

CHAPTER 18: REDUCING MARINE DEBRIS

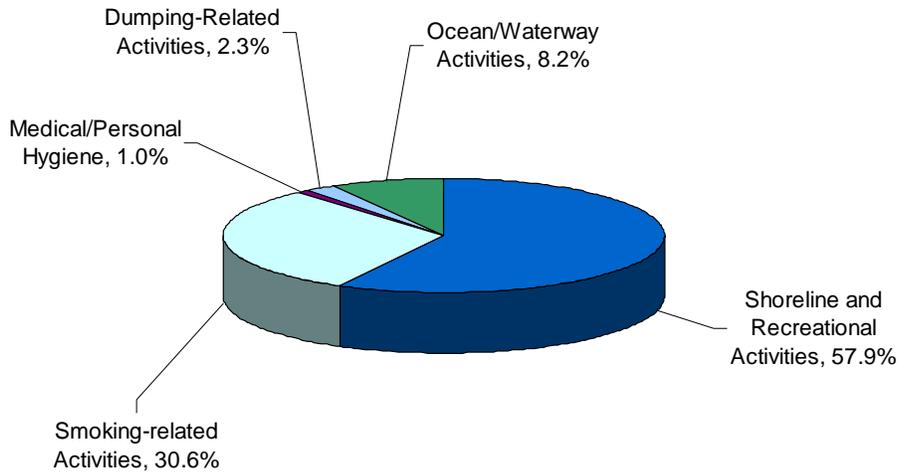
The trash and other waste that drifts around the global ocean and washes up on the nation's shores poses a serious threat to fishery resources, wildlife, and habitat, as well as human health and safety. Marine debris is difficult to address because it comes from a wide variety of sources, both on and off the shore. While marine debris is a global problem requiring international cooperation, many of its negative impacts are experienced at the local level and require local involvement. Because of its role as the nation's lead ocean agency, re-establishing a marine debris program within the National Oceanic and Atmospheric Administration would help address the range of issues associated with marine debris, as would better coordination at all scales—international, national, state, and local. Greater commitment to public education and outreach, partnerships with local governments, communities, and industry, and enhanced research, monitoring, and source identification will also help reduce marine debris.

ASSESSING THE SOURCES AND CONSEQUENCES OF MARINE DEBRIS

Most trash has the potential to become marine debris; cigarette filters, plastic bags, bottles, cans, and straws can all be found scattered along beaches and in the oceans. Marine debris degrades slowly and is buoyant, often traveling for thousands of miles in ocean currents. Approximately 80 percent of debris is washed off the land, blown by winds, or intentionally dumped from shore, while 20 percent comes from vessels and offshore platforms.¹

Shoreline and recreational activities were sources of the majority of debris found during the 2002 International Coastal Cleanup (Figure 18.1).² Litter associated with cigarette smoking was the second largest source. Ocean-based activities, including cruise ship operations, commercial fishing, recreational boating, commercial shipping, military vessel operations, and offshore oil drilling, were also a significant source of debris. Cargo lost overboard from freighters poses another concern. Large containers have broken open and released their contents—including everything from sneakers to computer monitors—into the ocean.

Figure 18.1. Trash Buildup at the Beach



In 2002, more than 8.2 million pounds of debris were collected and analyzed as part of a worldwide beach cleanup effort. The largest source of marine debris was from land-based human activities; shoreline and recreational activities alone contributed almost 58 percent of the number of items collected. Beaches yielded over 1 million cigarette butts, 444,000 food wrappers or containers, 220,000 bottles, 190,000 plastic bags, 32,000 pieces of fishing line, and 8,000 tires.

Source: The Ocean Conservancy. *The 2002 International Coastal Cleanup*. Washington, DC, 2003.

