

Output: O.T1.1

Study of data and information: Bulgaria

Author(s)/Subcontractors	Violin Raykov
Responsible organisation	Black Sea NGO Network, LP
Reference	MARLITER Study of data and information: Bulgaria. MARLITER BSB 138, Output: O.T1.1, 2019. Authors: Violin Raykov
Point of contact	Aleksandar Shivarov, bsnn@bsnn.org
Output Version	V1.0

Dissemination Level		
PU	Public	✓
RE	Restricted to a group specified by the consortium (including Programme Authorities)	

Common borders. Common solutions.

Contents

1. Status of marine litter and environment	4
1.1. Available literature and country specific information for marine litter status	4
1.1.1. National statistics, data sources, distribution, sites.....	5
1.1.2. Drivers, pressures, impacts, sources of pollution	19
1.2. Information, data and knowledge about the state of the environment	22
1.3. Gaps of knowledge and information, data and expertise on marine litter issue and national level peculiarities.....	28
2. Legislation	30
2.1. Marine litter on the global stage	31
2.2. The Bucharest Convention.....	34
2.3. The EU legal and policy framework for marine litter.....	35
2.4. Bulgarian legislation and policies.....	37
3. Stakeholders analysis.....	40
4. Strategies, practices, measures	43
4.1 National Waste Management Plan 2014 - 2020	43
4.2 National Waste Prevention Programme.....	46
4.3 National Development Programme: Bulgaria 2020.....	47
4.4 Strategic Action Plan for the Environmental Protection and Rehabilitation of the Black Sea 2009	47
4.5 Black Sea Marine Litter Regional Action Plan.....	49
4.6 Marine Strategy Framework Directive Programme of Measures.....	49
5. Monitoring status.....	52
6. Recommendations: policy, mitigation and management actions	56
6.1 Management of waste	57
6.1.1 Ordinance on packaging and waste packaging in Bulgaria	58
6.1.2 Plastic Bag Product Fee in Bulgaria	58
6.2. Legislative measures - part of the groups of measures laid down in the Bulgarian and Romanian marine strategies in the chapter on marine litter.	60
6.2.1 Introduction of the term ‘marine litter’ in the Bulgarian national legislation.....	60
6.2.2 Support for the adoption and implementation of Black Sea Marine Litter Regional Action Plan and respective Black Sea Marine Litter National Action Plan.....	61
6.3 Port reception facilities.....	62
6.3.1 Improving plans for the receiving and treatment of ship waste in the Bulgarian ports of national significance	62
6.3.2 Examples from the Mediterranean	63
6.4 Ship generated waste	64
6.5 Fishing generated waste & derelict fishing gear	64

6.6. Awareness raising and action (e.g. env. certification awards, motivation of citizens and groups for participation in monitoring- clean up actions; raising awareness campaigns; citizen science etc.)	67
6.6.1 Monitoring	69
6.6.2 Additional recommendations for measures and actions regarding marine litter	73
References	75
Appendix 1	78
Appendix 2	85

1. Status of marine litter and environment

1.1. Available literature and country specific information for marine litter status

The Black Sea coastline of Bulgaria extends for 378 km. The country exercises jurisdiction over an exclusive economic zone (EEZ) of 34,685 sq. km, located in the western part of the sea (Fig. 1). The area of the immediate Black Sea drainage basin is inhabited by around 1 million people. This estimate does not cover the Bulgarian population living in the Danube basin, which contributes indirectly via the Danube river to the pollution load on the Black Sea.



Figure 1. Exclusive economic zone (EEZ) and continental shelf (to 100 m depth) of Bulgaria in the Black Sea.

Source: Keskin et al., 2017

Solid waste enters the marine environment from land-based sources, such as rivers, canals, storm drains, wastewater, landfills and litter discarded on the shores. Another important source are activities at sea, e.g. shipping, fishing and aquacultures, off-shore installations, sports and recreation. Any waste created by humans that has been discharged into the coastal or marine environment is referred to as marine litter or debris. More precisely it is defined by UNEP and NOAA (2012) as “any anthropogenic, manufactured, or processed solid material (regardless of size) discarded, disposed of, or abandoned in the environment, including all materials discarded into the sea, on the shore, or brought indirectly to the sea by rivers, sewage, storm water, waves, or winds”.

The majority of marine litter is composed of plastics. Much smaller fraction of the solid waste entering the sea - around 20 per cent of the total or less - consists of metals, glass, textiles, wood, paper and cardboard. Between 60 and 90 per cent - sometimes as much as 100 per cent - of the litter that accumulates on shorelines, the sea surface and the sea floor is made up of one or a combination of different plastic polymers. The most common items, constituting over 80 per cent of the litter stranded on beaches (Andrady, 2015) are cigarette butts, bags, remains of fishing gear, and food and beverage containers. Likewise, 90 per cent of the litter collected from sea floor trawls is made up of plastic (Derraik, 2002; Galgani et al., 2015).

Mass production of plastics has accelerated in the second half of the 20th century and the volume of global plastics production has already exceeded that of steel in the 1980s (Stevens, 2002). The versatility of plastics make them a good replacement for most traditional materials and they offer qualities unknown in naturally occurring materials. Plastic products and technologies provide huge benefits in every aspect of life, to the point where life without them is almost unthinkable. Many sectors of the economy use plastics, including food and water packaging, a myriad of consumer products like textiles and clothing, electrical and electronic devices, life-saving advanced medical equipment and reliable and durable construction materials (Andrady, Neal, 2009; Thompson et al., 2009). The increasing production and consumption of plastics worldwide (Fig. 2), combined with a varying degree of waste (mis)management is leading to a constant flow and accumulation of polymer pollution in the marine and coastal environment.

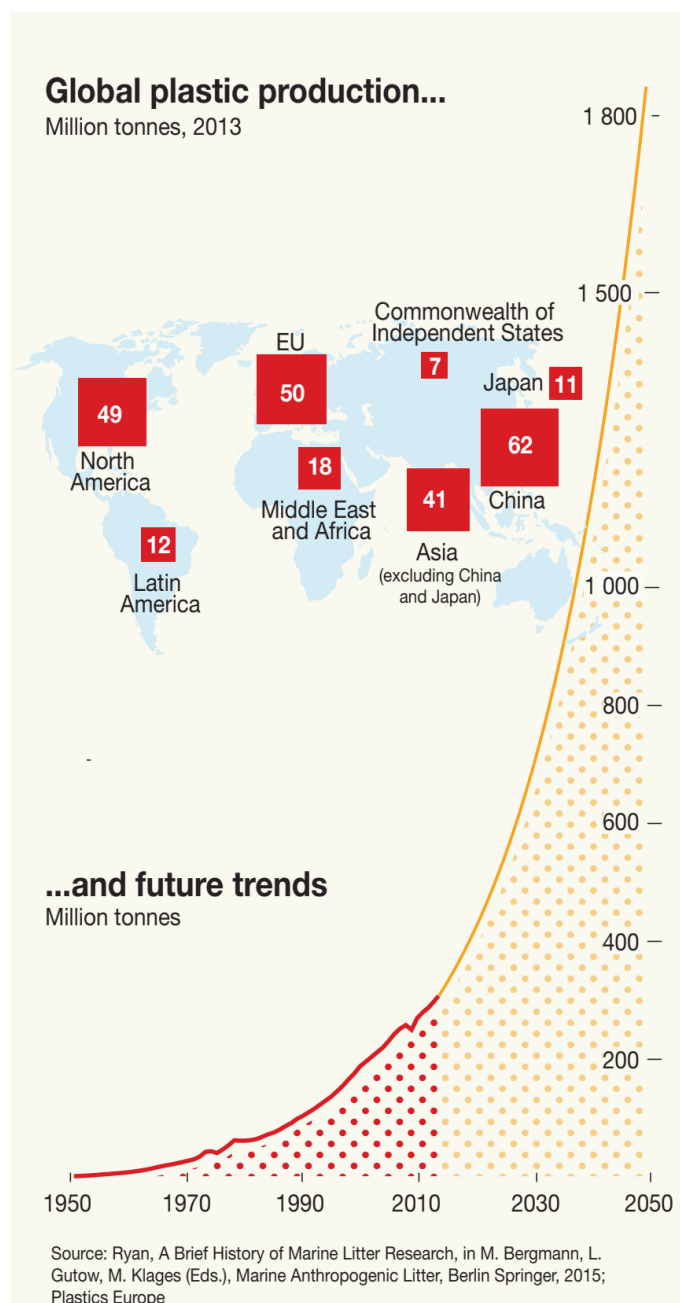


Figure. 2. Global plastic production, MT

1.1.1. National statistics, data sources, distribution, sites

Beach litter

Data from regular monitoring of beach litter in Bulgaria is available since 2015. For earlier periods there are only sporadic surveys and observations that have been conducted as part of clean-up campaigns or as side output to other research activities. The Bulgarian Black Sea coast

is no exception to the global pressure of marine litter pollution. The Black Sea Commission (2009) identified through expert assessment marine litter hotspots along the Bulgarian seashore, ranked according to their importance: 1. Coastal cities (including seaside resorts); 2. Ports; 3. Navigation routes; 4. Industrial zones along the beaches of the cities of Burgas and Varna; 5. Wild beaches and estuaries of rivers. The Bulgarian MSFD Initial Assessment (BSBD, 2013) states that there is no dedicated survey or available data on marine litter.

The more recent quantitative approach follows the requirements of the MSFD (2008/56/EC) and its amended Annex III (Commission Decision 2017/848/EU). The initial investigations follow the OSPAR guideline for marine litter monitoring (OSPAR, 2010a, 2010b). The study of marine litter, part of the MARLEN project, surveyed 8 beaches along the Bulgarian Black Sea coastline during four seasons in 2015-2016 (Simeonova et al., 2017). The results exhibited predominance of artificial polymer materials: 84.3% of all items (Fig. 3). Marine litter densities ranged from 0.0587 ± 0.005 to 0.1343 ± 0.008 items per sq. m, with the highest densities observed on urban beaches. The monitoring revealed also higher levels of pollution during the summer.

