

Marine Debris

Trashing our Oceans: Trashing our Future



Plastic...

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Ghost nets...

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The East Coast Trail Association (ECTA) is pleased to present an essay by the Department of Fisheries and Oceans, Government of Canada (DFO) St. John's, part of a (pending 2009) DVD release on ocean debris. Used with Permission (Beresford 2008).

Marine debris is a general term for garbage in the ocean, and on beaches. It is estimated that 6.4 million tonnes of garbage go into the world's oceans every year. Up to 80% of marine debris comes from the land. It blows and washes off beaches, parking lots, and roadsides. It's carried to the sea by rivers, sewage systems, and storm drains. But, even if all of our garbage is carefully bagged and collected, it can still make it into the ocean from poorly managed landfill sites. Marine debris is also lost or discarded from boats and ships of all types and sizes.

When people see garbage on a beach, they may think it was left there by people living in the area. In fact, almost all of the debris found on beaches comes from the ocean. Lightweight materials that float in seawater can be moved great distances by wind and ocean currents. Large amounts of these materials can wash up onto beaches that face into prevailing winds and currents, while other shorelines may be washed clean as the winds and currents carry the debris away.

For thousands of years, coastal people have combed beaches for valuable or unusual items. But during the 1980s, beach combers around the world began to notice more and more plastic garbage. The oceans circulate in a complex system of currents which act as a transport system for sea creatures and also, unfortunately, for floating garbage. As a result, some areas of the ocean collect debris while others remain relatively clean. An area off the coast of California which collects debris has been named the *Great Garbage Patch* - It is estimated that three million tons

of debris have accumulated in this area. Huge amounts of this debris also wash up on the shores of islands in this area.

Effect of Currents

In the Atlantic Ocean, currents funnel debris towards the Gulf of Mexico from a huge area which includes the south eastern USA, Mexico, central and South America and Africa. These currents eventually form the Gulf Stream, a major current which carries debris north towards Atlantic Canada. In turn the North Atlantic Current carries debris from the northeast coast of Newfoundland and Labrador towards Europe and Africa.

Atlantic Canada is influenced by three major currents, the Gulf Stream, the Labrador Current and flow from the Gulf of St. Lawrence. Sable Island is a low-lying, uninhabited island in the midst of these converging currents. Researchers study the island's fragile ecosystem which includes a population of wild horses as well as seals, seabirds, and leatherback turtles, and monitor the remarkable quantities of marine litter which wash onto its shores. Beach survey data from the late 1980s showed that litter is washed up at a rate of almost 20,000 items per month. Ninety-two percent of these items were found to be plastic, with approximately 20% clearly originating from the fishing industry, such as net fragments, floats, trap tags and fish boxes. Foreign labels showed that some items came from distant continents including Africa and Central America as well as the United States and Canada.

A survey of beaches in Placentia Bay conducted in 2004 also revealed large accumulations of marine debris. Over 90% of the debris was plastic, and a high percentage appeared to be fishing-related. Due to the prevailing winds and currents in the Bay, marine debris collects largely on the south west facing beaches. Most of the communities facing south west had cleaned up their beaches at least once during the months before the survey, but it was the uninhabited beaches that really told the tale: This is La Manche Bay¹, an isolated, uninhabited beach with no road access. This is North Wild Cove at the southern end of Long Island. There are no permanent residents on any of the Placentia Bay Islands. All of the debris on these beaches was washed up out of the ocean! This is St. Croix Bay, the worst of all. Large amounts of plastic were floating in the water although this beach is at least a 20-minute boat ride from the nearest community. Certainly it looks bad, but if nobody lives there, why should we care?

Plastic and Our Throw Away Lifestyle

The answer lies in the nature of plastic and our throw-away lifestyle. In the recent past, almost all the materials in daily use were biodegradable – part of the natural cycle of life. Toys, clothes, diapers, and shoes were made of natural materials such as wood, cotton, metal, glass or leather. Many people fished, hunted and grew their own vegetables. Things bought from a store came wrapped in paper and string or in a paper bag, and were mostly local products. Most fishing nets and ropes were made from natural fibers such as hemp and cotton, and buoys were made of cork or blown glass. But not any more...

