The Situation of Marine Litter Collected During Demersal Surveys in 2012 in the Romanian Black Sea Area *(Eugen Anton, Gheorghe Radu, George Țiganov, Mădălina Cristea, Magda Nenciu)*	**"Cercetări Marine" Issue no. 43** **Pages 350-357**	**2013**

THE SITUATION OF MARINE LITTER COLLECTED DURING DEMERSAL SURVEYS IN 2012 IN THE ROMANIAN BLACK SEA AREA

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ABSTRACT

Currently, there are no national or regional programs for the strict monitoring of the existing litter on the seabed. However, adjacently, by carrying-out activities at sea (demersal trawlings,) the collection of wastes from the seabed was favored, which allowed a quantitative and assortment assessment thereof.

In general, the abundance and distribution of the existing marine litter on the seabed shows a considerable spatial variability. Their geographical distribution on the seabed is strongly influenced by hydrodynamics, geomorphology and human factors.

Romania, through the national pelagic and demersal fish species status evaluation program, was favored by trawling operations performed on the seabed to obtain data which allowed the quantitative and qualitative assessment of such wastes in the areas of activity.

KEYWORDS: Black Sea, marine litter, bottom trawl

AIMS AND BACKGROUND

Marine litter are actually wastes from discards or losses resulting from human activities (shipping, fishing, tourism, and so on). These wastes are found on beaches along the shoreline, in water: floating on the surface or in the mass, or stationed on the seabed, respectively.

Marine litter have been considered since the early 1960s as an acute problem for marine life, but since then the volume of these wastes, associated with environmental, social and economic growth, has been globally increasing.

The magnitude of this problem has led to a growing concern internationally, in which case many governments, organizations and scientists have conducted both studies on marine litter and awareness campaigns. Nevertheless, even with all effort shown so far, the

scope is very limited compared to the always growing volume of wastes recorded during inventory campaigns. The scientific fishing activities performed at the Romanian Black Sea coast for the assessment of demersal fish stocks also favored the collection of wastes on the seabed. This has developed a new line of research, namely the monitoring of marine litter for the quantitative and qualitative assessment thereof, to determine the impact that they have on marine organisms and the formulation of proposals for measures to reduce pollution by the marine litter, respectively.

In Romania, the monitoring of the existing waste on the seabed (waste originated from discards or loss) is in the pioneer stage. Thus, starting with 2011 and 2012, voluntary monitorings were performed, facilitated by the surveys that targeted bottom trawl fishery to obtain data and information needed to assess demersal fish stocks. Starting with 2013, along with becoming partners in the project "Towards a Clean, Litter-Free European Marine Environment through Scientific Evidence, Innovative Tools and Good Governance", there was the opportunity to address a new research direction to ease obtaining data and information on marine litter in the Romanian Black Sea area, to determine the biological, social and economic impact of marine wastes and to set-out new monitoring, collection and recycling techniques and technologies and to draw-up measurement proposals to support policies aimed at mitigating the impact thereof, respectively.

MATERIAL AND METHODS

The research surveys performed in 2012 for bottom trawl survey fishing also facilitated, during fishing operations, the collection of litter on the seabed.

For activities at sea, NIMRD's research vessel "Steaua de Mare 1" (Fig. 1) was used and the 22/27 - 34 m bottom trawl was employed as fishing gear (Fig. 2).

Fishing activities were performed in all three sectors of the Romanian coast (southern, central and northern), from Vama Veche to Sulina, at depths ranging between 15 - 90 m (Fig. 3).