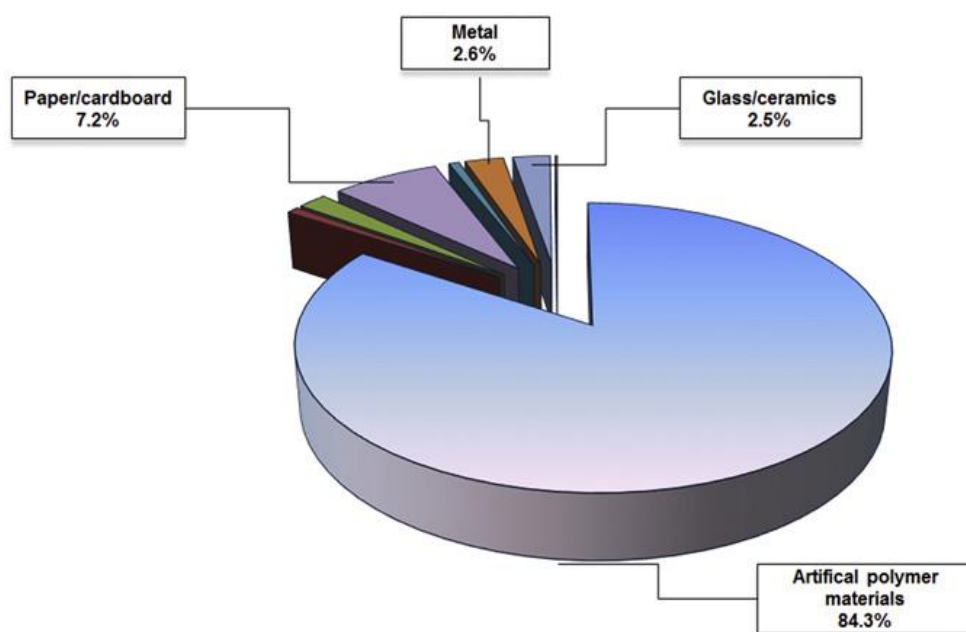
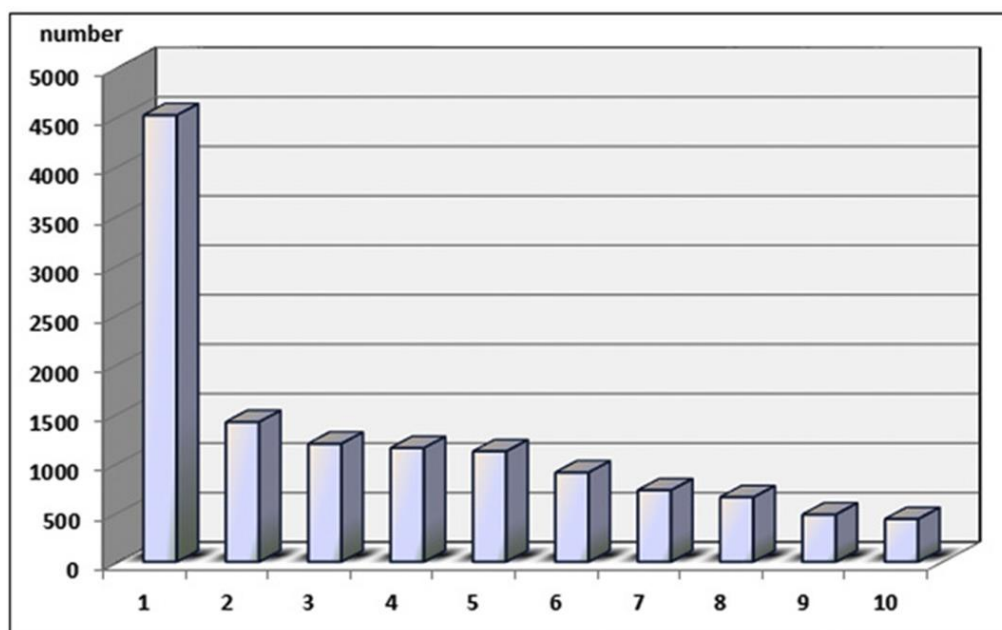


Figure 3. Composition of marine litter items recorded on the Bulgarian Black Sea beaches by categories, 2015-2016.

Source: Simeonova et al., 2017

Among the plastic litter found on Bulgarian beaches a prominent place take cigarette butts (Fig. 4). Large amounts of caps, drink bottles and cups are registered as well, regardless of the season (Palazov et al., 2017; Simeonova, Chuturkova, 2019). This distribution is well reflected in the amount of marine litter by weight (Fig. 5)



- | | |
|---|---|
| 1. Cigarette butts | 6. Crisps packets/sweets wrappers |
| 2. Plastic caps | 7. Drink bottles >0.5 l |
| 3. Plastic cups | 8. Small plastic bags |
| 4. Plastic caps/lids unidentified | 9. Drink bottles ≤0.5 l |
| 5. Plastic/polystyrene pieces 2.5 ÷ 50 cm | 10. Plastic rings from bottle caps/lids |

Figure 4. Plastic litter on Bulgarian beaches by number of items.

Source: Simeonova et al., 2017

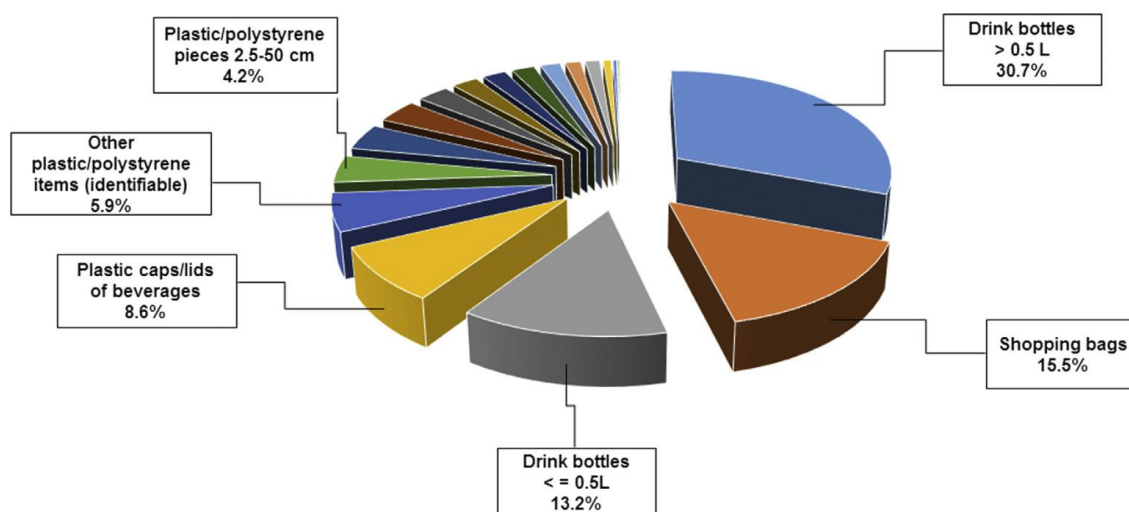


Figure 5. Contribution of marine litter types to the Bulgarian Black Sea coastal pollution, by weight.

Source: Simeonova, Chuturkova, 2019

The monitoring data from 2018 exhibits a decline in the share of artificial polymer materials to 60% (Fig. 6). This is accompanied by a relative abundance of paper/cardboard and wooden

items, compared to the 2015-2016 surveys. The monitoring on 2017 and 2018 includes the same 8 beaches as in 2015-2016 with the addition of two new sites.

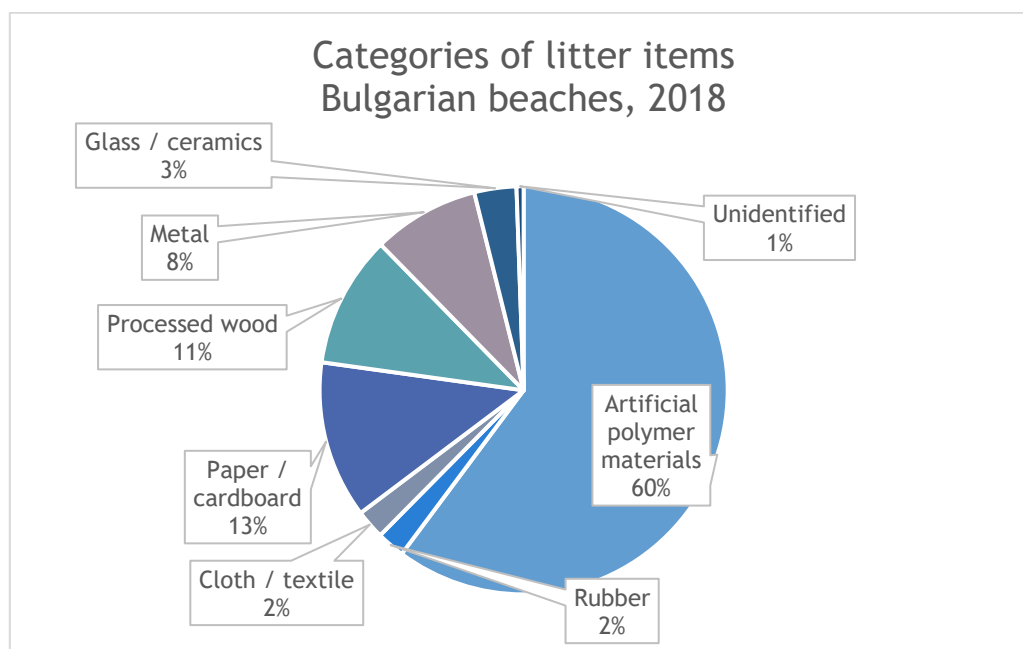


Figure 6. Categories of litter items recorded on Bulgarian beaches in 2018.

Source: BSBD, 2019

There are no defined threshold values for criteria D10C1, indicator 1: beach or coastal litter for Bulgaria. However according to Palazov et al. (2017) a qualitative assessment about the distance from the good environmental status for this indicator allows to state that the amount of marine litter along the coastline is insignificant and does not disturb the aesthetic characteristics of the beach. An exception is the site along the navigation canal linking Varna lake and the Black Sea, which is visibly polluted.

Floating litter

A pilot monitoring of floating litter on the sea surface has been conducted in the framework of project MARLEN, 2015-2016. Its objective has been to establish the quality and quantity of floating litter in the coastal and shelf zone of the Bulgarian sector of the Black Sea. The obtained data was meant to improve the regular monitoring programme, part of the Bulgarian Marine Strategy, which started in 2017.

The pilot survey of the quantity, type, size and spatial distribution of floating litter was done as within an 8-day trip in July 2016. The monitoring covered the coastal and shelf zone in the area between cape Kaliakra and the town of Sozopol. Visual observations of the sea surface have been performed for 46 transects, divided equally between the coastal and the shelf zone (Fig. 7)

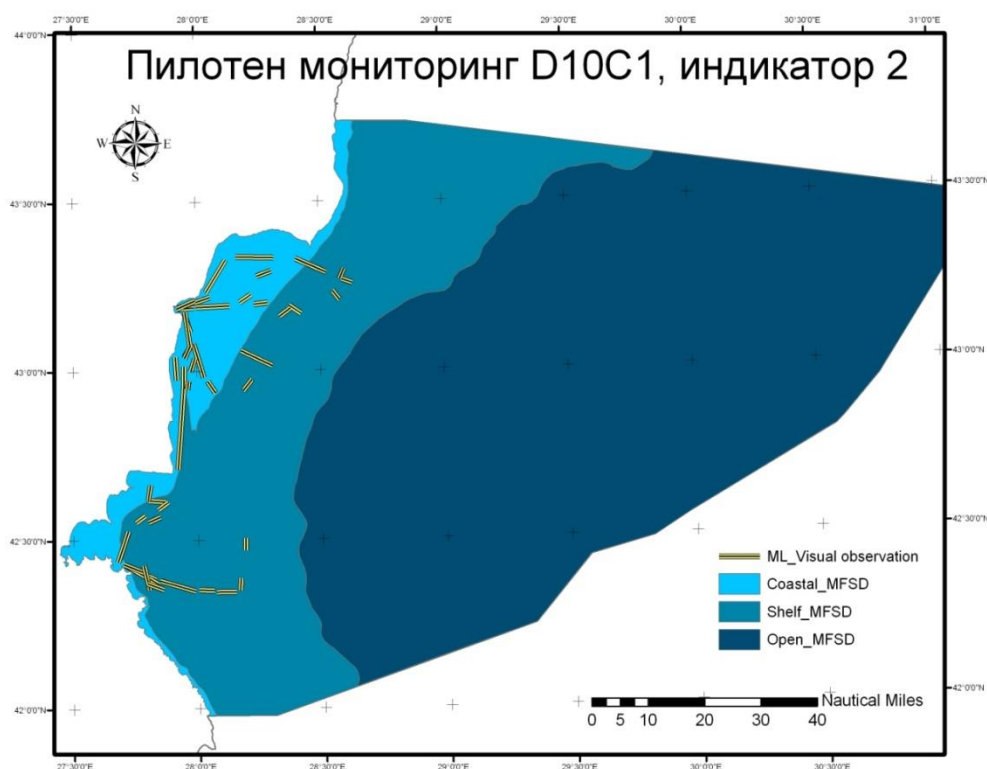


Figure 7. Survey area for floating litter >2,5 cm

Source: Palazov et al., 2017

A small fishing vessel (length - 14 m, gross tonnage - 18 t) has been used for the pilot survey.



Figure 8. Fishing vessel Iva-1 used for the pilot survey of floating litter

Source: Palazov et al., 2017

The survey has been conducted through visual observation, employing the method of linear transects described in the guidelines for D10 Marine litter. The observations are performed from the vessel's bow in a direction perpendicular to the course of the vessel (Fig. 9).

