvious change was recorded in the faunal communities in the mangrove forests. • The cost of beach clean-up, which has not yet been calculated by any study.
Saudi Arabia	<ul style="list-style-type: none"> • No information was provided by the respondent.
Yemen	<ul style="list-style-type: none"> • No information was provided by the respondent.
Jordan	<ul style="list-style-type: none"> • No information was provided by the respondent.
Sudan	<ul style="list-style-type: none"> • Scientific research to assess the negative impact of marine litter is very limited. • The cost of beach clean-up is very high; therefore the clean-up is limited to areas of less than one mile.
Djibouti	<ul style="list-style-type: none"> • Evidence of marine litter pollution at many beaches. • Pollution by solid waste threatens the tourism and recreation potential of Djibouti's beaches.

ANNEX 2C: MARINE LITTER MANAGEMENT ACTIVITIES, POLICIES, LEGISLATION AND MONITORING

Country	Management activities	Legislation and coastal management policies	Methods of monitoring
Egypt	Occasional beach clean-up activities and participation on the International Coastal Cleanup Day at Hurghada beach and islands, e.g., Giftun, Abu Minqar and Altawella (2003–2005); participants included volunteer citizens, private sector (e.g., Coca-Cola Company, Padi Intl. Ltd) and NGOs such as HEPCA.	The laws No. 102/1983 and 4/1994.	n.d.
Saudi Arabia	Municipalities are responsible for the removal of litter and waste from beaches.	Legislation by Ministry of Agriculture and Ministry of Municipality; a coastal zone management plan has been developed by the Presidency of Meteorology and Environment (PME).	n.d.
Yemen	No appreciable activities are undertaken.	Environmental law No. (26) of 1995.	Municipalities monitor marine litter as part of daily cleaning up.
Jordan	The daily beach clean-ups. Monthly clean-up dive campaigns. Participation in "Clean-up the World" campaign.	Aqaba Marine Park Regulation No. 22 year 2001; Environmental Protection Regulation No. 21 year 2002.	Visual administration.

Sudan	Garbage collection and removal services are provided by the sea ports; reception facilities for sewage from ships do not exist; no control/ regulation for ship wastes; oil waste removal services in dry port are provided by a few private contractors, licensed and controlled by the Maritime Administration.	No proper waste management policy; no adequate legislation for the preservation of the marine environment.	The municipal waste services.
Djibouti	Solid waste and garbage collection activities are occasionally organized by national authorities (Dept. of the Environment, local municipalities, etc.) with the participation of the school environmental clubs and associations.	Coastal zone management programme has been developed with the support of PERSGA.	n.d.

n.d.: No information or data were provided by the respondent.

ANNEX 2D: PUBLIC AWARENESS ACTIVITIES AND PROGRAMMES FOR MANAGEMENT OF MARINE LITTER

Country	Public awareness activities	National, sub-regional or regional projects and programmes for management of marine litter
Egypt	<ul style="list-style-type: none"> Educational programmes are run to raise awareness among students and young people regarding different issues related to the marine environment. 	<ul style="list-style-type: none"> LIFE Project fund - recycling unit in the southern Egyptian Red Sea.
Saudi Arabia	<ul style="list-style-type: none"> Saudi Environmental Awareness Program (SEAP) to raise awareness of the marine environment. Private sector organizations are encouraged to carry out programmes and campaigns. 	<ul style="list-style-type: none"> No information was provided by the respondent.
Yemen	<ul style="list-style-type: none"> No information was provided by the respondent. 	<ul style="list-style-type: none"> No information was provided by the respondent.
Jordan	<ul style="list-style-type: none"> There are various and continuous awareness programmes addressing local communities, in particular school children, high school and university students, and civil organizations in Aqaba City as well as the local and foreign tourists using materials such as posters, leaflets, video films, slide shows, and stickers. Participation of Marine Park users in clean-up campaigns. 	<ul style="list-style-type: none"> No information was provided by the respondent.
Sudan	<ul style="list-style-type: none"> There have been several national programmes for increasing public awareness of the condition of the coastline organized jointly by PERSGA and Marine Environment Protection Society (NGO); these include lectures, seminars and radio programmes intended to raise public awareness. 	<ul style="list-style-type: none"> The implementation of Jeddah Convention 1982. PERSGA has organized important seminars and workshops and also urges the member states to ratify and implement other IMO conventions like MARPOL 73/78 and the Global Ballast Water Management Programme.
Djibouti	<ul style="list-style-type: none"> No information was provided by the respondent. 	<ul style="list-style-type: none"> No information was provided by the respondent.