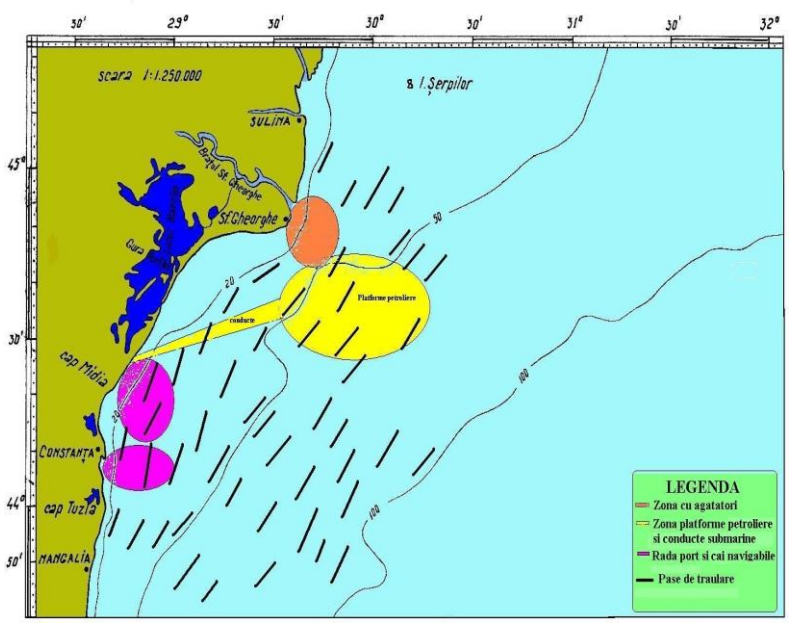

Fig. 3 - Position of tracks along which the hauls were made

RESULTS AND DISCUSSION

During 05.05 - 10.05.2012 and 13.11 - 16.11.2012, two research surveys were performed in the marine area of the Romanian coast using the research vessel "Steaua de Mare 1", for the assessment of demersal fish stocks.

In order to determine the biodiversity composition, 69 survey hauls were performed using the bottom trawl, in various locations and at different depths. The duration of the hauls was 60 minutes, the trawling speed was kept constant at 2.5 knots and the horizontal opening of the trawl was 13 m, which resulted in a surface covered during the trawling of 60,190 m^2 (0.6019 km^2).

In 28 of the 69 hauls performed, in the retention area of the trawl sack various wastes were also determined.

The amounts of wastes collected during the 69 trawler hauls were not large, yet marine litter was found in approx. 40% of the total hauls performed.

In percentages, in relationship with the total amount of marine litter (554.53 kg) collected from the areas covered during the 28 hauls [approx. 16.85 km^2 (28 hauls during which marine litter was identified x 0.6019 km^2 area covered during one haul], the situation of marine litter amounts, on assortments, is given in detail in Figure 4.

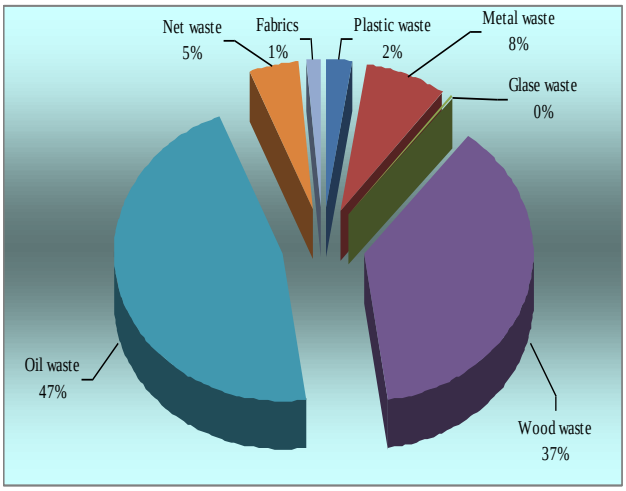

Fig. 4 - Percentages of marine litter collected from the seabed in 2012

During most of the trawling hauls (58%), plastic wastes were identified (PET containers, bags, sacks, lynoleum, buckets, canisters etc.) (Fig. 5). Plastic wastes originate from discards made directly from vessels/boats going out of harbors and the ones traveling along trade routes, respectively. In addition, the Danube river has a significant input in bringing plastic litter into the sea, through its outflows.

a)

Fig. 5 - Plastic marine litter: a) PET, b) canister, c) plastic sack

Metal and oil wastes, namely rubber, come in almost 100% of the cases from discards made from vessels, either before entering or after exiting the harbor enclosures, when there is a tendency to discard any unuseful item aboard the vessel (Fig. 6, 7 and 8).