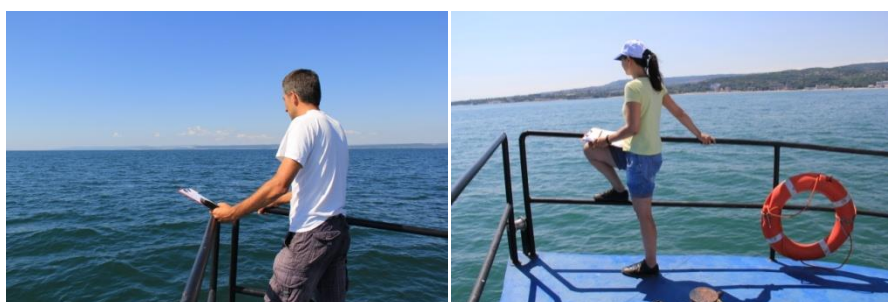
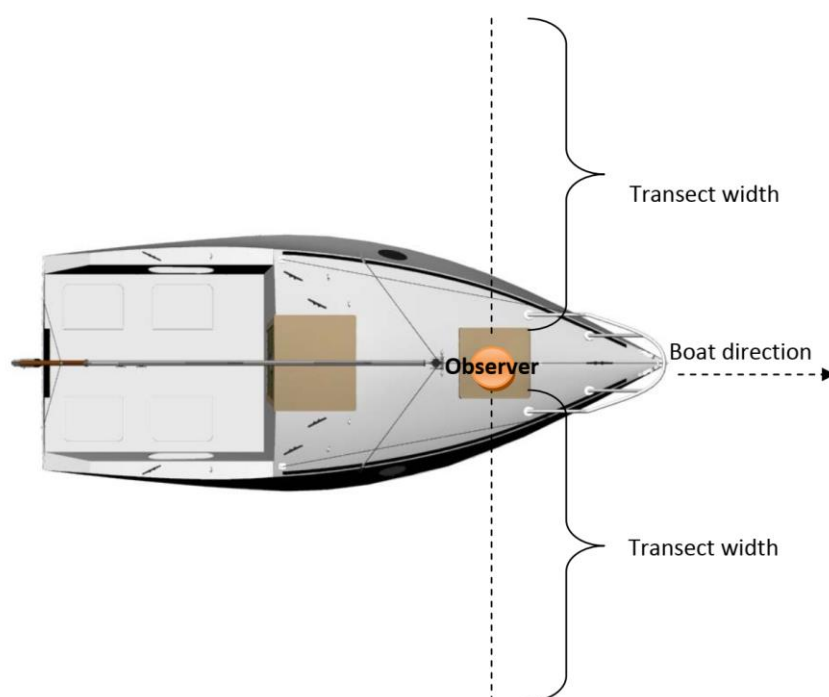


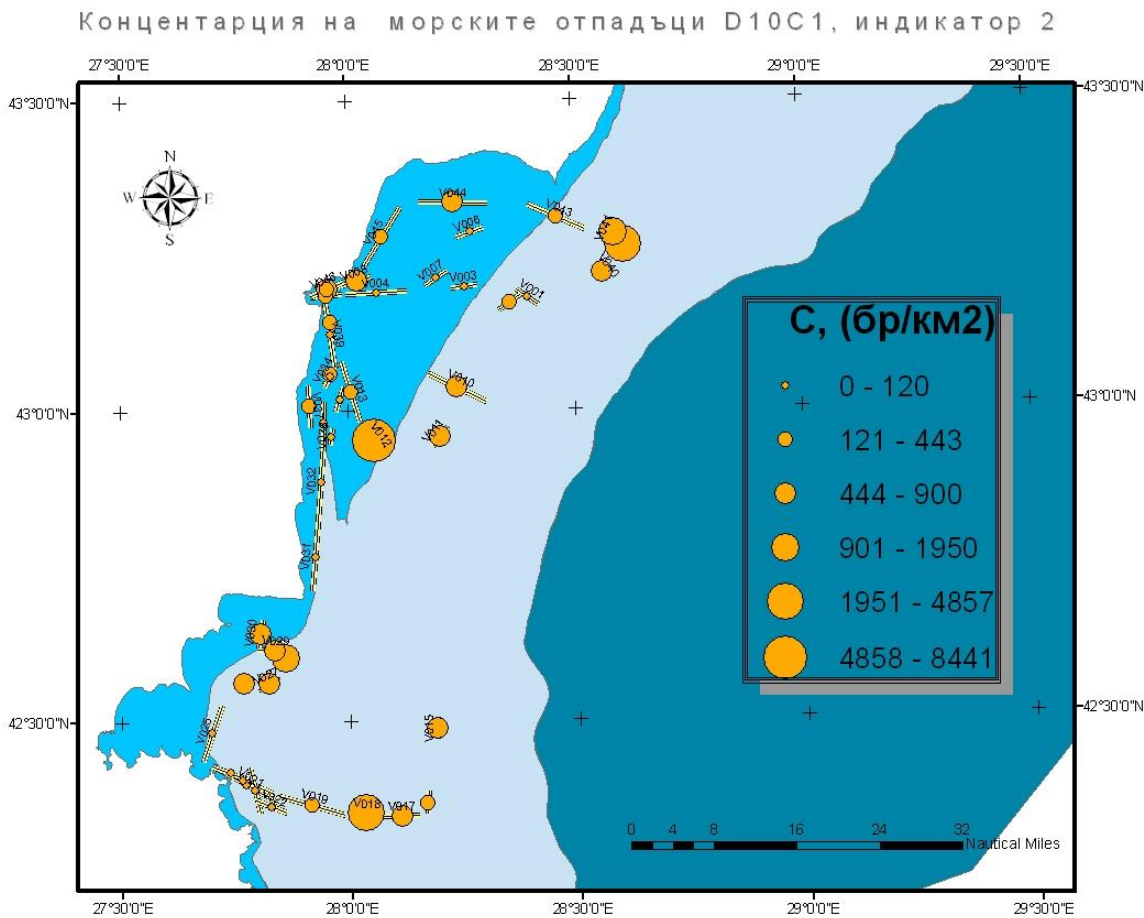
Figure 9. Position of observers during visual monitoring of the marine surface for floating litter.

Source: Palazov et al., 2017

The survey unit during visual observation of sea surface litter is the linear transect. Each transect is characterized by its width (observation corridor) and length. The transect width depends on the vessel speed and the height above the waterline, from which the observation is performed.

The total surveyed area included in the 46 transects is 2.34 sq. km and the total length of the transects is 325.2 km. The average length of a transect is 7 km. The total amount of registered litter on the sea surface is 1252 items. In the coastal zone have been observed 558 items, and in the shelf zone - 695 items. In four transects no debris has been observed. The density of the macrolitter on the sea surface varies from 0 to 8441 items per sq. km, with the average being 690 items/km². The average concentration is higher in the shelf zone (796 items/km²) than in the coastal waters (585 items/km²). Both minimum (11 items/km²) and maximum values (8441 items/km²) of floating litter concentrations have been registered in the coastal zone. In the first case in the vicinity of cape Galata and in the second between the Kamchia river and Shkorpilovtsi beach. The minimum density in the shelf area is 1.5 times (28 items/km²)

compared to the coastal area, while the maximum concentration is nearly half the one for the coastal zone (4857 items/km²). The spatial distribution of floating litter is presented in Fig. 10.





C)



D)



E)



F)



G)



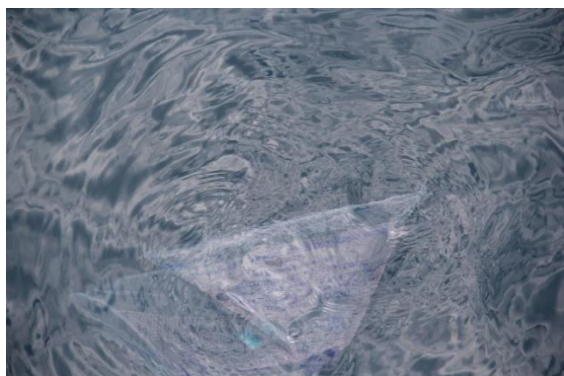
H)



I)



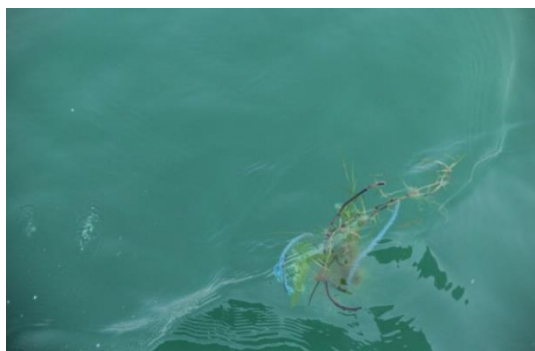
J)



K)



L)



M)



N)



O)



P)

Figure 11. A-G74 (Foam packaging/insulation/polyurethane), B-G23 (Plastic caps/lids, unidentified), C-G124 (Other plastic/polystyrene items, identifiable), D-G142 (Rope, string and nets), E-G23 (Plastic caps/lids, unidentified), F-G124 (Other plastic/polystyrene items, identifiable), G-G2 (Bags), H-G154 (Newspapers & magazines), I-G38 (Cover / packaging), J-G158 (Other paper items), K-G2 (Bags), L-G27 (Cigarette butts and filters), M-G142 (Rope, string and nets), N-G168 (Wood boards), O&P-G6 (Bottles)

Source: Palazov et al., 2017

The majority of all registered items (88%) are between 2.5 and 20 cm. Within class A (2.5-5 cm) fall 51% (636 items), 24% are classified as class B (5-10 cm), 13% - class C (10-20 cm). The remaining 12% are larger than 20 cm and only 26 items (2%) are larger than 50 cm. 24 items from the last class F are registered in the shelf zone. The size distributions for the coastal and shelf areas follow the same pattern (Fig. 12).

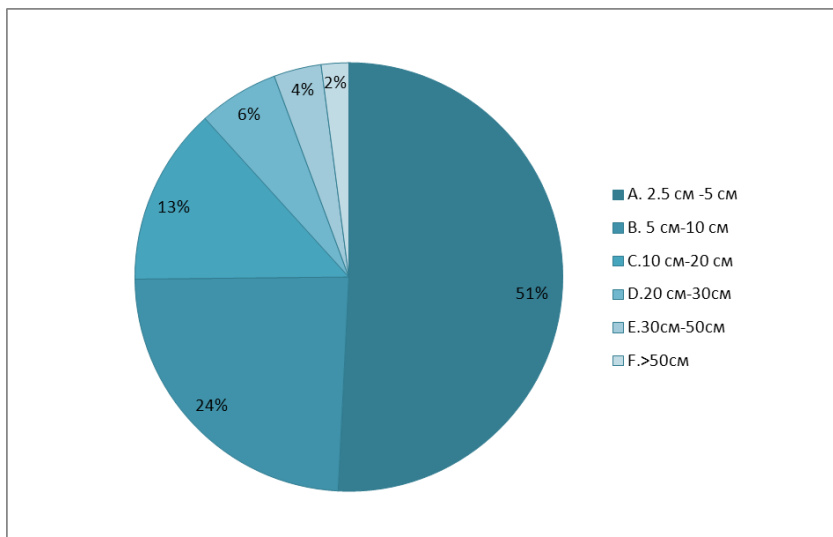


Figure 12. Distribution of floating litter by size (A: 2,5-5 cm, B: 5-10 cm, C: 10-20 cm, D: 20-30 cm, E: 30-50 cm, F>50 cm)

Source: Palazov et al., 2017

Another survey along the Bulgarian coast has been performed as part of the project Wind2Win (Berov, 2018). It followed the same methodology as already described above with transect width of 10 m on both sides of the boat, due to the low observation point of the Zodiac type vessel that was employed (Fig 13).