In the 1960s, plastics such as nylon and polyester, and polypropylene gradually replaced traditional fishing nets, rope and buoys, and the use of plastics in consumer items and packaging grew steadily with the introduction of products such as disposable razors, and polystyrene cups. In the 1970s the use of plastic continued to grow rapidly. By 1977, plastic soda bottles began replacing glass bottles, and plastic bags were introduced at supermarkets and department stores as an alternative to paper bags. In 1980, butter and margarine was first sold in polypropylene tubs, and soon most dairy products were packaged in plastic containers. The creation of plastic was probably one of the greatest inventions of all time – durable, light, cheap, waterproof, and versatile. Not surprisingly in just a few decades, plastic has become the world's most used material, and much of it is packaging and one-use disposables.

¹ N.B, the essay is meant to accompany a DVD and will be accompanied by images of Placentia Bay.

How Long Does Plastic Last?

We are producing and discarding plastic at an ever-increasing rate, but it doesn't biodegrade, so it's starting to pile up! Some scientists estimate that plastic can last 300-600 years. Others say it lasts forever, but we don't really know yet. We do know that plastic cannot be digested, or used as a source of food by any living creature. Unfortunately, many animals mistake plastic for food, and not just gulls feeding at the dump. Even creatures that spend most of their lives far from land are affected - Scientists have documented the consumption of plastic by 177 marine species. Seabirds such as fulmars, petrels, albatross and shearwaters are particularly vulnerable because they feed at the sea surface. They often mistake floating plastic for food items, with deadly results. Plastic is not softened by the digestive juices like real food, so hard plastic objects, like disposable lighters can block the intestine causing death. A belly full of plastic may cause the animal (like this fulmar) to feel too full to eat while it actually starves to death.

Sea turtles ride the ocean currents, and can travel great distances. The favourite food of some sea turtles is jellyfish, which come in many different colours, shapes and sizes. Balloons, condoms, and plastic bags can look a lot like jellyfish, and are often eaten by mistake. This plastic was found in the stomach of a dead leatherback sea turtle entangled in fishing gear off the coast of Newfoundland.

Although plastic doesn't biodegrade, sunlight can weaken its structure over time in a process known as photodegradation, and wave action gradually breaks the plastic debris into pieces. The pieces become smaller and smaller, but they remain plastic and are virtually impossible to clean up. Scientists studying the *Great Garbage Patch* report that plastic particles outnumber plankton six to one! These persistent plastic particles are probably the greatest threat to marine life, because even tiny plankton and larval fish are affected. Even if we stopped putting plastic into the oceans today, plastic particles will continue to be released for hundreds of years from the slow breakdown of the millions of tons of plastic already circulating in the world's oceans.

There is also concern that some plastics can be toxic, and in the ocean, floating plastic may absorb harmful pollutants like PCBs and DDT from the sea surface.

Marine Debris and Marine Animals

Marine debris also entangles fish, seabirds, turtles, and marine mammals. Six-pack rings, rope, fragments of netting, and monofilament line can be deadly. This lucky seal was rescued and later released by researchers on Sable Island, but most entangled creatures die a slow, agonizing death. Lost fishing gear accounts for only about 5% of the total debris found in the ocean, but in relation to entanglement, fishing gear is the most serious threat. Lost pots and traps can continue to fish indefinitely. This trap, photographed by divers in Trinity Bay, Newfoundland, contained the remains of 10 to 12 otters at different stages of decomposition. Traditional wooden pots may be less problematic than those made of metal and plastic netting because they break up more easily and may not keep fishing for as long. In deep water, these nets may drift in the currents for thousands of miles, and continue to fish for years.

Lost nets, known as ghost nets, can also continue to fish. In deep water, these nets may drift in the currents for thousands of miles, and continue to fish for years. In shallow, rocky areas, nets heavy with fish sink, snag on the bottom and often form into tangled balls of netting and dead fish, which then attract and capture scavengers such as lobster, crab, and flatfish. These huge balls of netting can weigh up to a tonne, and in heavy seas can roll along the bottom, damaging fragile habitat and tearing off pieces of net which are then released into the water column.

