

Litter composition on the shelf and upper slope of the Argosaronikos region and the eastern Ionian Sea, as evidenced by MEDITS surveys 1995-2008.

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Summary

Photographs of the total catch, taken by haul during Greek MEDITS surveys (1995-2008), have been used for a preliminary investigation on composition and spatio-temporal distribution of macro-litter in the eastern Ionian Sea and the region of Argosaronikos (middle west Aegean Sea). Litter items were categorized, counted and reported following the recently established MEDITS protocol for litter. Litter was recorded in more than 85% of examined hauls on shelf and slope of both studied areas, with plastic items most frequently collected (shelf: > 66%, slope: ~80%), followed by metallic (>45%) and glass/ceramic objects (> 23%). Litter annual density estimates were generally higher in the region of Argosaronikos but a significant increasing trend of annual density was shown only for metallic and glass/ceramic items on the slope of the eastern Ionian Sea. Items of the 3 main litter categories, generally accumulated along navigation routes, apart from a high density of plastic items, observed on the southern Argosaronikos slope that might be rather associated to the water-masses circulation along the western Aegean Sea and needs further investigation.

Introduction

Monitoring of litter on the sea floor is considered of prime importance to obtain information concerning properties and quantities of marine litter do not cause harm to the coastal and marine environment assess marine litter spatio-temporal abundance, to identify its origin and achieve an equal level of Good Environmental Status (GES) across all European Seas. The International Bottom Trawl Surveys in the Mediterranean Sea (MEDITS), performed annually by European countries under the Data Collection Framework (DCF) for the Common Fisheries Policy, have been considered an ideal tool to obtain standardized information on the amount, composition and distribution of litter on the continental shelf and upper slope, as requested for the implementation of the Marine Strategy Framework Directive (MSFD). The present study should be considered as preliminary, since litter monitoring was not a target for MEDITS surveys until 2012 and it is based on available photographs of the total catch taken for each haul upon the release of the trawl net content on board.

Materials and Methods

MEDITS surveys carried out by the HCMR from 1996 to 2008 m covered trawlable areas of the eastern Ionian and the region of Argosaronikos (Aegean Sea), with about 21 and 32 sampling stations respectively, distributed in five depth strata with the following limits 10, 50, 100, 200, 500, 800, according to the MEDITS protocol (Bertrand et al., 2002).

The complete sets of total catch photographs available for the years 1996-99, 2003-4, 2006 and 2008 for both studied areas were used. Litter items identified among catches were enumerated and classified into the categories and sub-categories provided by the recently established MEDITS protocol for litter data collection (Anonymous, 2013). The qualitative and quantitative data of litter were introduced in the Integrated Fisheries Information System of HCMR (IMAS-Fish) (Kavadas et al. 2013) and connected with the general data concerning hauls (haul code, date, geographic coordinates, depth zone, e.t.c.) and data of the gear performance, allowing the estimation of the swept surface during each haul and the

standardized indices of total and by category litter abundance per km². In order to identify annual trends of abundance for the main categories of litter, the standardised annual density estimates for shelf and slope by study area were log-transformed and the significance of their trends by year of survey was tested by regression analysis. Density standardised values (No items/ km²) estimated by haul for the 3 main litter categories, were incorporated into a common geo-reference system and were mapped along with the main navigation routes, in order to detect any existing association of their distribution.

Results and Discussion

Litter was found in more than 85% of examined hauls on shelf and slope of both studied areas. Litter items of all main categories were identified, belonging in 24 sub-categories. Plastic items were the most frequently collected (shelf: > 66%, slope: ~80%), followed by metallic (>45%) and glass/ceramic objects (> 23%). Among plastic items bags and bottles were the most numerous and frequently caught, whereas beverage cans comprised the vast majority of metallic items and bottles/jars dominated glass/ceramic items. Unspecified litter items were recorded in 14% and 10% of hauls in Argosaronikos and eastern Ionian respectively, whereas the remaining litter categories were present in less than 10% of examined hauls.

A significant increasing annual trend ($P < 0.05$) was only shown for metallic and glass/ceramic items on the slope of the eastern Ionian Sea. Annual average abundance of litter items per km², although varied considerably, was generally higher on the shelf of Argosaronikos region, where the most important Greek port is located. The distribution of the 3 main litter categories (Figure 1) indicated their accumulation along navigation routes. The high density of plastic items observed on the southern Argosaronikos slope, however, might be rather associated to the water-masses circulation along western Aegean Sea and needs further investigation.

References

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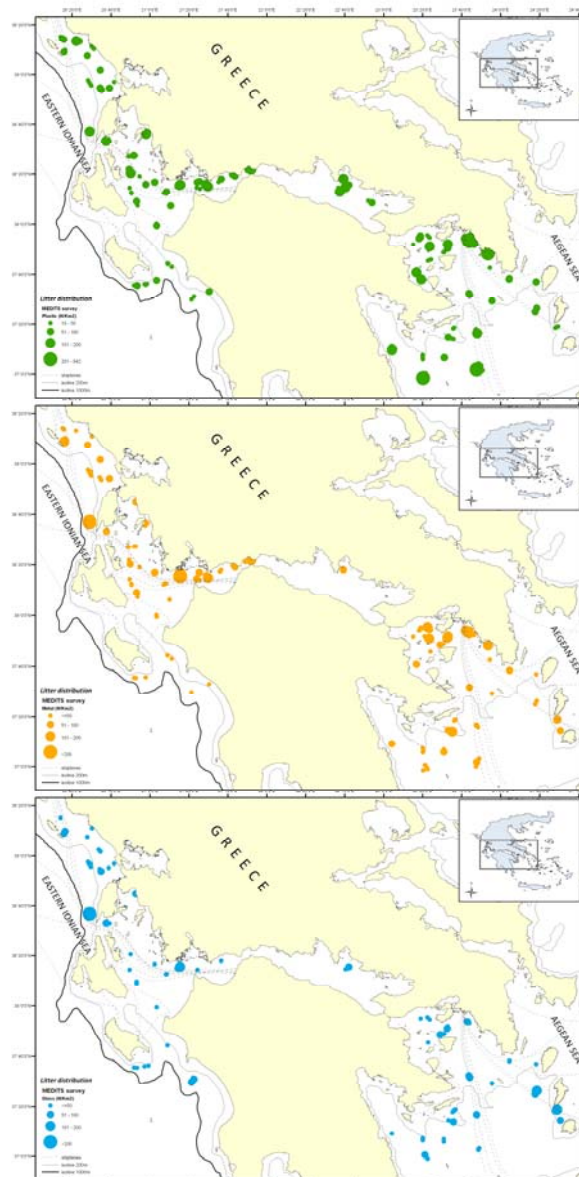


Figure 1. Density distribution of plastic, metallic and glass/ceramic litter items, as evidenced by the MEDITS trawl surveys (1996-2008) in the eastern Ionian and the region of Argosaronikos (Aegean Sea)