STATE OF MARINE LITTER POLLUTION IN THE BENTHIC HABITAT OF THE SOUTH EASTERN BLACK SEA COASTS

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ABSTRACT

Marine litter is a major concern worldwide and posses an environmental, health, economic, and aesthetic threats. Knowledge on the status of distribution and abundance of marine litter on the sea bottom is necessary for the implementation of both national and international policy frameworks, and public awareness. The Black Sea is a semi-closed basin, connected to the Mediterranean through the narrow Turkish straits system (Istanbul Strait, Sea of Marmara, and Dardenelles) with a limited water exchange. Wide range of river systems carry diverse pollutants to the sea of which some settle down and accumulates intensively by destructing bottom habitats and some others float coasts of riparian countries by the existing wind and current systems. In this presentation, litters on the bottom habitat were analyzed based on field samplings with R/V Denar I of KTU. During the surveys, 671 litter items weighing 83.93 kg were collected from the sampling stations. The average density by number and weight were calculated as 460.70 ± 99.71 n/km^2 and 80.68 ± 48.06 kg/km^2. The litter density was found significantly higher at 10–20 m (646.09 ± 165.63 n/km^2) compared to 20–30 m (165.53 ± 81.02 n/km^2) and >30 m (413.87 ± 146.59 n/km^2) depth ranges.
Plastics (69.03%) are the most abundant litters by number, followed by textile (20.94%) and metal (5.68%). The litter composition varies between the trawl and no-trawl zones. Results indicate that more detailed research is needed to understand the interaction of various factors affecting transportation and accumulation of marine litter in the Black Sea.

MARINE LITTER AS GLOBAL THREAT

- Marine litter is human-made materials discarded, abandoned, or transported to the marine environment,
- Oceans and seas are the final destination of all kind of litters discarded to the nature,
- First determined in 1960s and its environmental impacts were observed in 1970s,
- At present, marine litter pollution is one of the major concerns of regional, international, national and local governments, scientists, decision makers, societies, NGO's and diverse businesses how to reduce the use of pollutants, to change negative habits of citizens, to develop new litter collection and recycling systems, to promote the use of nature friendly materials and develop new strategies and efficient legal measures and strategies.
- Marine litters accumulate on surface, water column and bottom by destroying habitats and marine living organisms living in these habitats.
- In spite of comprehensive studies showing the dimensions of the pollution, measures remains very weak to reduce its levels in developed, developing and under developed countries due to transboundary characteristics of the pollution.

MATERIAL & METHOD

- Assessment of distribution, abundance, and composition of marine litter on the seafloor was the main aim.
- Samplings were carried out by KTU Denar-I R/V at 27 stations (Fig 1.) along the southeastern Black Sea coast of Turkey, using dredge (3.2 m mouth width, 70 mm mesh sized bag) and bottom trawl net (28 m mouth opening, 40 mm mesh size in the cod end).from 27 October and 5 November 2016.

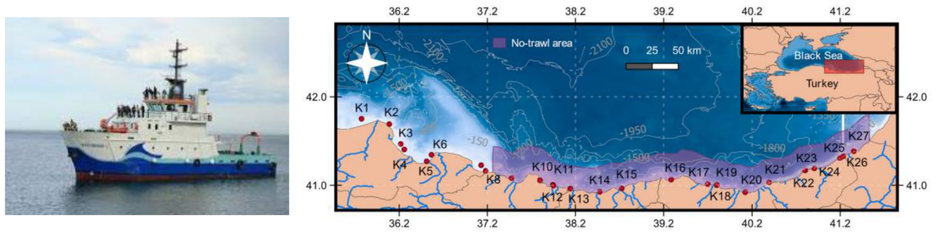


Fig 1. KTU R/V Denar 1 and sampling stations

- Both gears were towed for 30 mins at the speed of 2.5-3.0 knots.
- Litters were washed, dried, classified into several categories, counted and weighed.
- The swept area method of Sparre and Venema (1998) was used to estimate the area towed.
- Litter abundance for each haul was calculated using the formula A = N/a where A is the number of items (n/ km2) and weight (kg/km2) per unit area, N is the number or weight of the collected litter items in the haul, a is the swept area.
- Series of statistical tests were applied for data analyses; Kendall's tau correlation test, Welch's t-test, ANOVA and Tukey test in order to compare the differences between stations, depth ranges and litter group accumulations.

