

Marine Debris in Little and Great Nicobar Islands

The pristine Andaman and Nicobar Islands consists of a group of 572 Islands and located at an approximate distance of 1200 Km from Indian continent, off the East Coast of India in the Bay of Bengal (Lat. 6°45'-13°45' N and Long 92°15'-94°00'E) forming India's southeast border. The group of Islands are surrounded by the Andaman Sea which is considered to be in the cradle of Bay of Bengal. These Islands have proximity to some South East Asian countries like Malaysia, Myanmar, Thailand, Singapore and Indonesia. Average area of Andaman sea is about 6,00,000 Km² with a coastal stretch of 1912 Km.

During the Marine Fisheries Census programme conducted by Fishery Survey of India (FSI), Port Blair, a sub-ordinate office under the administrative control of Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture and Farmers Welfare, New Delhi during February to March 2016 at Andaman and Nicobar Islands, an attempt was initiated to survey the debris littered at the pristine beaches of Little and Great Nicobar, which can be further termed as Marine Debris (MD).

The United Nations Environment Programme (UNEP) and the European Commission have adopted the most accepted definition of marine debris as "any persistent, manufactured or processed solid material discarded, disposed or abandoned in the marine and coastal environment, is an escalating environmental problem". During this survey, the most alarming environmental hazard i.e. plastic debris were found in all along the shore regions of Little and Great Nicobar (Figure 1) which were recorded promptly and these areas are under the strict surveillance of the Andaman and Nicobar administration for the welfare and protection of Particularly Vulnerable Tribal Groups and permission is strictly required to enter these areas. The population (about 10,000; according to our survey) in Great Nicobar is mixed i.e. occupied by the tribes (Shompen), Nicobaries and others, whereas the population in Little Nicobar (about 3,000; according to our survey) is only occupied by the Nicobari tribes. Majority of these areas are protected by law [Shompen Policy (2015)] in order to ensure the safety of the aboriginal tribes dwelling in these Islands. The recorded debris is not of the Indian origin; majorly originated from adjacent countries like China, Cuba, Indonesia, Malaysia, Myanmar and Thailand. Of all the debris, plastics occupy the major proportion which are highly non-degradable and cannot be degraded naturally. Moreover, the process of photo-degradation takes longer time in the ocean rather than on land because of the cooling capacity of the ocean.

Rubbish aggregation in the beaches poses a grave threat worldwide, starting from poles to equator. MD is the human introduced solid stuffs that are discarded at the sea or reach the sea through waterways or domestic or industrial effluents. Many recreational activities such as picnicking, boating, swimming and fishing in the sea can generate MD like plastics, food wrappers, fishing nets, containers, and paper cups etc. and most of MD are buoyant in nature and subsequently reach the beaches via the action of tides and currents. Unwanted quantities of plastic debris in these regions are strictly due to intentionally dumping of wastes

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violating the law of MARPOL 73/78 (the International Convention for the Prevention of Pollution from Ships) by the above said adjacent countries. The evidence to this statement points out to the illegal fishing and garbage generated in the coastal areas of China, Indonesia, Malaysia, Myanmar and Thailand and by International shipping services who dispose off their wastes in Indian waters. The role of foreign passenger ships in this regard is also notable. The dumped off wastes in Indian waters are carried to the shore by prevailing currents, circulated along the coastal waters and in the open sea and subsequently washed ashore.



Figure 1: Plastic pollution at Gandhi Nagar Jetty, Great Nicobar.

There are many instances of ingestion of plastic debris (PD) starting from marine invertebrates to large pelagic. Most of the plastic floating in the surface is being mistakenly ingested by marine birds, turtles and fishes. The author had also recorded significant ingestion of foreign plastic debris by pelagic thresher

sharks (*Alopias pelagicus* & *Alopias superciliosus* unpublished data). Further, this may be a potential hazard to various turtles species, as their breeding and hatchlings grounds are located in the Little and Great Nicobar area. After the Tsunami (26th December 2004), these islands notices the growth of beautiful coral reefs and it is assumed that these debris may also impose threat to these reefs. Further, plastic pieces can attract and hold hydrophobic compounds like PCB and DDT up to one million times background levels, which are considered as potential endocrine disrupter. PD can affect large marine animals on a broad scale and are responsible for deterioration of water quality, as the plastics are susceptible to contamination by waterborne organic pollutants and can leach potential toxic plasticizers due to percolation in the water medium. Ubiquitous and long lasting effects of PD are also observed when it gets accumulated resulting in fragmentation of macroplastics into small pieces in the marine environment and thereby increasing the potentiality of ingestion by marine organisms. Another major ecological problem contributed by the marine debris is the movement of invading or alien species which may carry many organisms such as small crustaceans, plankton, algae, bacteria and fungi. When organisms from one environment are carried to another part of the world, significant problems can arise. Recently PD recognised as a major threat to marine life due to polymers like Polyethylene (PE), which shares 64% production among synthetic plastic wastes produced. PE is most commonly found as a non-degradable solid waste and causes blockages in the intestine of fish, birds and marine mammals. Studies related to ubiquitous presence of debris; comforting them in the marine food web via ingestion by zooplanktons to apex predators is also evident. Thus, marine debris including PD can affect marine wildlife via entanglement and ingestion.

The tribal people of Little Nicobar collect the foreign plastic bottles and use it for their domestic use (Figure 2). Another major reason for getting abundant foreign material is the intrusion of fishermen of adjacent countries to these islands for salt water crocodile hunting. As shown in Figure 3, sea-surface current prevailing in that region might have resulted in debris being circulated continuously in the open sea and coastal areas, and subsequently washed ashore in the coastal areas. From the above study, it may be inferred that the garbage generated in the coastal areas of adjacent countries and by International shipping services are not disposing wastes properly and directly dump into the sea and this is taken by the currents and washed ashore on our pristine beaches of the little and Great Nicobar group of islands. Apart from this foreign plastic invasion through oceanic circulation, plastic and glass find several ways, like our domestic materials, to enter into our pristine islands and subsequently

into the coastal ecosystem, since there is no proper solid-waste disposal practice.

Since the matter relates to international crisis, controlling the marine debris problem in our coast is not easy. However, an assessment and periodically monitoring of the floatable debris in the coastal waters, beach and underwater clean-up campaign can be taken up periodically to check the MD in our coastal water and beaches. Above all, quick setting up a pilot-scale plastic recycling plant near to these affected beaches will be advantageous in curbing this problem effectively. This will also generate revenue and improve the socio-economic status of the coastal community.



Figure 2: Foreign plastic bottles used by Nicobari tribes in Little Nicobar.

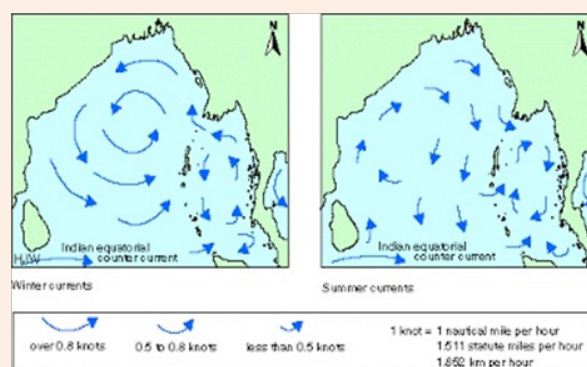


Figure 3: Surface current profile in the Andaman Sea.