Lost nets are also extremely hazardous to scuba divers and vessels. In 2005 a Russian mini-submarine was trapped 190 metres below the sea surface, tangled in lost fishing gear. Happily, the crew was rescued by a remotely-operated vehicle after a three-day ordeal. Boat propellers

also get entangled by netting, rope and fishing line. Floating debris, especially plastic bags and wrapping can clog water intakes and pumping systems which can cause engine failure. These incidents can lead to expensive repairs, and even life threatening situations. Large items are a collision hazard and may also damage fishing and aquaculture gear. Fuel, lubricant and solvent containers, paint buckets and personal hygiene items can contaminate aquaculture gear and fishing nets, and ruin catches.

Marine debris has serious effects on marine life, the coastal environment, and on all the people who live, work and play there. Litter-covered beaches and floating trash affect our enjoyment of the ocean's natural beauty, they create hazards for our children and pets, and affect tourism development. Walter Manning, owner of Bird Island Resort in St. Brides, Newfoundland, is seen here on his daily mission, cleaning up the beach near his resort.

Beach clean-ups are the easiest and most common method of removing marine debris, but they can be expensive, and local municipalities and volunteer organizations often have to cover the costs. Many coastal communities need to organize several beach clean-ups every year to keep their beaches clean. Marine Trash Skimmers such as The Trashcat have been developed to remove floating debris from busy harbours and other heavily polluted areas. High speed vertical conveyors create a suction effect which draws in floating garbage. Over 50 TrashCats currently remove floating debris from heavily littered areas such as New York and Baltimore Harbours.

Local programs also focus on the clean-up of sensitive marine habitats such as coral reefs. Unfortunately these types of clean-ups are not practical on a large scale, unless groups like fish harvesters, government agencies and research institutes work together. One such project in Placentia Bay, Newfoundland, recovered 60 nets that contained lumpfish, seal, redfish, flounder, lobster and 30,000 lbs. of rotting cod.

In Northern Europe, seven countries have joined forces in the Fishing for Litter at Sea Program. Litter bags and dockside removal services are provided to fishers who bring marine litter ashore for proper disposal.

Poaching and vandalism were once significant causes of lost fishing gear, but now, through their unions, committees, and Integrated Oceans Management teams, fish harvesters are finding new ways to resolve conflicts over access to marine areas and resources. Accidental loss of fishing gear has also been reduced by the use of modern gear location and retrieval systems.

Various programs recognize marinas and vessels committed to pollution prevention with a system of eco-ratings. A good eco-rating can be a marketing advantage with today's environmentally-aware consumers. Government regulations also encourage responsible practices. In Canada, DFO requires that gear is tagged, lost nets are reported, and that gear is checked regularly. Fish harvesters can be fined for abandoning nets at sea. And increasingly, traps and pots are required to have escape devices to reduce ghost fishing if the gear is lost. This is accomplished by including a section that will rust or biodegrade within a set period of time.

The *Canada Shipping Act* prohibits the discharge of garbage into Canadian waters, and an International Convention bans the dumping of all forms of plastic into the sea. Although the world's fishing fleets still dump thousands of tons of debris into the sea each year, increased awareness is making a difference and steadily reducing this practice. Because marine debris comes from so many different sources, people in all walks of life must be part of the solution.

Around the world from Australia, to Canada, education and awareness programs are the first step in preventing marine debris. As awareness grows, more and more people are sorting, recycling, and composting their garbage. People are also refusing products with packaging that is not biodegradable or recyclable, or choosing products with minimal packaging.

Plastic bags are a particular concern. Over 1 million plastic bags are used and discarded worldwide, **every minute of every day!** Plastic litter is not only ugly, it clogs streams and storm drains causing serious flooding. As a result, plastics are becoming increasingly regulated – For example, some places now require consumers to pay for plastic shopping bags, while others have completely banned non-biodegradable bags. Science is rising to the challenge by developing a new generation of plastics that will biodegrade in the natural environment. These new plastics could greatly reduce pollution from common disposable products such as bags, diapers, tampons, and packaging. We used to think that the oceans were so huge that we could never have a serious impact on them. Now we realize that our activities do have serious consequences, but we are also solving our problems by working together. Change can be positive, and we can all be part of the solution.

DFO (2009 pending)

