



Inter-American Convention for the Protection and Conservation of Sea Turtles

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Marine Debris Impacts on Sea Turtles

Due to the increase in scientific information on marine debris and sea turtles warning about the growth of the problem in the IAC region, delegates at the 7th Consultative Committee of Experts (CCE7) considered the inclusion of the impacts of marine debris on sea turtles and their habitats in the IAC agenda. At the meeting, representatives of the NGO sector, along with delegates from the USA, Ecuador, Brazil and Argentina, highlighted the importance of this problem. It was agreed to request the IAC Scientific Committee to prepare a technical document on the effects of marine debris on marine turtles and their habitats, using the scientific information available and information provided by the IAC Parties. This document was prepared by the marine debris working group at the 11th meeting of the IAC Scientific Committee and edits were finalized at the Committee's 12th meeting.

This document summarizes the main negative effects that marine debris has on the health of sea turtles and their habitats. It also contains a brief description of the international instruments that address this issue. The objective of this document is that IAC Parties use it to guide their efforts in the implementation of measures to reduce the negative impact of marine debris on sea turtles and their habitats. The purpose is not only to recommend bibliography but, it is also to recommend IAC Parties to use it in their training programs which will facilitate that the information and strategies adopted internationally to prevent and reduce marine debris is informed to the public. Finally, the document provides a set of strategies focused on the prevention and reduction of marine debris that could be used as a reference by the IAC Parties.

Introduction

Marine debris includes any anthropogenic, manufactured or processed solid material, regardless of its size, discarded, disposed of, or abandoned in the environment, including all materials discarded into the sea, on the shore, or brought indirectly to the sea by rivers, sewage, storm water or winds (UNEP/CMS, 2011, UNEP/NOAA, 2011). This definition is not limited to plastic objects, but also encompasses other types of materials such as textiles, metal, glass, paper, construction materials, as well as dangerous materials such as asbestos, ammunitions, medical waste and discarded gear from fishing activities. Although a wide range of materials are constitute marine debris, most items fall in a small number of

types such as glass, metal, paper and plastic; last being the most abundant and the one with most interaction with marine organisms (Secretariat of the Convention Biological Diversity, 2012). The characteristics of plastic such as its durability, lightness and low economic cost, make it very convenient for a large-scale manufacturing of products for daily use (Vegter 2014).

Marine debris occurs in all oceans of the world, at all latitudes and depths and is of global concern, and their impacts are being reported in 663 marine species (Secretariat of the Convention on Biological Diversity, 2012). The pollution of coastal and marine ecosystems by debris and its interactions with biodiversity is a complex, multi-sector problem with economic, social and environmental implications. In terms of the environmental implications, marine debris is considered a major factor contributing to the loss of biodiversity and is one of the least understood and most complex to study (National Research Council, 2008).

Interactions of marine debris with sea turtles and their habitats

Given the many types of marine debris, their interactions with sea turtles and their habitats have been classified in two different ways: Ingestion and Entanglement/Entrapment.

- **Ingestion:** Marine debris ingestion, especially small-sized plastic, has been reported to occur in all sea turtle species, in all geographic areas and in all life stages (Gonzalez Carman, 2013; Schuyler et al., 2013; Secretariat of the Convention on Biological Diversity, 2012; National Research Council, 2008). Recent studies suggest that the probability of plastic ingestion by green turtles (*Chelonia mydas*) and leatherbacks (*Dermochelys coriacea*) has significantly increased over the last decade (Schuyler et al., 2013). For example, in a study performed in the Southwestern Atlantic on juvenile green turtles, 90% of the 62 specimens examined had ingested anthropogenic debris (Gonzalez Carman, 2013). Similarly, a high percentage of ingestion was reported in Florida, USA (Bjorndal, 1994) and Brazil (Bugoni et al, 2001). Marine debris ingestion may have lethal and sub-lethal effects, both of which have significant importance for sea turtles species. Ingestion may result in blockage of the digestive tract by foreign objects, which is the main lethal effect caused by marine debris. The ingestion of plastic bags may also cause an obstruction in the digestive tract, causing injuries to the mucosa/lining and altering its normal functioning. This can cause malfunctioning in buoyancy control, preventing turtles from submerging and feeding normally. This in turn causes a gradual deterioration in the turtles' physical state, which leads eventually to death. Gastrointestinal perforation caused by hooks or hard plastics, generates chronic infection, peritonitis and septicemia, which in many cases can kill turtles. (McCauley & Bjorndal 1999).

Additionally, the ingestion of debris can cause poisoning as a result of toxic constituents that can be absorbed and accumulated in the body. Micro plastics (plastics size <5 mm) are particularly easily ingested by a variety of species distributing contaminants in to the trophic chain. Marine debris ingestion may not only cause lethal effects on sea turtles because of the obstruction of the digestive tract. Other research has shown sub-lethal effects of marine debris ingestion as a consequence of nutrient dilution (McCauley & Bjornda1999). This happens when ingested debris, which has no nutrients, takes up so much room in the stomach, that nutrient depletion results. Nutrient depletion directly affects growth and reproductive rate; thereby seriously affecting sea turtles populations and their conservation (McCauley & Bjornda1999).

- **Entanglement/Entrapment:** Nowadays, entanglement with marine debris is internationally recognized as a threat to many marine species; affecting at least 135 species, including snakes, turtles, seabirds, pinnipeds, cetaceans and sirenians (Udyawer et al, 2013). Many forms of marine debris like packages, ropes, tires and abandoned fishing gear pose series threats to sea turtles; after being caught in this debris, the individual's mobility is diminished and some drown while others die of starvation or are easy prey for predators. Also, lacerations can lead to death by sepsis.