Figure 13. Zodiac type boat used during the project Wind2Win

Source: Berov, 2018

A total of 20 observations have been performed during 18-22 September 2018. Only during 6 observations were registered floating objects, while during the remaining 14 observations no floating litter was detected. In five of the transects the litter densities varied between 23 and 50 items per sq. km, mostly bags and other plastic pieces. The highest level of pollution has been observed in Sozopol Bay: 558 items per sq. km. A repeated observation of the same transect later during the day resulted in no registered objects, as the litter has been most probably transported by strong wind to the seashore.

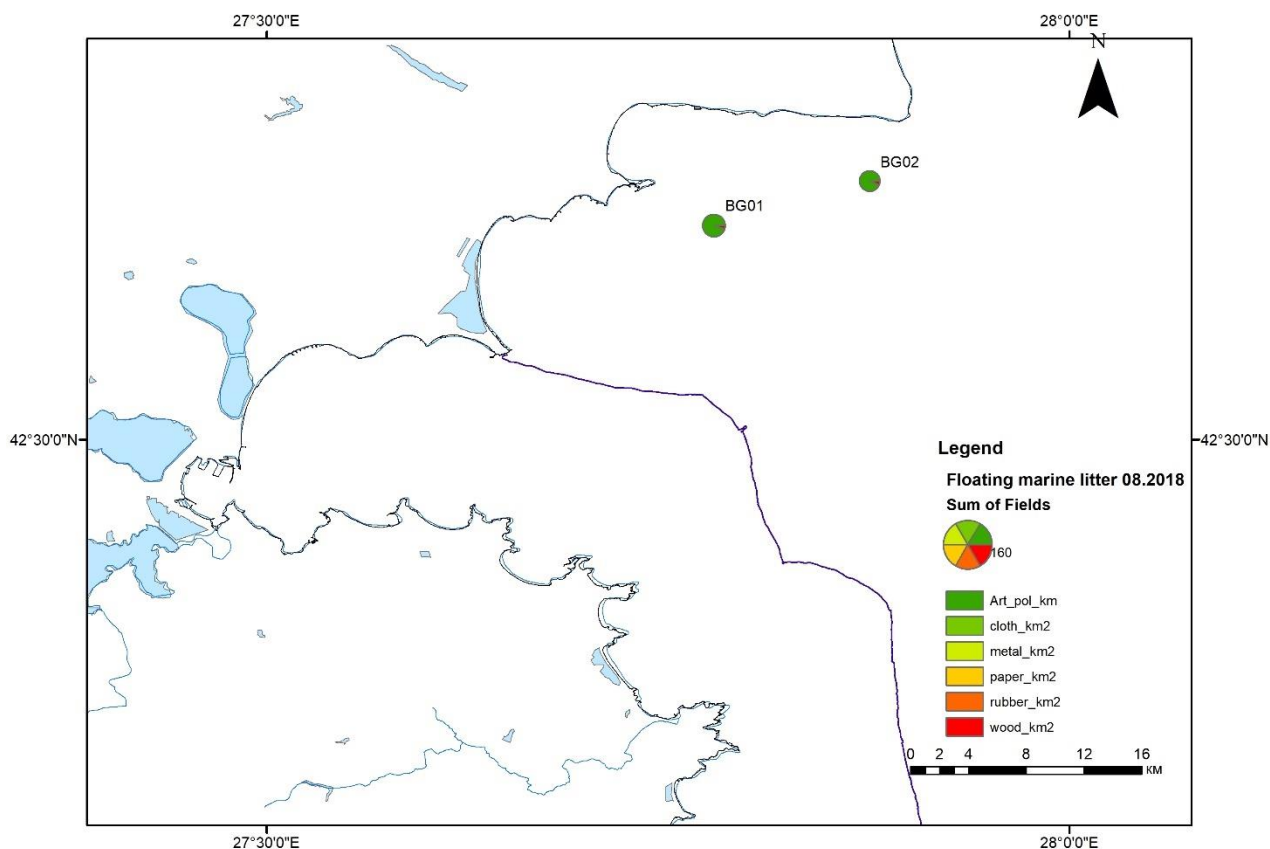


Figure 14. Composition of floating litter during observations in Burgas Bay

Source: Berov, 2018

Based on comparison from a similar survey conducted a year earlier Berov (2018) concludes that isolated observations provide only a snapshot of the momentary situation and the amounts of floating litter. Therefore, he recommends to combine the monitoring efforts with oceanographic data on water movements in the coastal area and modelling of the distribution of different types of artificial polymers on the sea surface.

Seafloor litter

Increasing concern about marine debris has been driven by the rapid and widespread accumulation of persistent plastics, representing about 75-83% of all items found globally and in Europe (Barnes et al., 2009; Gregory, 2009; Moore, 2008, UNEP/MAP, 2009). Plastic was also the most common debris material (68 %) found in a regional study of the north-western Black Sea in 2013 in the framework of MISIS project. The average quantity of marine litter found in the NW Black Sea reported by Moncheva et al. (2016) is 6359 ± 2015 items/km². This is an order of magnitude higher than the amount (126 ± 82 items/km²) reported for example for the western Baltic Sea (Galgani et al. 2000), although significant ambiguity could be associated to differences in methods used for sampling and analysis. It strikes as a very high estimate also compared to a different study of Constanta Bay (291 ± 237 items/km²) and the highest pollution density reported in the Saronic Gulf of the Aegean Sea (1211 ± 594 items/ km²) by Ioakeimidis et al. (2014)

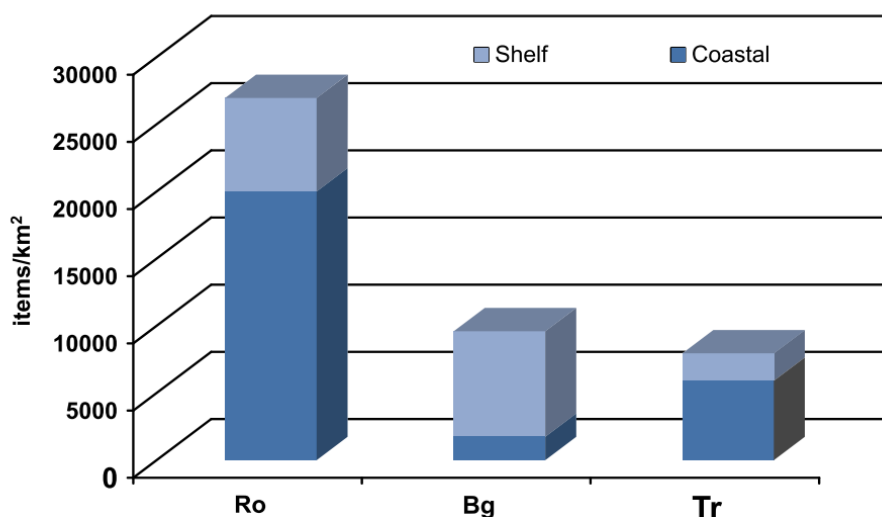


Figure 15. Distribution of bottom marine litter in the coastal and shelf area of NW Black Sea (Romania, Bulgaria and Turkey)

Source: Moncheva et al., 2016

The marine debris at the coastal area were found to exceed about two times shelf density related most likely to the proximity to land-based sources, intensive human activities in the coastal marine domain and accumulation on the bottom due to weaker currents (Barnes et al. 2009, Katsanevakis, 2009, Katsanevakis & Katsarou, 2004). The high marine litter density observed in the Bulgarian shelf polygon could be associated to the intensive fishing and shipping in this particular area (Initial Assessment report, 2013). The nature of the marine litter extracted during the bottom trawling suggests sea-based origin, mainly from shipping and fishing (Moncheva et al., 2016).

In addition, Barnes et al. (2009) discussed existing accumulation zones offshore with very high debris densities despite being far from coasts, related to a number of factors such as prevailing wind, currents, eddy circulation patterns and convergence zone of seabed sediment movements. Thus, natural dispersal of floating and suspended marine litter by wind and sea currents represents a transboundary problem that needs basin scale concerted management strategies of different sectoral activities.

Solid waste management is one of the major environmental problems in the Black Sea region and is a likely source of marine litter especially in the shallow areas (Celik, 2002). Berkun et al. (2005) reported municipal and industrial solid wastes were dumped on nearby lowlands or directly to the sea on the southern coast of the Black Sea. The ML management is further complicated by the lack of consistent monitoring programs and data at regional and global scale.

A pilot survey, covering the whole Bulgarian coastal and shelf area has been conducted under the project MARLEN in 2016. It included 26 polygons with depths from 20 to 80 m. The collected items during the trawling were predominantly from plastics, rubber, metals and textiles. Following the same methodology, established by the MSFD Technical Subgroup on Marine Litter (EC, 2013), as the earlier MISIS project, this survey established lower densities of marine litter on the sea bottom. Out of 26 hauls 5 did not bring any litter and the average reported quantity found on the sea floor was 8.1 ± 0.9 items/km² with a maximum of 14 items/km² north of Varna (Palazov et al., 2017).

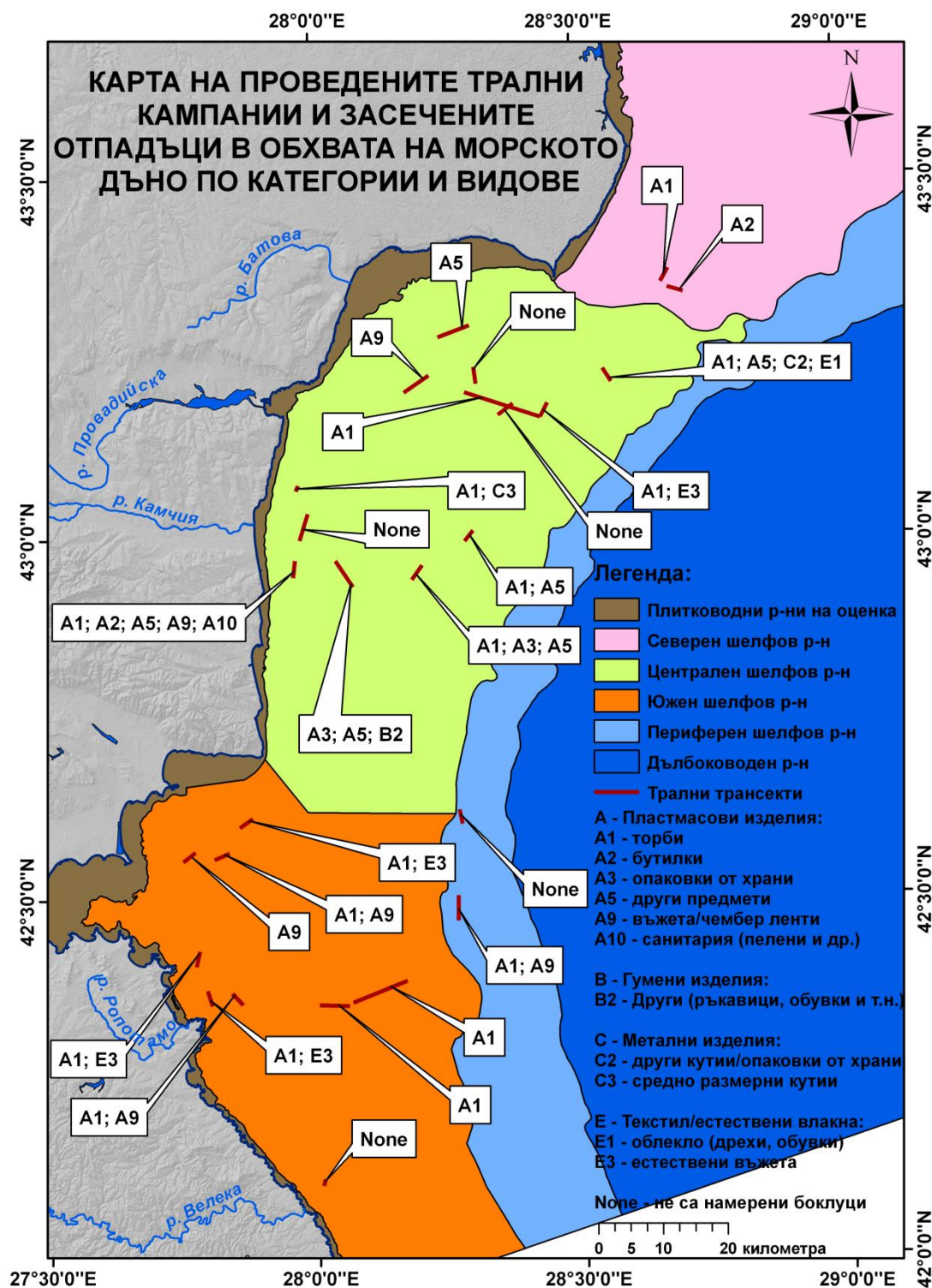


Figure. 16. Map of trawling sites with types of registered seafloor litter on the Bulgarian shelf

Source: Palazov et al., 2017

Sampling has been performed in areas with intensive shipping traffic, such as E-SE of Varna and E-NE of cape Maslen Nos. Besides the shipping, important source of litter are the rivers Kamchia, Dvoinitsa, Hadjiyska, as well as the large recreational areas around Golden Sands and Varna, Sunny Beach and Nessebar, from Sozopol to Dyuni. The riverine and coastal litter is transported

southwards by the currents and a number of trawling sites in the central and south shelf area have been chosen taking this fact into consideration. Thus most of the effort has been concentrated along the central and southern Bulgarian coast.

