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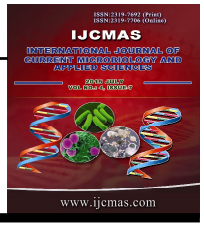

Original Research Article

Growth of sponges around nylon rope and E-waste in the coastal water of Veedhalai, Gulf of Mannar, India

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A B S T R A C T

Marine litter pollution is common all around the marine and coastal environments. This can affect the normal life of marine fauna as entanglement, over growth of sessile organisms, consumption of micro litters as food particles etc. In the Gulf of Mannar, India, the redundant growth of sponges around the anthropogenic wastes such as fishing lines (nylon rope) and e-waste (Computer RAM) has been reported in August 2014. They source of nylon fishing wastes was due to fishing activities while the e-waste may be due to dragging of fishing net by the mechanized or motorized boats nearer to the shore. The consumption of spongivori marine organisms may engulf these litters as food which can affect the normal life of marine inhabitants. Therefore it is necessary to conduct occurrence and abundance of marine litters in the coastal waters for the well being of marine biota.

Introduction

Every part of the world's seas, coastal waters and open oceans, i.e., beaches, intertidal, coral reef, seagrass bed, benthic sediment and surface of the seawater have contaminated by mass influx of anthropogenic solid wastes including plastic bags, bottles, foam, rubber, clothes, e-wastes etc (Gregory, 2009; UNEP, 2014). Most of the litters contain at least one hazardous chemical which end up in the sea (Katsanevakis and Issaris, 2010; Rochman *et al.*, 2013) because the coastal marine environment acts as a sink for contaminants. The sources of the marine litters are both the land and sea based activities.

Many thousands or even millions of litter items per hectare reached the seafloor or along the beaches (Katsanevakis, 2008; Katsanevakis and Issaris, 2010). Over thousands of species of marine animals such as fishes, sea turtles, seabirds, crustaceans, corals, sponges etc., are entangled by abandoned nets and accumulated solid litters of various types and these are a serious issue for their survival and growth.

Undisturbed natural substrates like coral rubbles, rocks and abandoned shells have always supported for the settlement and growth of sponges (Duckworth and Wolff,

2011; Abdul Wahab *et al*., 2014). Mostly the marine sedentary organisms like sponges and corals are experiencing unparalleled accessibility of substrate for better settlement and intact growth due to various anthropogenic activities. Since marine sponges are also an important dietary composition of variety of marine organisms from invertebrates to vertebrates (Wulff, 1994; Gemballa and Schermutzki, 2004; Barbara *et al*., 2007) there are enormous chances for plastic engulfing of marine animals.

The Gulf of Mannar has declared as a first Marine Biosphere Reserve in the Southeast Asia in 1989 with 21 reef islands for 160 km between Rameswaram Island and Tuticorin. It is well known for its high degree of biodiversity and endemic flora and fauna including sedentary organisms like corals, sponges etc., (Venkataraman, 2005). The major sources of solid wastes and litter contaminations to the coastal waters are through tourism, fishing related activities, municipal sewage and waste dumping, transportation etc. The disposal of litters along the beaches of Indian Coasts especially in the Gulf of Mannar coast is common (Ramakritinan and Kumaraguru, 2012). This could spoil the aesthetic nature of beaches and creates serious health hazards to the marine biota including human beings. At this juncture, the redundant growth of sponges around the anthropogenic wastes such as fishing lines (nylon rope) and e-waste (Computer RAM) in the Gulf of Mannar has been observed.

During the regular snorkeling and skin diving in the near shore area of Veedhalai (N 09º15’06.43”; E 079º06.33.71”) of Gulf of Mannar (Figure 1), the research team observed two different species of sponges grown around the litters in the benthic marine environment. These sponges were sampled for further investigations. But no other sedentary organisms found to any entanglement in this region. The location from which the sponges collected was heterogeneous nature of substrates i.e., mixture of sandy rocks, sandy and rubble bottom. The sandy rocks are covered dominantly by green and brown seaweeds followed by patches of small reefs and sponges. Remarkably, the majority of this area was contaminated by polythene bags, food wrappers, opaque water bottles, fragments of fishing line etc.

Then the sampled sponges were observed in the site itself. One of the encrusting sponges was grown around nearly a 2.5 meter length of nylon fishing line, which was abandoned in the marine benthic environment during fishing activity (Figure 2a). The weight of the dry sponge and nylon fishing line were about 80 and 40 g, respectively. In the meantime, another species of massive sponge was also grown around an electronic waste (e-waste) i.e., RAM card (Figure 2b). The source of fishing line may be due to fishing activity but the source of e-waste is questioned because it is a hard solid waste. The source may be dragging of fishing net by the mechanized or motorized boats nearer to the shore. The size of RAM card was 9 cm length and 2 cm width and the dry weight of the massive sponge was about 30g.

Gulf of Mannar has known for its rich marine faunal diversity especially coral reefs, sponges, and other invertebrates. The sponge eating fishes like Pomocanthidae, Labridae, Scaridae, Acanthuridae, Balistidae and Cheatodondidae, turtles and dolphins inhabited in the Gulf of Mannar (Venkataraman, 2005). Due to the spongivori nature, accidental engulfing of plastic litters along with sponges by these organisms may happen. Thus the engulfed

plastic litter particles may enter into the marine food web. Recent findings of plastic micro litter particles of varying sizes have been observed in the gut content of marine organisms are the forewarning to this worsening condition (Kripa *et al.,* 2014).

In contrast to the international scenario, Indian coastal waters were poorly understood for marine litter impacts. Except very few beach cleanup studies, no systematic beach and underwater marine litter monitoring studies were conducted. Particularly, studies on the impact of marine litter (by engulfing, entangling, habitat degradation, toxic effect and invasive species) to the marine organisms and ecosystems of Indian coastal waters are urgently needed for better protection and management of sedentary organisms like coral reefs, sponges and other bottom dwelling marine invertebrates such as molluscs, echnioderms, crustaceans etc.

Based on the present observation, it is necessary to undertake research on entanglement of marine litters and their impacts on marine organisms in addition to assess the sources, distribution and occurrences of marine litters along the beaches and coastal waters. For safe keeping of our beautiful beaches and biota inhabited in the marine ecosystems, we along with Government agencies should take steps to avoid dumping of solid and litter wastes along the beaches, reduce their usage and to increase the recycling efficiency of the marine litter.

Figure.1 Veedhalai fishing village, (N 09º16.170' E 079º06.449'), Gulf of Mannar, India. Arrow indicates the sampling location

Figure.2 Marine sponges grown around marine litters in Veedhalai coastal water, Gulf of Mannar, India (a) Sponge species grown around abandoned nylon fishing line (Length 250cm and 2 mm diameter); (b) Sponge species grown around e-waste, Computer RAM card (Length 9cm x Breadth 2 cm)

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