Marine debris may also cause the alteration, degradation or destruction of key marine and coastal habitats used by sea turtles for foraging and nesting. There are studies referring to the impact of waste accumulation in different types of habitats. For example, the plastic waste accumulation in intertidal habitats alters key physical and chemical processes as the availability of light and oxygen (Goldberg 1997), as well as temperature and water movement (Carson et al. 2011). Furthermore, on sandy beaches micro plastic accumulation can change the permeability and temperature of the sediments, with consequences for the animals showing the condition of temperature-dependent sex determination, as some reptiles (Carson et al. 2011). Coral reefs are also affected by marine debris; mainly fishing gear remains as nets and lines (Richard et al. 2011). Debris may be used as dispersal substrates for invasive species allowing rafting over large areas. Although the marine debris issue has not been exhaustively studied, the existing information on its impact on sea turtle species is sufficient to support the need for immediate action to be taken to control and mitigate it.

International instruments related to marine debris

Several conventions and international organizations are addressing this issue, and have produced global legal instruments and voluntary agreements for the prevention and

management of marine debris, of both terrestrial and marine origin. Those instruments that specifically regulate different sources of marine debris are:

- *The Conference of the Parties to the Biological Diversity Convention (CBD COP10)* has generated a global framework describing the impact of human activities on marine biodiversity. CBD COP10 stressed the urgent need to assess and monitor the impacts and risks arising from human activities on coastal and marine biodiversity, as well as to work collaboratively with other organizations to address this problem. Furthermore, the CBD Secretariat published a technical document (CDB Technical Series No.67) on the impact of marine debris on biodiversity.
- *The Convention on Migratory Species (CMS)* adopted a Resolution (UNEP/CMS Res.10.4) about marine debris. This Resolution recommends the Parties develop and implement their own action plan, which should be directed towards the negative impacts of marine debris within the jurisdiction of the Convention. It also instructs the Scientific Council to identify information gaps in the management of marine debris and its impacts on migratory species, as well as to identify the best practices for garbage management on board commercial ships, among other recommendations. It also requests the Secretariat to form linkages with other international instruments (IMO, FAO, UNEP) to promote synergies, thereby avoiding duplication and maximizing efforts to reduce the impact of marine debris on migratory species.
- *The International Convention for the Prevention of Pollution from Ships (MARPOL)* and its Annex V that prohibits the discharge and disposal of all types of garbage at sea.
- *The Honolulu Strategy*, made at the 5th International Conference on Marine Debris held in Hawaii in March 2011, is a comprehensive framework for an integrated and collaborative global effort, to reduce the ecological, sanitary and economic impacts of marine debris worldwide. The Honolulu Strategy focused on three main objectives, and provides a list of potential actions that could be implemented under each of the strategies.

Existing strategies for the management of marine debris

The management and reduction of marine debris is complicated to resolve unilaterally due to the complex nature of the issue. In order to understand the problem it is important to understand that: the accumulation of debris occurs in habitats far from the source, their persistence in the environment is very long, there is a lack of a regulatory framework for

the manufacturing chain that considers the negative impact it has on the environment once discarded (extended producer responsibility) there is a high clean-up cost. Because of this, global measures taken to prevent the problem focus on prevention at source to reduce the amount of debris that goes into the sea and to reduce the amount of sea-based debris introduced into the sea from abandoned vessels and offshore platforms among others. Beside, actions have been identified to prevent debris accumulation. Among the main strategies identified by The *Honolulu Strategy* for the prevention and reduction of marine debris are:

- Implementation of education and outreach programs on i) the importance of reducing, reusing and recycling materials in order to avoid/reduce the production of debris; ii) the importance of keeping streets, storm drains and other areas near rivers and other waterways, free of debris; iii) raising awareness among boaters and other interest groups on the importance of properly stowing their debris on board and avoiding disposing of materials at sea.
- Creation of local and international legal frameworks aimed at strengthening legislation to support management, prevention and reduction of marine debris, along with capacity building to apply these regulatory frameworks.
- Promotion of periodic clean-up campaigns in critical areas such as watersheds, rivers and other waterways to reduce the accumulation of garbage that may end up in the sea.
- Use of infrastructure to improve rainwater management and reduce the discharge of solid waste into waterways.

Additional resources

The following links contain documents that will provide more information on the effects of marine debris on marine biodiversity.

UNEP/NOAA, (2011). The Honolulu Strategy. A Global Framework for Prevention and Management of Marine Debris.pp. 57

<http://www.unep.org/esm/Portals/50159/Honolulu%20Strategy%20Final.pdf>

Secretariat of the Convention on Biological Diversity and the Scientific and Technical Advisory Panel—GEF (2012). Impacts of Marine Debris on Biodiversity: Current Status and Potential Solutions. Montreal, Technical Series No. 67, 61 pages.

<https://www.cbd.int/doc/publications/cbd-ts-67-en.pdf>

Amigos del Mar Program (CPPS) is a regional initiative promoted by the Permanent Commission of the South Pacific (CPPS) under the Regional Program for Integral Management of Marine Debris in the Southeast Pacific. The objective of this initiative is to develop environmental awareness among students/teachers of middle and high school, as well as the fishing community to encourage their participation in the search for sustainable and environmentally friendly solutions to combat the problem generated for waste ending in the sea.

<http://amigos-del-mar.net/index.php/m-amigos-del-mar>

CMS / UNEP: Project Resolution on the management of marine debris, based on three studies that were conducted according to the instruction in UNEP/CMS/Resolution 10.4 Marine Debris. This link includes three technical reports (Inf.27, 28 and 29)

<http://www.cms.int/es/node/5936>

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