The highest concentration of marine litter has been established in front of the seaports Varna and Burgas. The amount in the other areas is lower. The total amount of registered items was 81, divided in categories and types (Annex 1). The most often encountered seafloor litter are plastic bags: a total of 55 during the whole survey. In terms of weight the biggest amount has been hauled from depth of 75-100 m (7.66 kg), followed by depth range 50-75 m (6.82 kg).

The second most often type is other plastic items (G124) with a total of 9, followed by ropes synthetic and from natural fibres - 5 from each category and single bottles, boxes, shoes, clothing, etc.

Among the recommendations from the analysis is the establishment of regular monitoring of seafloor litter, accompanied by opportunistic observations and information from fishing vessels. This can contribute information about the types, origin and distribution of marine litter, as well as for establishing polygons and assessment areas under MSFD. As main sources of marine litter in the Bulgarian EEZ are identified fishing and aquaculture, maritime transport, tourism, the major rivers flowing into the Black Sea and the ports (Palazov et al., 2017).

The MARLEN report provides also raw data about the registered items, from which it becomes obvious that there are issues with the extrapolation of the results. Based on this information the recalculated average density of litter on the sea floor is 46 ± 8 items/km² with a maximum of 155 items/km².

In comparison, Öztekin and Bat (2017b) report seafloor litter density of 808.74 ± 215.02 items per sq. km from the southern part of the Black Sea (Sinop Inceburun coast). The found items are predominantly from plastic (95.35%), mostly plastic bags as along the Bulgarian coast. These results are in the range of those reported by Ioakeimidis et al. (2014), which indicates that there might be a need for reassessment of the extrapolations in the Bulgarian study.

Microplastics

There are no published results on microplastics in the Bulgarian EEZ. Pilot surveys, such as the one performed by D. Berov in 2018 point at levels of pollution, comparable to the other reported values worldwide.

Aytan et al. (2016) have assessed microplastics from zooplankton samples taken during two cruises along the south-eastern Black Sea coast in 2014-2015. In each cruise neuston samples were collected at 12 stations using a WP2 net with 200 µm mesh. Microplastics (0.2-5 mm) were found in 92% of the samples. The primary shapes were fibres (49.4%) followed by plastic films (30.6%) and fragments (20%), and no micro beads were found. Average microplastic concentration in November 2014 ($1.2 \pm 1.1 \times 10^3$ particles per cubic m) was higher than in February 2015 ($0.6 \pm 0.55 \times 10^3$ particles per cubic m). Reduced concentrations in February 2015 are attributed to increased mixing. The highest concentrations of microplastics were observed in offshore stations during November 2014 sampling. The heterogeneous spatial distribution ($0.2-3.3 \times 10^3$ particles per cubic m for all samples) and accumulation in some stations could be associated to transport and retention mechanisms linked to wind and current dynamics, as well as to different sources of plastics.

Another study of microplastic pollution of the sea surface and water column provides additional reference points from the southern Black Sea. Distribution, density and type of microplastics have been investigated in Sinop Sarikum Lagoon following the methodology of the Technical

Group on Marine Litter (EC, 2013). The study has been carried out between 2015 and 2016 with seasonal surveys, using two types of nets for sea surface and water column at three different depths: 5, 15 and 30 m. The results indicate microparticle density of 2.667 ± 2.325 particles per cubic m for sea surface and 24.475 ± 26.153 particles per cubic m for water column (Öztekin and Bat, 2017a). The most common material type is ship paints/coatings (on the sea surface: 55.45%; in the water column: 54.21%) followed by fibers, hard plastic pieces and nylons. Microplastics are found in large amounts in the Black Sea and present a growing challenge. The presence of this pollution type is an important issue and requires further examination about transportation, origins, types and effects on biota.

The two studies from the southern Black Sea area differ substantially regarding the concentrations of micro litter, and partially in the types of particles found. However, they are unanimous about the significance of the phenomena and the ubiquitous presence of microplastics both on the sea surface and at different depths in the sea column. They underline also the substantial seasonal variability in their findings. The establishment of a more representative picture of the level of pollution and its dynamics calls for systematic monitoring efforts.

1.1.2. Drivers, pressures, impacts, sources of pollution

One of the commonest general categorisations of the origin of ML items is the division between sea-based and land-based input. Sea-based origin relates to litter that is directly (accidentally or purposely) released into the sea by maritime activities e.g. shipping, fishing, offshore installations or dumping of refuse at sea. Land-based origin relates to activities which cause littering directly on the coast, such as beach tourism, but can also refer to litter generated in more distant areas, such as towns and industrial sites, and blown or washed into the sea.

Litter entering the environment via sewage outlets is considered as having a land-based origin, even though most sewage outlets are situated in rivers or discharge directly in to the sea. Similarly, riverine litter is sometimes considered to be land-based, even though some of the littering can occur by boats and ships navigating rivers. Following the terminology adopted in this report, rivers are a transport mechanism and effluents are the pathway of entry.

Whether ML is originating from a point source, such as a town or a beach cafe, or from a diffuse source, such as shipping, will also influence the choice of measures used to combat the problem.

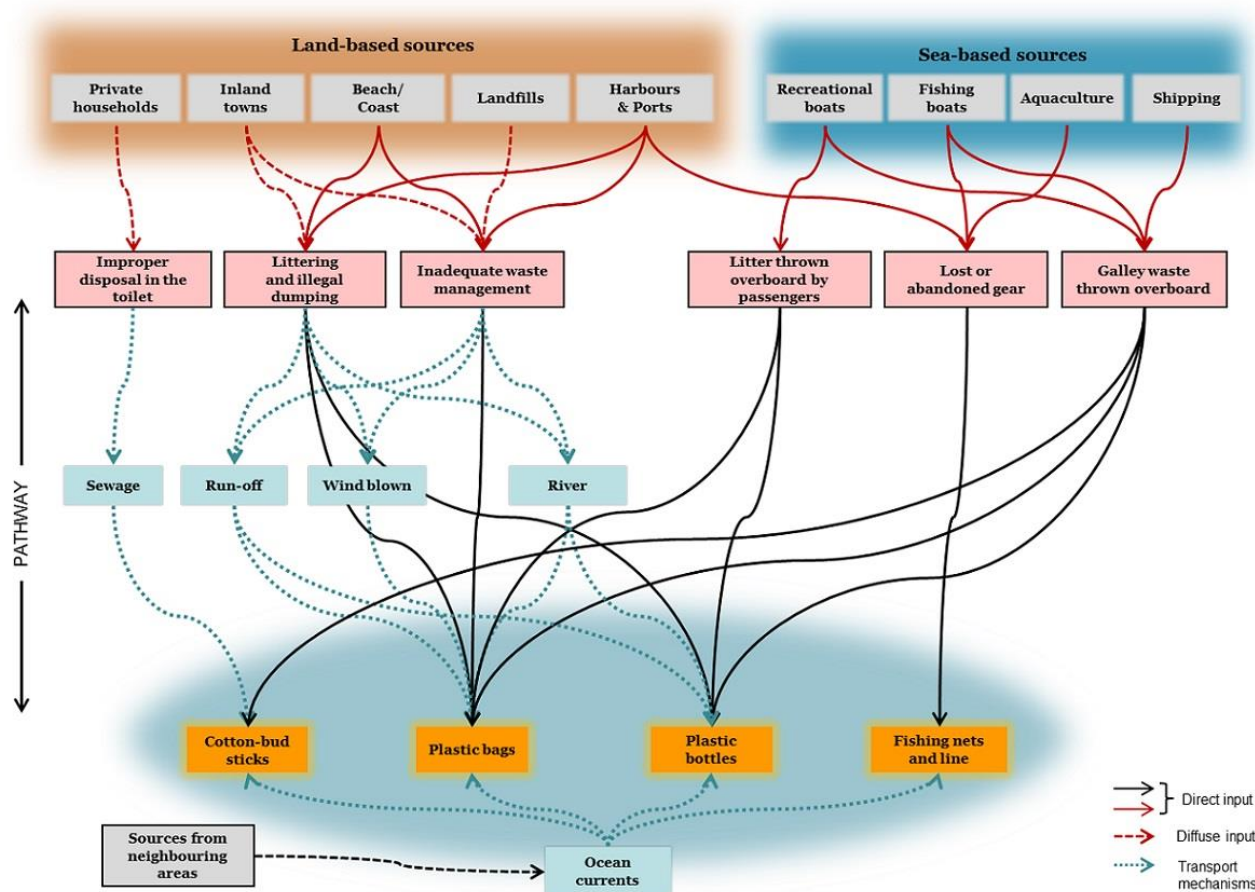


Figure 17. Multiple sea- and land-based sources (grey boxes) of 4 common items of marine litter and their potential pathways of entrance (blue boxes) into the marine environment. (Note: the size of the boxes does not reflect their relative importance).

Source: Veiga et al., 2016

Rivers as litter pathways in the Black Sea

According to several studies, improper solid waste management and illegal marine and coastal dumping are the most important sources of litter in the Black Sea (Suaria et al., 2015). It has been reported that at the southern part of the Black Sea, large amounts of municipal and industrial solid waste, mixed with hospital and hazardous waste, are being dumped on nearby lowlands and river valleys, directly on the seashore or even at sea (Berkun et al., 2005). Most uncontrolled coastal landfills and dumping sites are not protected from waves and thus serve as stationary sources of unknown (but admittedly large) quantities of ML (UNEP, 2009).

River discharges also play an important role in the amounts of litter that end up in the Black Sea every year (Bakan and Büyüküngör, 2000; Topçu et al., 2013). The north-western Black Sea receives freshwater from a large number of rivers, including the second, third and fourth longest rivers in Europe, namely the Danube, Dnieper and Dniester, running across 22 different countries. The Danube alone, accounts for 60% of the total freshwater discharged into the Black Sea (Karageorgis et al., 2009) and it is probably responsible for a huge inflow of litter. For example, a study carried out in a flowing stretch of the Danube, between Vienna and Bratislava, estimated an average input of small plastic fragments into the Black Sea of about 4.2 tonnes per day (Lechner et al., 2014). According to the authors, the amounts of large floating items (>5 cm) were probably underrepresented in their study, given that downstream countries feature lower

standards in wastewater treatment if compared to Germany and Austria and therefore the actual litter load at the river mouth is potentially much higher.

A substantial part of the artificial polymer pollution of the marine environment is caused by packaging of industrial and consumer goods. There is steady increase in the generation of packaging waste in Bulgaria for the period 2010-2017. This trend has been typical also for plastic packaging (Fig. 18).

