

An Invisible Disaster:
Plastic in Marine Environments

Annotated Bibliography

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Allsopp, M, Walters A, Santillo, D, Johnston, P. 2006. Plastic Debris in the World's Oceans. Greenpeace. [Internet]. Available from:

http://www.greenpeace.org/international/en/publications/reports/plastic_ocean_report/

This report from Greenpeace attempts to document the quantity and source of plastic debris in marine environments worldwide. In addition to estimates of marine debris by region and source, the report also documents species that are known to be negatively affected by plastic waste, includes fishes, seabirds, turtles, and mammals. Greenpeace is a well-known environmental NGO: their international efforts to promote environmental responsibility are generally well-regarded, but their tactics have also been subject to criticism by corporations and governments. Despite their clear bias, this report will still be useful in that it provides a summary of the available information on the extent of the plastics problem. Further credibility is earned by the inclusion of sources from respected peer-reviewed journals.

Brander, SM, Fontana, RE, Tawny, MM, Gravem, SA, Hettinger, A, Bean, JR, Szoboszlai, AI, Keiper, CA, Marrero, ME. 2011. The Ecotoxicology of Plastic Marine Debris. *The American Biology Teacher*. 73(8): 474-478.

This article from a journal for biology teachers provides background on the toxicology of plastic as well as important concepts in ecology and oceanography that are necessary for understanding the scope of the problem that plastic poses for the environment. The authors present lesson plans for several activities designed to teach students about marine plastic. This article will be used to argue that teaching children about plastics started at a young age is one of the most important steps society can take to combat the environmental degradation caused by debris and will also be used as an example of mainstream acceptance of scientists' concerns about plastic in oceans.

Environmental Protection Agency. Common Wastes and Materials: Plastic. [Internet] Available from <http://www.epa.gov/osw/consERVE/materials/plastics.htm#facts>.

The Environmental Protection Agency's (EPA's) website provides a wealth of information on plastics and American consumption habits. Important data includes the amount of plastic waste created in the U.S. annually, details of how plastic is recycled, and tips for reducing the use of plastic. As the arm of the government responsible for environmental policy, the EPA is a well-regarded and reliable source of information. Data from the website will be used to demonstrate the scope of people's reliance on plastics and to show how difficult it will be to reduce society's use of plastics.

Moore, C, Phillips, C. 2011. *Plastic Ocean How a Sea Captain's Chance Discovery Launched a Determined Quest to Save the Oceans*. New York: Avery.

Moore, who is credited with bringing international attention to the enormous collection of debris caught in the Pacific Ocean Gyre (known as the "Great Pacific Garbage Patch"), explores the worldwide impact of plastics from production to disposal. The book does an excellent job of explaining how plastic is made and also how it breaks down to leave vast amounts of tiny plastic particles floating in the ocean. The book will be used as part of an explanation for why most people are unaware of just how much plastic can currently be found in the ocean. The book also

provides a firsthand account of what an ocean filled with plastic is really like. While there are sections of the book that are sensationalistic and lacking in scientific credibility—including a chapter that links plastic to a whole range of illnesses and physical ailments—the parts of the book that focus on the science of plastic production and decomposition are generally sound and based on good science.

Moser, ML, Lee, DS. 1992. A Fourteen-Year Survey of Plastic Ingestion by Western North Atlantic Seabirds. *Colonial Waterbirds*. 15(1): 83-94.

The rate of plastic consumption by seabirds was measured by analyzing the gut contents of 1033 birds off the coast of North Carolina between 1975-1989. Fifty-five percent of the species surveyed were found to have ingested plastic particles. Procellariiform birds had ingested the most plastic, and the amount of plastic found was clearly correlated with feeding mode and diet. It was also shown that the rate of plastic consumption had risen steadily over the 14 years of the study. The authors claim that no evidence was found to support the idea that the health of the birds was affected by the plastic. However, no attempt was made to determine the cause of death of the birds. This article will be used to demonstrate that the amount of plastic consumed by marine animals has been increasing since at least 1975.

Oigman-Pszczol, SS, Creed, JC. Quantification and Classification of Marine Litter on Beaches along Armacao dos Buzios, Rio de Janeiro, Brazil. *Journal of Coastal Research*. 23(2): 421-428.

The researchers surveyed the debris found both onshore and in submerged nearshore, hard-bottom zones at a tourist beach located just outside Rio de Janeiro, Brazil. On the coastline, there was an overall average density of 13.76 items/100 m², with paper being the most abundant debris, particularly cigarette butts. The most common submerged debris was plastic, with 46% of the marine litter coming from fisheries. This paper will be used to demonstrate how tourist activities can result in marine debris.

Weiss, K. 2006. Plague of Plastic Chokes the Seas. *LA Times*. Available from:

<http://www.latimes.com/news/la-me-ocean2aug02,0,4917201.story>

Weiss investigates plastic debris on the Midway Atoll, a mostly uninhabited island between North America and Japan that nevertheless is overflowing with plastic debris. He examines whether plastic is responsible for deaths at the large albatross rookery and also provides statistics on the amount and diversity of plastic found in ocean environments. The article includes an anecdote about a piece of plastic found in the gut of a dead Midway albatross that bore a serial number from a plane shot down in World War II and then travelled 6,000 miles to Midway. This story will be used as evidence of how far plastic can travel and how long it lasts in oceans. Quotes from the article about Kamilo Beach in Hawaii, where debris washed up onshore from the ocean is piled as high as 10 feet deep, will be used to demonstrate the impact of plastic marine debris on coastal communities.