a) b)

Fig. 6 - Metal wastes: a) metal drum, b) fire extinguishing panel

Fig. 7 - Semiliquid oil wastes in impermeable plastic bags

Fig. 8 - Tractor tyre

Some waste fishing gears originate in the gears lost by companies performing fishery activities at the Romanian coast (Fig. 9). However, most of them also come from the fishing gears abandoned by Turkish, Bulgarian and even Romanian vessels practicing illegal fisheries (with no permits or licenses or fishing during prohibition periods).

Fig. 9 - Gillnet type fishing gears

Wood wastes are washed by the Danube through its three branches and are carried by currents in the offing and close to the coast, from Sulina down to Vama Veche (Fig. 10).

Fig. 10 - Wood wastes

Most of the hazardous and toxic wastes (waste oil products) and hardly biodegradable materials (plastic) were found in the close vicinity of the Constanța and Mangalia harbors [approx. 96.61% (259.39 kg) of the total amount of such wastes collected from the seabed (268.48 kg)], where vessel traffic is also the busiest.

The data obtained during the research surveys performed in 2012 revealed the fact that there is a considerable amount of marine litter on the seabed, coming from discards or losses, many of them having a negative impact on biodiversity, as well as on activities such as fisheries and tourism.

With regard to fisheries, the occurrence on the seabed or in its vicinity of plastic wastes (bags, PET bottles, sacks and so on), constantly moving under the influence of marine currents, causes in most of the cases the blocking of meshes in gillnet type fishing gears, leading to changes of the operational parameters of the gears and implicitly the reduction of the catchment capability.

On the other hand, obtaining data (geographical coordinates) on the location of large-sized objects (entangling items, such as wrecks, pontoons, gear bodies etc.), identified on the seabed during trawling operations, helps in creating GPS maps with the actual location of entangling items.

The existence of such maps aboard vessels practicing trawl fisheries helps at avoiding trawler hauls in such areas and, consequently, protecting the fishing gear, which means avoiding its damage or total loss.

CONCLUSIONS

The pollution of seas and oceans is the result of introduction by man, directly or indirectly, of various substances and materials in the marine environment, which generally have harmful effects on living resources, human health and marine activities.

Shipping trade routes are to a limited extent a source of marine pollution by wastes different in nature. Oil tankers, but not only them, can discharge the oil from the tanks, enhancing thus oil pollution that may be harmful to marine habitats by degradation, depopulation of organisms, the extinction of certain organisms due to the high degree of pollution, fish flesh fouling and clogging of fishing gears.

Major oil spills may be real local catastrophes from the fisheries point of view, but, overall, the risk of marine oil spills has often been exaggerated.

The amount of oil that reaches the Black Sea through discharged vessel ballast water is unknown, but is believed to be considerable.

Another potential source of oil pollution is the offshore drilling platforms in the Black Sea riparian countries, including Romania.

Abandoned or lost gillnets are an imminent danger both for fish populations and dolphins (according to the observations performed, they remain operational and continue to retain fish and dolphin individuals crossing them).

Abandoning gillnet type fishing gears is highly dangerous both for cetacean species and demersal fish species, due to their prolonged catchment capability. The decay of catches in these abandoned fishing gears, the decomposition thereof may be a hazard for the quality of the surrounding waters, including for the health state of predator fish and fishermen tempted to recover the respective gears.

Currently, only a small part of plastic is recycled, the remained reaching most of the times the world seas and oceans. Given the fact that plastic is a hardly biodegradable material, it is considered the thrid main marine litter, after cigarettes and glass, as shown by the United Nations Environmental Program, causing major damages to the marine life.

With reference to all the above, we consider that it is highly recommendable to perform the monitoring of marine litter on the seabed, with the aim of its quantitative and qualitative assessment, on the one hand, and of identifying the measures needed to be taken to reduce its amounts, on the other hand.

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