RESULTS AND DISCUSSION

- The litter density highly varied across the sampling area (Fig 2). The total number and weight of the collected litter were 671 and 83.93 kg, respectively.

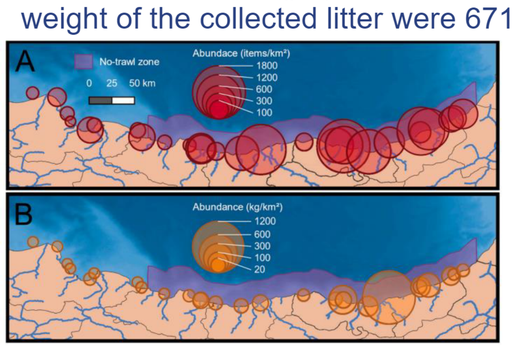


Fig 2. Distribution of benthic litter in the survey area by number (A) and weight (B)

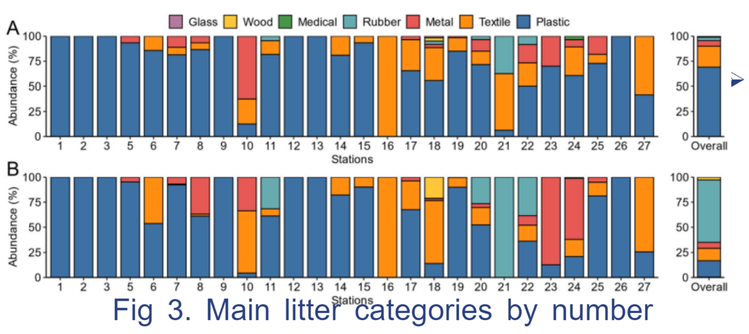


Fig 3. Main litter categories by number (A) and weight (B) on each sampling stations.

- The composition of the benthic litter collected from the stations was highly varied by number and weight (Fig 3). Overall, the most abundant litter types by number were plastics (69.03%), followed by textile (20.94%), and metal (5.68%) (Fig 4A), while by weight it was rubber (62.01%), plastics (16.37%), and textile (12.29%) (Fig 4B).
- Plastic items were collected from all hauls.

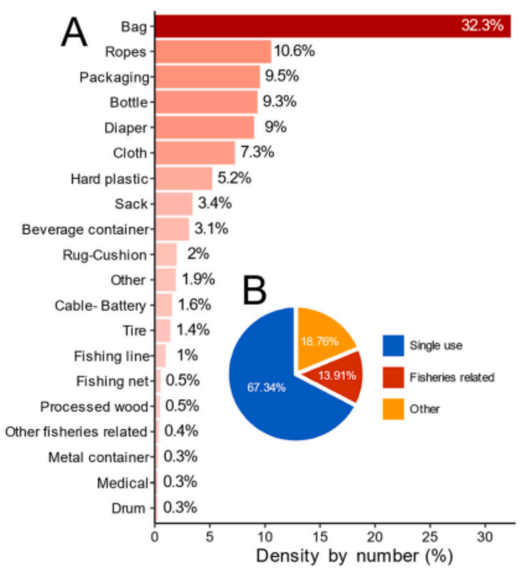


Fig 4. Sub-categories of benthic marine litter by number (A) and share of the single-use and fisheries-related items (B).

CONCLUSIONS

As the other seas, the Black Sea is under the thread of litter pollution. All economic drivers are under the influence of lmarine litter problem; mainly tourism, fisheries, overall Black Sea ecosystem. This study is an overview of the current distribution and presence of marine litter on the seafloor along the southeastern Black Sea coast of Turkey. Results indicate that the litter distribution and abundance are variable due to interactions between anthropogenic activities, water runoffs, hydrography, and physiography. The total surveyed area of the study is very limited to see the whole picture of litter problem in the Black Sea basin. Therefore, large monitoring programs are needed to determine the hotspots, possible sources, and effects on natural benthic habitats and biodiversity. Results of this study shows that majority of litters composed by single-use items. Measures encouraging reduction at source have a vital role. With recent legislation that comes into force in 2019, consumers are being charged for single-use carrier bags in Turkey. We also suggest buyback programs that encourage fishermen to collect and land marine litter. Improving social awareness is the most powerful tool to reduce marine litter problem.

KEY REFERENCES

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