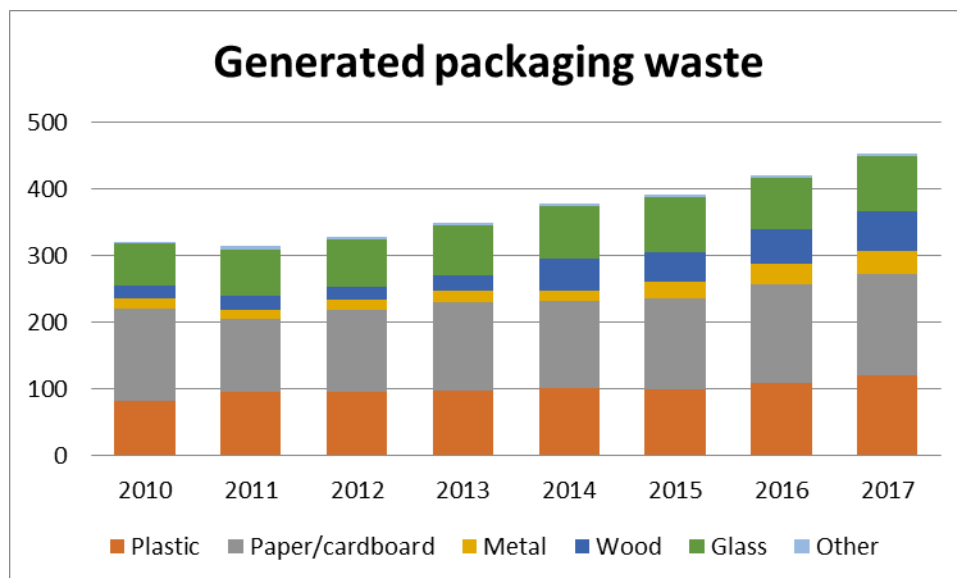


Figure 18. Generated packaging waste in Bulgaria, thousands of tonnes

Source: NSI, 2018

While this trend has increased the potential for pressure on the environment, the rate of recycling has grown by similar pace (Fig. 19). It is a matter of further analysis whether the recycling effort is sufficient to abate the input of packaging from point and diffuse sources to the sea.

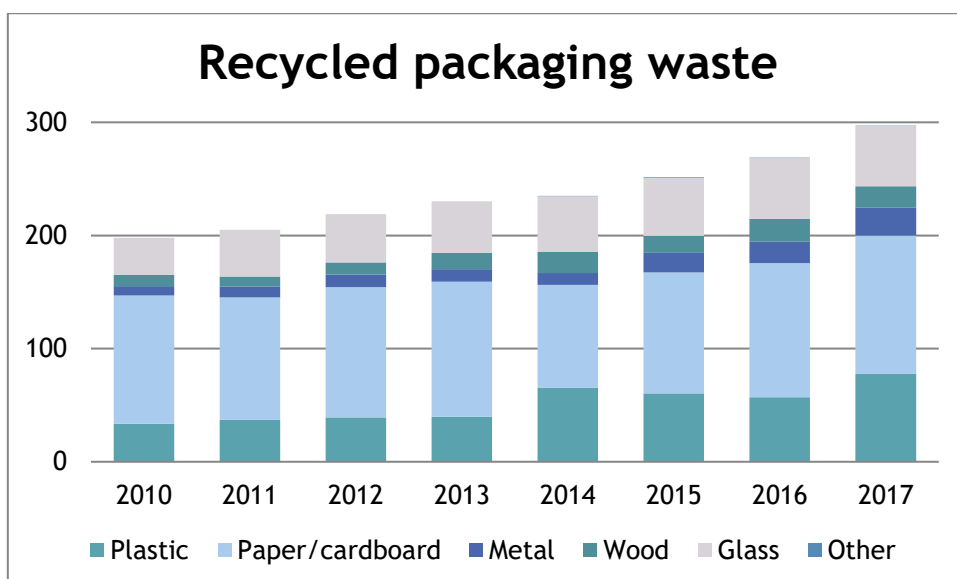


Figure 19. Recycled packaging waste in Bulgaria, thousands of tonnes

Source: NSI, 2018

According to Palazov et al. (2017) the main sources of marine litter in the coastal zone and in the marine environment are the following:

1. Land-based sources, such as unregulated waste dumps close to the shore, canals, stormwater drainage collecting industrial and urban wastewater without treatment;
2. Tourism and recreation activities in the coastal zone;
3. Construction activities along the coast
4. Riverine input
5. Stormwater drainage
6. Commercial and recreational fishing
7. Transborder transport of floating marine litter

1.2. Information, data and knowledge about the state of the environment

The coastal waters of the Bulgarian section of the Black Sea are subject to monitoring and assessment under the Water Framework Directive (2000/60/EC). They cover the water bodies within one nautical mile from the seashore. Their status is defined along biological and physico-chemical quality elements. A summary of the ecological status of Bulgarian coastal waters from north to south is presented in table 1.

The majority of coastal water bodies have moderate ecological status with a number of areas, especially along the southern Bulgarian coast, achieving good status in 2017. A notable exception with bad status is Varna Bay and the shallower part of Burgas Bay (in 2016). This is due largely to the high pressure from the two biggest coastal cities in the country. A number of activities, such as shipping, port operations and mass tourism exert negative impact on the status of the marine environment.

Table 1. Ecological status of coastal waters

Code	Water body	2016	2017
BG2BS000C001	Durankulak - Shabla	moderate	moderate
BG2BS000C002	Shabla - Kamen Bryag	moderate	good
BG2BS000C1003	Kamen Bryag - Kaliakra	moderate	not defined
BG2BS000C1004	Kaliakra - Kavarna	moderate	moderate
BG2BS000C1013	Kavarna - Cape	moderate	not defined
BG2BS000C005	Varna Bay	bad	bad
BG2BS000C1113	Galata - Kamchia resort	moderate	moderate
BG2BS000C1006	Kamchia resort - Shkorpilovtsi	moderate	moderate
BG2BS000C1007	Shkorpilovtsi - Emine	moderate	not defined
BG2BS000C1008	Emine - Sveti Vlas	moderate	good
BG2BS000C1108	Sveti Vlas - Pomorie	moderate	good
BG2BS000C1208	Pomorie - Sarafovo	moderate	good

BG2BS000C1308	Southern Burgas Bay < 30 m	bad	moderate
BG2BS000C1010	Burgas Bay > 30 m	moderate	moderate
BG2BS000C1011	Akin - Maslen Nos	moderate	good
BG2BS000C1012	Maslen Nos - Rezovo river mouth < 30 m	good	not defined
BG2BS000C1112	Maslen Nos - Rezovo river mouth > 30 m	moderate	not defined

Source: BSBD, 2018

The measures for abating marine litter in the more polluted Varna and Burgas bays include:

- Control of collection and transportation of ship waste and domestic ship-generated garbage;
- Control of pollution by ships transporting packaged harmful substance.

The prevention of waste in the coastal waters and on the shore for all water bodies include:

- Annual campaigns (in the spring and in the autumn) for cleaning river mouths;
- Cleaning and removal of unregulated landfills along the coast (annually, with a frequency of at least once a year in the coastal zone up to 2 km inland, outside the beaches);
- Provision of garbage bins and regular disposal of waste in fisheries settlement areas part of coastal municipalities;
- Control of waste management in the areas of fishing settlements on the territory of coastal municipalities (BSBD, 2018).

Responsible for the control of the status of bathing waters are the Regional Health Inspectorates in Dobrich, Varna and Burgas. They conduct regular monitoring of the sea bathing waters from May to September every two weeks. The main indicators are the number of enterococci and *E. coli* bacteria in the water.

At present there are no regular reports about the environmental status of the shelf and the open sea in the Bulgarian EEZ. The initial assessment of the Black Sea marine environment (BSBD, 2013) considers the hydrological characteristics of the marine region - large catchment area, relative isolation and low water exchange with the world ocean, anaerobic conditions in the Black Sea depression, significant impact of the global climate systems on the hydrological and ecological characteristics of the sea. In the context of global changes, the significant pressure from human activity from the Black Sea countries contributes to deterioration of the living conditions for the marine life and the ecosystem services, most noticeable in zones near the shore. Meanwhile, the natural circulation of the sea and the relative proximity of large rivers, having a major share in the water balance and pollution of the Black Sea, increases the vulnerability of the marine ecosystems within the Bulgarian EEZ to transboundary impacts, which determines the importance of the regional cooperation in solving common environmental problems. The Initial assessment of the state of the marine environment is the first step to establish environmental targets and measures to achieve good ecological status.

The initial assessment designates the areas within two habitat types - benthic and pelagic. The Black Sea waters are characterized by thermohaline stratification with seasonal variability. The circulation of the Black Sea waters is determined by the influence of the Main Black Sea current with predominant northeast-southwest direction in the western part of the sea and the modifying influence of the river runoff in the north-western Black Sea shelf. The coastal currents are unstable, wind-generated and with varying intensity. The Bulgarian Black Sea coast is

exposed to waves from the eastern half, stronger in the winter months. The main storm waves are generated by east and northeast winds. Multi-annual changes in the sea level are determined by the ratio between the main components of the water balance: river flow, evaporation and water exchange through the Bosphorus, developing in the context of the global climate change.

The chemical properties of the Black Sea waters are controlled by external factors, the major one being the river runoff. This largely determines the increasing concentration of nutrients and solutes in the nearshore direction, while the oxygen and oxygen saturation increase in the opposite offshore direction.

The Black Sea waters stratification results in the formation of two layers - upper aerobic (0 m to -100/150 m below sea level) and lower anaerobic, abundant in hydrogen sulphide.

The assessment of seabed habitats is performed according to prevailing types of bottom habitats, in coherence with the habitat types in Annex I of the Habitats Directive and national habitat subtypes (biotopes) in the Bulgarian Black Sea waters. The greatest alterations in the natural conditions undergo the coastal (mediolittoral and shallow sublittoral) habitat resulting from sealing, burial, changes in hydrology, and in some cases - pressure of invasive species on the native habitat-forming species. The trends to 2020 in the development of this type of habitats would be negative, because the anthropogenic pressure is likely to increase, resulting from the new coastal developments related to the tourism, port construction, coastal protection and urbanization.

There are four major pelagic habitats identified in the Bulgarian Black Sea waters:

- 1) Coastal water habitats in the 1-mile zone,
- 2) Nearshore habitats (outside the 1-mile zone to a depth of 25-30 m);
- 3) Shelf habitats (up to 200 m depth) and
- 4) Open sea habitats (> 200 m).

The approach used in assessing the phytoplankton communities follows the quality elements for assessing the marine environment under WFD and MSFD: species diversity (species richness), taxonomic structure and quantitative development. For the 2006-2011 period, the phytoplankton communities are characterized by the dominance of a few species, deviation of the taxonomic structure from both the typical referent taxonomic structure, and from the taxonomic structure characterizing the period of increased eutrophication. In general, the assessment of the phytoplankton communities revealed deviation of the features corresponding to the reference state, as defined by the WFD and MSFD.

The zooplankton communities are an important connection between the primary producers and higher levels in the food chains. The assessment of zooplankton based on the available data series comprising the coastal, shelf and territorial sea over in front of Cape Galata and covers the period 1967-2011. The comparison of the assessment period with the historical data reveals that the biomass of zooplankton fluctuates by increasing in the period 1967-1973, and declining in 1980-1993, up to today's unstable condition, which makes it impossible to display either a positive or negative trend in its development.

The assessment of fish is performed based of available data for the period 2009-2011. The assessment of ecological status carried out by 5 - grade classification system corresponding to the one used under the WFD. The analysis of species diversity reveals that the nearshore and the shelf areas are in poor environmental conditions.