Marine debris threatens wildlife through entanglement and ingestion. A 1997 study found that at least 267 species have been affected by marine debris worldwide, including 86 percent of all sea turtle species, 44 percent of all seabird species, and 43 percent of all marine mammal species, as well as numerous fish and crustaceans.³ Entanglement can wound animals, impair their mobility, or strangle them. Birds, sea turtles, and marine mammals can swallow debris such as resin pellets, convenience food packaging, and plastic bags, which interfere with their ability to eat, breathe, and swim. Sea turtles often ingest floating plastic bags, mistaking them for jellyfish. “Ghost fishing”—entanglement of fish and marine mammals in lost fishing gear—represents a serious threat to marine life, including endangered species such as Hawaiian monk seals and North Atlantic right whales.

Coral reefs, seagrass beds, and other fragile coastal habitats have been harmed by trash in the oceans. Derelict fishing gear, pushed by wind and waves, can become snagged on coral reefs and other structures. This global problem is particularly evident in the Northwest Hawaiian Islands, which include 69 percent of all U.S. coral reefs by area. Floating debris can also transport non-native, potentially invasive species over long distances.

Abandoned Fishing Nets Catch a Wave to Hawaii

The two most prevalent types of nets recovered in the Northwest Hawaiian Islands (measured by weight) are trawling nets and monofilament gill nets, despite the fact that no commercial trawl or gillnet fisheries exist in the area.⁴ The nets are carried to the islands via ocean currents from domestic and foreign fisheries in the North Pacific. Finding a solution to the problem of derelict fishing nets and other gear will require international cooperation.

Marine debris also has significant consequences for people. Broken glass and medical waste on beaches, as well as ropes and lines dangling in the ocean, pose threats to beachgoers, boaters, and divers. Debris can damage boats and strand their occupants when propellers become entangled on lines, or engines stall when plastic bags are sucked into intake pipes. Beach closures and swimming advisories due to marine debris can

have direct economic impacts by reducing coastal tourism. For example, New Jersey lost an estimated \$2 billion in tourist revenue as a result of debris washing ashore in the 1987 and 1988 beach seasons. The state has chosen to invest \$1.5 million annually in beach cleanup to avoid similar losses in the future.⁵

ADDRESSING MARINE DEBRIS NATIONALLY

Existing Programs

Efforts to reduce marine debris must take place at all levels, from international to local. Internationally, marine debris is addressed by Annex V of the International Convention for the Prevention of Pollution from Ships (MARPOL), which prohibits all overboard disposal of plastics and limits other discharges based on the material and the vessel's location and distance from shore. The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (known as the London Convention) is another international agreement that addresses the problems of marine debris. Domestically, a number of federal laws focus on marine debris, including the Act to Prevent Pollution from Ships (which prohibits the disposal of all garbage within 3 nautical miles of the coast and enforces Annex V of MARPOL), the Marine Plastic Pollution Research and Control Act, the Clean Water Act, Title I of the Marine Protection, Research, and Sanctuaries Act (commonly referred to as the Ocean Dumping Act), the Beaches Environmental Assessment and Coastal Health Act, and the Shore Protection Act. (Appendix D includes a summary of these and other ocean-related federal laws.) Some states also have their own laws to address marine debris.

Reductions in marine debris have been the focus of a number of agency initiatives and volunteer efforts, ranging from local adopt-a-beach programs to international beach cleanups. The Ocean Conservancy, a nonprofit ocean advocacy group, coordinates the annual International Coastal Cleanup campaign with support and funding from the U.S. Environmental Protection Agency (EPA) and private and corporate foundations. The one-day event takes place in September, with volunteers from all over the world collecting trash along the coasts and in the oceans. Since its inception in 1986, the campaign's original 2,800 volunteers have grown to almost 392,000 in 2002.

From 1986 to 2002, the International Coastal Cleanup removed 89 million pounds of debris from more than 130,000 miles of shoreline. Starting in 1995, more than 108,000 divers also collected 2.2 million pounds of trash in over 3,900 miles of underwater habitat.⁶ The program is effective not only because of the visibility it receives as the largest single-day volunteer event for the marine environment, but also because of the amount of data collected during the event. Debris collection results are posted by source, calling attention to the activities that create the most debris with the hope of improving prevention.