The Black Sea has provided historically habitats for four species of marine mammals: *Phocoena phocoena*, *Tursiops truncatus*, *Delphinus delphis* and *Monachus monachus*. In Bulgaria the monk seal, is considered extinct. In the absence of specific studies on cetaceans, an assessment of the current status of the populations of the three cetacean species can be made by indicators based on the abundance, distribution, size-population structure, sex ratio. Despite insufficient research, the three species of dolphins are subject to special protection in the Bulgarian.

The ecological status assessment by species, designated for protection under the EU directives embraces the three types of cetaceans (*Phocoena phocoena*, *Tursiops truncatus* and *Delphinus delphis*) and fish (*Acipenser sturio* and *Alosa spp.*). The sturgeon (*Acipenser sturio*) is considered extinct in Bulgaria. *Alosa spp.* is endangered species, particularly vulnerable to human activities, especially those related to access to their breeding areas and the quality of the marine environment.

The environmental assessment of the commercial species includes sprat (*S. sprattus*), rapa whelk (*R. venosa*) and turbot (*Sc. maeoticus*). The populations of sprat are characterized by variation, resulting from the combined effects of the biology of the species, peculiarities of reproduction, fishing pressure and environmental factors. The population status of the predatory rapa whelk and the trends for the 2006-2011 period are not well understood, which complicates the initial assessment. The population status of turbot for the 2006-2011 period indicates that the population is distressed.

The assessment of the ecosystems is based on literature data, because there are neither experimental, nor model tests performed in front of the Bulgarian coast. Depending on the degree of eutrophication and the response of the biota, there are three periods in the Black Sea ecosystems evolution - reference "clean" period (during the 1960s), a period of intense anthropogenic eutrophication (from 1970s to 90s) and the modern period characterized by anthropogenic eutrophication decrease. However, for the period 2006-2011 is characterized by both positive and negative trends in the ecosystem. Coastal sea remains the most vulnerable and reflects the state of the levels in the food chain under the influence of the high variability of natural and anthropogenic factors.

The impact of alien species indicates that for the 2006-2011 period there are 20 new alien species registered, of which 14 phytoplankton (not including the cysts), 2 zooplankton, 1 zoobenthic, 3 species of fish and 1 species of macrophytes. The trend is increasing i.e. the risk of invasions is still high.

The pressures and impacts on the marine environment result from two types of activities: land-based and sea-based activities.

Physical losses in the coastal zone include sealing (technogenic load) and burial (reclaimed land). From maximum pressure suffer the mediolittoral and shallow sublittoral ecosystems, expressed in loss of bottom substrate (habitat) and associated species and communities as a result of the coastal protection projects, port development, fisheries and tourism in the coastal zone. Besides the direct losses, the construction of coastal structures has indirect harmful effects on the lithodynamic and hydrodynamic regime, leading to deterioration of water quality and siltation. Subject to highest degree of anthropogenic alteration are the heavily urbanized assessment areas: Cape Kaliakra - Cape Galata and Cape Emine - Sozopol.

Physical losses in Black Sea shelf result from commercial fishing. Fishing with bottom gear (trawling) leads to seabed abrasion and in particular the vulnerable biogenic substrates. The trawl pressure measured by the ratio between the total length of trawl routes in an area and the area of the zone, allowing to distinguish areas of strong, moderate and weak pressure. Over 50%

of the area of the seabed up to 100 m depth in 2011 is under significant pressure from abrasion as a result of intensive fishing. Bottom below 100 m depth is not affected. An assessment of pressure from abrasion due to fishing on the main types of substrates - sand, mussel banks on shelf sediment muds of the upper and lower circalittoral and mixed phaseolin shelf sediments presents the following results. From the bottom substrates, the biogenic mussel banks are characterized by the highest sensitivity to abrasion, because the habitat-forming species *Mytilus galloprovincialis* and the associated typical representatives of the epifaunal community develop on the seabed surface and fall under the direct physical impact on the bottom towed fishing gears.

The assessment of alterations of hydrological processes is performed by analysing the thermohaline (T, S-) structure, sea surface temperature, intensity of the Main Black Sea current, and the impact of global climate systems. There is no statistical assessment regarding the sea surface temperature of the Bulgarian shelf waters and adjacent deep-water areas for the period after 2005. The literature studies reveal a trend of increasing sea surface temperature in the western part of the Black Sea from 15°C to 16°C after 2006, which is confirmed by the results of the analysis of satellite data. There is no evidence for any significant changes in the salt balance of the sea waters. There is sufficient research proving the impact of the global climate systems on the hydrological processes. There is no objective evidence for any lasting significant changes in the wave climate. At present, the complex and irregular nonlinear structure of hydrological changes in the western part of the Black Sea precludes the drawing of explicit quantitative assessments, only qualitative estimates and hypotheses.

The marine pollution by hazardous substances is analysed by types of human activities and economic sectors by using data from the synthetic and non-synthetic pollutant loads from terrestrial point and diffuse sources. The chemical pollution is one of the problems of the Black Sea, determined by the Transboundary Diagnostic Analysis (2008).

The share of the domestic wastewaters and river loads is significantly higher than the proportion of industrial wastewaters discharged into the sea.

The comparison of the types of pollutants would be difficult, since no information is available for each of the years in the 2006 - 2011 period. This further complicates the analysis of the pollution trends. The available data reveals that areas with high levels of contamination Varna and Burgas Bay, owing to the direct or indirect influence of the industrial runoff, port operations and marine transport. Two other areas at risk of contamination are: the Shabla region subjected to the direct influence of purified industrial runoff from the nearby industrial site for oil and gas extraction and the area in front of the mouth of Kamchia river. In the region of Burgas are detected the highest concentrations of nickel and lead in marine waters.

The results obtained from the analysis of priority substances are not sufficient for assessing the chemical status and highlighting the trends of change over the years.

The pollutants assessment in marine biota is based on literature data for the period 2004 - 2011. A study of the polychlorinated biphenyl content of five commercial fish species the three regions of the Bulgarian coast (northern, Varna, and southern) reveals absence of seasonal differences and a higher content in the Varna region and to the north of it. Furthermore, studies on the quantity of some organic pollutants and heavy metals in different types of coastal fish of economic importance for the period 2007 - 2011 are further analysed in this report.

There are no cases of acute pollution with large-scale and fatal consequences for the environment for the period 2006 - 2011. According to the Executive Agency "Maritime Administration", there is evidence of accidental oil spills, most often of unknown origin in the

bays areas and the nearby water areas. The spills are localized and the contaminants - cleaned up. The general trend is to reduce of the number of spills and the hydrocarbon contamination in the two bay areas (Varna and Burgas) compared to 2005-2006.

The assessment of the enrichment of biogenic and organic substances (eutrophication) is complicated, because there is no information available for each year for the period 2006 - 2011 and for all sources of pollution. There are difficulties in calculating the loads in rivers due to lack of data on water levels (not all rivers are monitored). It is impossible to evaluate the contribution of the different diffuse sources and the degree of diffuse pollution with nitrogen and phosphorus. Despite the shortage of information, the analysis of available data shows that areas with high nutrient overloads the Varna and Burgas Bay areas, owing to the direct or indirect influence of the industrial inflow, domestic inflow from wastewater treatment stations, port activities and rivers. Another vulnerable to eutrophication area lies in front of the Kamchia River.

There shortage of data on nitrogen and phosphorus loads of from groundwater flowing into the sea to provide a more complete picture of the diffuse sources of pollution. The information provided on dredging activities is incomplete, because it specifies the place of disposal of dredged material without specifying the dredging period and the composition of the deposited material. The exact concentrations of nitrogen and phosphorus in the sediments are not measured, precluding the assessment of their distribution in the marine environment during dredging operations or transportation. There is also information deficiency about the wastewaters from the livestock farming.

The assessment of pressures and impacts of phytoplankton blooms in the period 2006 - 2011, shows that while the quantitative parameters of total phytoplankton biomass decrease, the taxonomically based metrics correspond to the unstable structure of phytoplankton communities, more pronounced in coastal marine areas. While in the spring period factors of regional scale related to the cross-border transfer of water masses from the northeast, have greater significance on the state of phytoplankton communities, especially the shelf areas, in the summer a key role play local factors (intake of nutrients and organic matter), mostly associated with the state of wastewater treatment plants and runoff of other land-based sources, in the conditions of increased influence of natural factors such as extreme high summer temperatures, increasing the intensity of the storms, the changes in the cycle and intensity of rainfall, typical for the period. However, the lack of data with sufficient spatial and temporal resolution both in terms of phytoplankton, and in terms of the pressure and specific local studies, preclude from drawing definite conclusion.

The assessment of the pressure and impact of microbial pathogens (so III.9) on water quality in bathing areas for the period 2007 - 2011 evaluates the areas complying with accepted sanitary requirements: there are 12 areas in Dobrich (60%), 7 in Varna (30%) and 12 in Burgas (26%). Although the proportion of areas in the Varna region is significant, according to the criterion about "areas incompatible with the standard values of the microbial pathogen", the largest share of such areas lies again in the Varna region. The only area closed due to microbiological contamination is precisely the areas in Varna region. The trend for the period is shows percent increase of the areas incompatible with the standards of the microbial pathogen.

There is a marked increase in the pressure of invasive species. Most important for the distribution of the alien species in the Black Sea is marine transport. The greatest pressures on benthic communities have the predatory snail *Rapana venosa* and the pelagic ctenophore *Mnemiopsis leidyi*. However, the lack of sufficient data and irregular studies do not allow the development of indicators.

The selective extraction of species is an assessment of pressures and impacts of commercial fishing on the Black Sea ecosystem in Bulgarian territorial waters. The degree of impact include - sprat (*S. sprattus*), turbot (*Sc. maeoticus*), whiting (*M. merlangus*) and anchovy (*E. encrasicolus*).

The first biannual report for the implementation of the Programme of Measures, part of the Bulgarian Marine Strategy, is due to be released in the last quarter of 2019.

1.3. Gaps of knowledge and information, data and expertise on marine litter issue and national level peculiarities

The Initial Assessment produced under the MSFD (BSBD, 2013) provides only fragmentary and insufficient information about the level of solid waste pollution in the marine and coastal environment. The available data regarding marine litter in the water column, on the sea surface and on the seafloor is particularly scarce. Most studies mainly focus on litter washed ashore or deposited on the beaches.

There is a lack of sufficient information on the overall assessment of the current situation as regards to litter and its impact. There are no quantified data on the impact of litter on marine biota. Generating estimates of catch rates and spatial/temporal patterns for entanglement are not yet possible due to the lack of quantitative information. In addition, micro-plastics are a relatively new and poorly investigated topic in terms of their impacts on biota. There is scarce information about pilot surveys of microplastics in the Bulgarian EEZ but no results have been published so far. There are no scheduled surveys in the monitoring protocols. Issues of insufficient data could be encountered by funding research programmes focusing on the impacts of litter on marine life.

As most data concern coastal areas, there cannot be safe conclusions about the open sea (mainly about the sea bottom, since floating litter is ultimately washed ashore, if not decomposed). The fact that most research and actions focus on the coastal environment leads to information inadequacy about the state of the deep sea in relation to litter. The existing pilot surveys of floating and seafloor litter provide a very wide range of values about the concentration of solid waste in the marine environment. This may point at large temporal variations due to natural and anthropogenic factors. Another possibility are gaps in the implementation of the protocols for assessment of marine litter in the sea.

According to national reports marine litter constitutes an important issue for the coastal and marine environment in Bulgaria, although it is difficult to quantify the induced disturbance due to lack of specific criteria at the national or sub-regional scale. Currently Bulgaria has not defined any baseline values for litter concentrations in the Black Sea.

There is a rather limited and fragmented understanding of the problem due to the lack of accurate, coherent, reliable and comparable scientific data under a common monitoring framework. Even for information provided by surveys and clean up campaigns results are inconsistent in terms of parameters investigated; therefore it is difficult to have a complete insight into a holistic assessment of marine litter. The comparisons made between the data generated by voluntary coastal clean-up campaigns and those resulting from scientific programs clearly underline the need for all stakeholders to apply the protocol and methodology proposed by the MSFD, so that these data are useful for assessment of the country's status (Vlachogianni et al, 2017).