The vast data collection potential demonstrated during International Coastal Cleanup events led to development of the National Marine Debris Monitoring Program, implemented by The Ocean Conservancy with EPA funding. This program is designed to systematically assess the success of Annex V of MARPOL by identifying sources and trends of marine debris. Volunteers at 180 randomly selected study sites along the U.S. coast collect and submit monthly information on the incidence of thirty specific marine debris items.

EPA and The Ocean Conservancy also created the Storm Drain Sentries program in response to research indicating that storm drains are significant sources of marine pollution. This program raises public awareness of the consequences of dumping trash and other pollutants into sewer systems. Volunteers stencil storm drains with educational messages and collect information on the types of contaminants found around storm drains.

The Coral Reef Ecosystem Investigation is a multi-agency program, headed by the National Oceanic and Atmospheric Administration (NOAA), to assess, monitor, and mitigate the impact of marine debris on coral reef ecosystems of the U.S. Pacific Islands. The Coral Reef Ecosystem Investigation began as a pilot study in

1996, primarily to remove fishing gear in and around Hawaiian monk seal habitat. Since then, the program has grown to involve a number of federal, state, local, nongovernmental, and private partners in the large-scale removal of marine debris, including derelict fishing gear.

NOAA's Role

Concerns about marine debris came to public attention during the 1980s, with mounting evidence of entanglement or other harm to marine mammals, sea turtles, birds, and fish. In 1985, Congress appropriated \$1 million in funding for the development of a comprehensive marine debris research and management program (which became the Marine Entanglement Research Program), directed by NOAA in consultation with the U.S. Marine Mammal Commission. In 1995, a report by the National Research Council called for a long-term program to monitor the flux of plastics to the oceans and noted that NOAA would be best suited to lead such a monitoring effort.⁷ Despite this recommendation—and the ongoing problem of marine debris—the Marine Entanglement Research Program ended in 1996.

Although EPA has some programs to address marine debris (described above), the problem of marine debris is more closely related to NOAA's mission and management responsibilities, including fisheries, marine mammals, endangered marine species, beach and shoreline management, and coral reefs. While NOAA currently addresses marine debris as a part of several other efforts, there is a need to coordinate, strengthen, and increase the visibility of the marine debris efforts within NOAA by creating a clear, centralized marine debris program within the agency.

Recommendation 18–1. The National Oceanic and Atmospheric Administration should establish and support a marine debris management program.

This program should be closely coordinated with EPA's marine debris activities, as well as with the significant efforts conducted by private citizens, state, local, and nongovernmental organizations. In the future, the National Ocean Council should examine whether marine debris efforts would benefit from consolidation within a single agency.

Interagency Coordination

The Marine Plastic Pollution Research and Control Act of 1987 established an interagency marine debris coordinating committee with membership comprised of senior officials from NOAA, EPA, the U.S. Coast Guard, and the U.S. Navy. The committee was charged with furthering public outreach, education, and information sharing efforts. However, Congress allowed the committee to lapse in 1998, and it has not been re-established.

Although strengthening NOAA's work on marine debris through establishment of an office within the agency is an important step, an interagency committee under the National Ocean Council will still be needed to unite all appropriate federal agencies around the issue. Such a committee could support existing marine debris efforts by agencies and nongovernmental organizations. Potential functions for the committee are described below.

Education and Outreach

While existing public education and cleanup initiatives have made a substantial contribution to improving the ocean environment, the volumes of trash that continue to appear on beaches and in the oceans indicate that many people and communities have not yet changed their behavior. Many people consider their actions to be negligible when compared with those of large-scale polluters; however, the cumulative impact of continuous,

small-scale insults can be significant. Although items such as plastic bags, rope, and six-pack holders do not comprise the majority of the debris, they are extremely dangerous for marine life. Thus a significant opportunity to reduce marine debris comes from educating the public. (Public education and outreach opportunities are addressed in greater detail in Chapter 8.)

Because comprehensive monitoring and enforcement of individual behavior would be impossible, people should be given the knowledge, training, and motivation to voluntarily change their behavior. Public education campaigns should clearly convey that individual actions have cumulative impacts and should involve the tourism industry and other nontraditional participants, such as packaging companies and local government officials.

Working with Communities

Cigarette filters, food wrappers, caps, and lids accounted for nearly half of all debris collected in the 2002 International Coastal Cleanup. For the past thirteen years, cigarette filters have been the most commonly found debris item.⁸ It is apparent that implementation and enforcement of local anti-litter regulations have been inadequate.

Not only is trash left on beaches and shores, allowing it to wash into the oceans, litter is also washed off streets and parking lots, and through storm drains far inland. People generally have not made the connection between actions taken far from the coast and their impacts on the shore and ocean areas.

While public education can send the message not to litter, active management of debris entering and exiting sewer systems can also be improved by adding controls for local sewer systems, such as screens and netting, and making catch-basin modifications. Floatable controls can help reduce or eliminate solid waste emitted from sewer systems. Placing sufficient trash receptacles throughout communities can also make it easier for people to dispose of the materials that might otherwise end up in the marine environment.

Working with Industry

Cooperation with industry, particularly companies whose products are ending up on the shores and in the oceans, presents another opportunity to reduce marine debris. The Coca-Cola Company, Dow Plastics, and Philip Morris are all examples of companies that have helped sponsor the International Coastal Cleanup. Morton Salt, the maker of products used by many commercial shrimp boats to treat their catches at sea, took action after blue plastic bags with the Morton Salt label started washing up on Gulf of Mexico beaches. Since the company started printing reminders like “Stow It, Don’t Throw It” on the bags, fewer Morton Salt bags have been reported as washing up on shores.⁹

Working in concert with the U.S. Department of the Interior’s Minerals Management Service, the offshore petroleum industry has instituted marine debris education training for personnel working on offshore platforms, mobile drilling rigs, and other facilities in the Gulf of Mexico. This initiative requires the posting of marine debris reminder signs and the mandatory viewing by all personnel of a film demonstrating proper waste disposal practices and the impacts of marine debris on the ocean.

Plastics comprise about 60 percent of the trash found on beaches¹⁰ and about 90 percent of debris found floating in the water.¹¹ Industry support for reducing plastic trash and encouraging greater recycling rates could reduce the amount of litter reaching the coasts and oceans. Fishing gear manufacturers could also play a role in educating fishing vessel owners and crews about the impacts of derelict gear.

Source Identification, Monitoring, and Research Efforts

The implementation of effective control measures is currently hampered by a lack of consistent monitoring and identification of sources of debris. A 1995 National Research Council report found that most available data are obtained from beach surveys, with relatively little information on debris that ends up in the sea or on the seabed.¹² Collection of such data would require a systematic, international effort. Information about the behavior of debris in the marine environment and its ecological effects is even scarcer. These effects cannot be established simply on the basis of available surveys, due primarily to the absence of a common framework for data collection, centralized data analysis, and information exchange. Once a framework and suitable information protocols are in place, these data should be linked with the national Integrated Ocean Observing System (discussed in Chapter 26).

Recommendation 18–2. The National Ocean Council should re-establish an interagency marine debris committee, co-chaired by the U.S. Environmental Protection Agency and National Oceanic and Atmospheric Administration. The committee should work to expand and better coordinate national and international marine debris efforts, including: public outreach and education; partnerships with local government, community groups, and industry; monitoring and identification; and research.

ELIMINATING DERELICT FISHING GEAR

One source of marine debris that requires special attention is derelict fishing gear. Whether intentionally discarded or unintentionally lost during storms or fishing operations, derelict fishing gear poses serious threats, entrapping marine life, destroying coral reefs and other habitat, and even posing danger to humans. Currently, almost all of the fishing nets used outside of subsistence fisheries are made of synthetic fibers that are highly resistant to degradation.¹³ Although derelict fishing gear is a worldwide problem, currently no international treaties or plans of action address it.

Recommendation 18–3. The U.S. Department of State and National Oceanic and Atmospheric Administration, working with the United Nations Food and Agriculture Organization and other appropriate entities, should develop a detailed plan of action to address derelict fishing gear, to be implemented on a regional, multi-national basis.

Within the United States, a public–private partnership program is needed to prevent, remove, and dispose of derelict fishing gear. Some options include imposing a fee on the manufacture of nets to pay for their recovery, attaching locator devices to gear, providing incentives for industries that are developing biodegradable fishing gear, and providing compensation for the expense of bringing discarded gear to shore.

Recommendation 18–4. The National Oceanic and Atmospheric Administration should promote a public-private partnership program and implement strong incentives for removal and disposal of derelict fishing gear.

ENSURING APPROPRIATE PORT RECEPTION FACILITIES

Annex V of MARPOL contains several provisions that address marine debris. Under its requirements for port reception facilities, member nations must provide waste disposal facilities in their ports to receive waste from ships. Despite this requirement, many ports do not have adequate facilities. In addition, Annex V calls for the designation of Special Areas that receive a higher level of protection than is required in other ocean areas. Special Areas have been designated for many parts of the world, including areas of the Mediterranean, Baltic, Black, Red, and North Seas, the Antarctic, and the Wider Caribbean region, which includes the Gulf of

Mexico and the Caribbean Sea. However, for a Special Area to receive extra protection, there must first be a demonstration of adequate port reception facilities. Once these facilities have been verified, the International Maritime Organization establishes a date for Special Area protections to enter into force. Some important Special Areas, such as the Wider Caribbean, are not yet eligible to receive extra protection because of inadequate port reception facilities.

Recommendation 18–5. The U.S. Department of State should increase efforts to ensure that all port reception facilities meet the criteria necessary to allow implementation of Special Areas protections under Annex V of the International Convention for the Prevention of Pollution from Ships.

¹ U.S. Department of Commerce and U.S. Navy. *Turning to the Sea: America's Ocean Future*. Washington, DC, September 1999.

² The Ocean Conservancy. *2002 International Coastal Cleanup*. Washington, DC, 2003.

³ Laist, D.W. "Impacts of Marine Debris: Entanglement of Marine Life in Marine Debris, Including a Comprehensive List of Species with Entanglement and Ingestion Records." In *Marine Debris: Sources, Impacts and Solutions*, ed. J.M. Coe and D.B. Rogers. New York, NY: Springer-Verlag, 1997.

⁴ U.S. Department of State. *Promotion of Implementation and Enforcement of MARPOL 73/78 and Related Codes. MARPOL Annex V and Marine Debris*. London, England: International Maritime Organization, 2001.

⁵ National Oceanic and Atmospheric Administration. "Perspectives on Marine Environmental Quality." In *Year of the Ocean Discussion Papers*. Washington, DC, 1998.

⁶ The Ocean Conservancy. *2002 International Coastal Cleanup*. Washington, DC, 2003.

⁷ National Research Council. *Clean Ships, Clean Ports, Clean Oceans: Controlling Garbage and Plastic Wastes at Sea*. Washington, DC: National Academy Press, 1995.

⁸ The Ocean Conservancy. *2002 International Coastal Cleanup*. Washington, DC, 2003.

⁹ *Ibid.*

¹⁰ U.S. Department of Commerce and U.S. Navy. *Turning to the Sea: America's Ocean Future*. Washington, DC, September 1999.

¹¹ United Nations Environment Program, Global Programme of Action Coordination Office; Swedish Environmental Protection Agency; and United Nations International Maritime Organization. "Marine Litter—What & Where?" <<http://marine-litter.gpa.unep.org/facts/what-where.htm>> Accessed November 2, 2003.

¹² National Research Council. *Clean Ships, Clean Ports, Clean Oceans: Controlling Garbage and Plastic Wastes at Sea*. Washington, DC: National Academy Press, 1995.

¹³ U.S. Department of State. *Promotion of Implementation and Enforcement of MARPOL 73/78 and Related Codes. MARPOL Annex V and Marine Debris*. London, England: International Maritime Organization, 2001.