Consistent and systematic socio-economic information related to the full extent of marine litter impacts on marine environment and human welfare, the economic damage caused and mitigation costs at the national level is completely lacking

Despite variations in marine litter monitoring methodologies and discrepancies on specific results, it is widely accepted that both the levels of marine litter and the rate of input into the coasts and seas are rising overtime. There is an urgent need for immediate prevention and mitigation actions as outlined in the Marine Strategy of Bulgaria.

2. Legislation

Marine litter can be defined as waste, discarded or lost material resulting from human activities (Cheshire et al., 2009). As such, marine litter is any such material that has made it into the marine environment, including material found on beaches or material that is floating or has sunk at sea. The United States National Oceanographic and Atmospheric Administration (NOAA) and the United States Coast Guard (USCG) adopt the term ‘marine debris’ and define it as any persistent solid material that is manufactured or processed and directly or indirectly, intentionally or unintentionally, disposed of or abandoned into the marine environment or the Great Lakes (Lippiatt et al., 2013).

Marine litter has negative impacts on the marine environment at various ranges and scales. The UNEP/IOC Report (Cheshire et al., 2009) includes a list of the most relevant impacts; they are illustrated in Table 2.

Table 2. Synthetic list of impacts of marine litter to the environment, society, economy and public safety.

Type of impact	Specific impact
Environmental	Entanglements and ghost fishing
	Ingestion (intestinal blockage, malnutrition and poisoning)
	Blockage of filter feeding mechanisms from small particulate (neustonic) plastic debris
	Physical damage and smothering of reefs, seagrasses, mangroves e. potential to vector marine pests including invasive species
Social	Loss of aesthetics and/or visual amenity
	Loss of indigenous values
	Antagonism against perceived polluters
	Perceived or actual risks to health and safety
Economic	Cost to tourism (loss of visual amenity and obstruction to beach use)
	Cost to vessel operators (downtime and damage due to entanglements)
	Losses to fishery and aquaculture operations due to damage or entanglements
	Costs for clean-up, animal rescue operations, recovery and disposal
Public Safety	Navigational hazards (loss of power or steerage at sea is potentially life threatening)
	Hazards to swimmers and divers (entanglements)
	Cuts, abrasion and stick (puncture) injuries
	Leaching of poisonous chemicals
	Explosive risk (e.g. from gas cylinders and dumped military ordinance)

Source: Elaborated from Cheshire et al., 2009.

For these reasons, several legal and policy frameworks have been put in place in the last years, targeting the production of waste and the prevention of marine pollution from marine litter, at various levels (international; regional seas; and national).

The purpose of this report is to present a brief review of the legal and policy frameworks and non-binding initiatives on marine litter, in place at the global, regional seas, and European Union (EU) stage. Section 2.1. presents the main binding and non-binding legal and policy frameworks developed at global level; Section 2.2. presents the main agreements and initiatives developed in the context of the Black Sea Convention; finally, Section 2.3. presents the main policy

initiatives and legal acts, developed in the context of the European Union (EU). The review of national policy is described in Section 2.4.

2.1. Marine litter on the global stage

The UNCLOS and other global conventions

The United Nations Convention on the Law of the Sea (UNCLOS; 1982) is the main international agreement regulating ocean related issues. It requires contracting parties, inter alia, to protect the marine environment and address land-based and sea-based sources of pollution. However, being a framework agreement, it does not contain specific provisions that can be directly related to the issue of marine litter.

The main binding international agreements that target, directly or indirectly, the issue of marine litter are:

1. The International Convention for the Prevention of Pollution from Ships (MARPOL 73/78), especially Annex V of the Convention, dedicated to the prevention of pollution by garbage from ships (1998);
2. The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention, 1975), as replaced by the “London Protocol” (1996; entered into force in 2006); and
3. The Stockholm Convention on Persistent Organic Pollutants (POPs; 2001).

Table 3 summarizes their objectives and their provisions related to the issue of marine litter.

Table 3. The main international agreements related to marine litter, their objectives, and their specific measures on marine litter.

International Agreement	General Objective	Provisions for marine litter
MARPOL - Annex V	Prevent the pollution of the marine environment by the discharge of harmful substances or effluents containing such substances (art. 1 of MARPOL); to prevent pollution by garbage from ships (Annex V)	<p>The MARPOL Annex V:</p> <ul style="list-style-type: none"> • defines garbage as “all kinds of food, domestic and operating waste, excluding fresh fish, generated during the normal operation of the vessel and liable to be disposed of continuously or periodically”; • prohibits the disposal into the sea of all plastics, and regulates the distances from the coast at which other types of waste can be disposed of into the sea; • introduces more stringent requirements for garbage disposal into special areas, among which the Mediterranean and Black Seas; and • requires each party to ensure the provision of facilities at ports and

		terminals for the reception of garbage.
London Convention	Prevent, reduce and where practicable eliminate pollution caused by dumping or incineration at sea of wastes or other matter	<ul style="list-style-type: none"> prohibits the dumping of waste into the sea; and requires a permit to dump waste listed in Annex 1 (e.g., dredged material, sewage sludge, organic material, and bulky items).
Stockholm Convention	Protect human health and the environment from persistent organic pollutants	Reduction or elimination of the release of unintentionally produced POPs, such as those released by plastic materials as they degrade.

Other global conventions

Several other non-binding, voluntary initiatives are in place worldwide to tackle the issue of marine litter; the most important are: the Honolulu Strategy; the Global Partnership on Marine Litter (GPML); and the G7 and G20 commitments on marine litter. They are briefly presented in the following sub-sections.

The Honolulu Strategy

The Honolulu Strategy is a framework for a comprehensive and global effort to reduce the ecological, human health, and economic impacts of marine litter. It is intended to help improve collaboration and coordination among groups and governments across the globe, and to serve as a common frame of reference for action. It has been developed by NOAA in cooperation with the United Nations Environment Programme (UNEP) and presented during the 5th International Marine Debris Conference (5IMDC) in March 2011.

The Honolulu Strategy is organized around three overarching goals:

- Goal A: Reduced amount and impact of land-based sources of marine debris introduced into the sea;
- Goal B: Reduced amount and impact of sea-based sources of marine debris including solid waste, lost cargo, ALDFG, and abandoned vessels introduced into the sea; and
- Goal C. Reduced amount and impact of accumulated marine debris on shorelines, in benthic habitats, and in pelagic waters.

Each goal is accompanied by a list of strategies; they are listed in Table 4. Strategies under Goal A and B focus on preventing, reducing, and managing land and sea-based sources of marine litter, while Strategies under Goal C focus on removing the continuing accumulation of marine debris.

Table 4. The three goals and related Strategies of the Honolulu Strategy.

Goal A: Reduced amount and impact of land-based sources of marine debris introduced into the sea
Strategy A1. Conduct education and outreach on marine debris impacts and the need for improved solid waste management
Strategy A2. Employ market-based instruments to support solid waste management, in particular waste minimization
Strategy A3. Employ infrastructure and implement best practices for improving stormwater management and reducing discharge of solid waste into waterways

Strategy A4. Develop, strengthen, and enact legislation and policies to support solid waste minimization and management
Strategy A5. Improve the regulatory framework regarding stormwater, sewage systems, and debris in tributary waterways
Strategy A6. Build capacity to monitor and enforce compliance with regulations and permit conditions regarding litter, dumping, solid waste management, stormwater, and surface runoff
Strategy A7. Conduct regular clean-up efforts on coastal lands, in watersheds, and in waterways— especially at hot spots of marine debris accumulation
Goal B: Reduced amount and impact of sea-based sources of marine debris, including solid waste; lost cargo; abandoned, lost, or otherwise discarded fishing gear (ALDFG); and abandoned vessels, introduced into the sea Strategy
B1. Conduct ocean-user education and outreach on marine debris impacts, prevention, and management Strategy
B2. Develop and strengthen implementation of waste minimization and proper waste storage at sea, and of disposal at port reception facilities, in order to minimize incidents of ocean dumping Strategy
B3. Develop and strengthen implementation of industry best management practices (BMP) designed to minimize abandonment of vessels and accidental loss of cargo, solid waste, and gear at sea. Strategy
B4. Develop and promote use of fishing gear modifications or alternative technologies to reduce the loss of fishing gear and/or its impacts as ALDFG Strategy
B5. Develop and strengthen implementation of legislation and policies to prevent and manage marine debris from at-sea sources, and implement requirements of MARPOL Annex V and other relevant international instruments and agreements Strategy B6. Build capacity to monitor and enforce (1) national and local legislation, and (2) compliance with requirements of MARPOL Annex V and other relevant international instruments and agreements
Goal C: Reduced amount and impact of accumulated marine debris on shorelines, in benthic habitats, and in pelagic waters
Strategy C1. Conduct education and outreach on marine debris impacts and removal
Strategy C2. Develop and promote use of technologies and methods to effectively locate and remove marine debris accumulations Strategy
C3. Build capacity to co-manage marine debris removal response
Strategy C4. Develop or strengthen implementation of incentives for removal of ALDFG and other large accumulations of marine debris encountered at sea
Strategy C5. Establish appropriate regional, national, and local mechanisms to facilitate removal of marine debris
Strategy C6. Remove marine debris from shorelines, benthic habitats, and pelagic water

The Global Partnership on Marine Litter (GPML)

Closely related to the Honolulu Strategy is the Global Partnership on Marine Litter (GPML), which was launched in June 2012 in the framework of the Global Programme of Action for the Protection of the marine Environment from Land-based Activities (GPA). The aim of GPML is to protect health and the global environment by the reduction and management of marine litter, through the achievement of a series of objectives:

- To reduce the impacts of marine litter worldwide on economies, ecosystem, animal welfare and human health;

- To enhance international cooperation and coordination through the promotion and implementation of the Honolulu Strategy - a global framework for the prevention and management of marine debris, as well as the Honolulu Commitment - a multi-stakeholder pledge;
- To promote knowledge management, information sharing and monitoring of progress on the implementation of the Honolulu Strategy;
- To promote resource efficiency and economic development through waste prevention, following the waste hierarchy principles of reduce, re-use, recycle and re-design, and by recovering valuable material and/or energy from waste;
- To increase awareness on sources of marine litter, their fate and impacts; and
- To assess emerging issues related to the fate and potential influence of marine litter, including (micro) plastics uptake in the food web and associated transfer of pollutants and impacts on the conservation and welfare of marine fauna.

G7 and G20 initiatives

In June 2015, the G7 countries (Canada; France; Germany; Italy Japan; UK; and the USA) adopted an Action Plan to Combat Marine Litter. The Action Plan includes a list of priority actions to address land-based and sea-based sources, as well as a list of priority removal actions, and priority actions on education, research, and outreach.

This initiative was echoed in 2017 by the G20, which adopted an Action Plan on Marine Litter, whose aim is to take action to prevent and reduce marine litter of all kinds, including from single-use plastics and micro-plastics. The G20 Action Plan focuses on seven main areas of action:

1. Promote the socio-economic benefits of establishing policies to prevent marine litter;
2. Promote waste prevention and resource efficiency;
3. Promote sustainable waste management;
4. Promote effective waste water treatment and storm water management;
5. Raise awareness, promote education & research;
6. Support removal and remediation action; and
7. Strengthen the engagement of stakeholders.

2.2. The Bucharest Convention

The Convention on the Protection of the Black Sea against Pollution (also known as the Bucharest Convention) was signed in 1992 and ratified in 1994 by the six Black Sea coastal countries (Bulgaria, Georgia, Romania, the Russian Federation, Turkey, and Ukraine). The appointed Commission on the Protection of the Black Sea against Pollution adopted in 2009 a Protocol on the Protection of the Marine Environment of the Black Sea from Land-Based Sources and Activities, whose aim is to prevent, control and to the maximum extent possible eliminate pollution from land-based sources and activities, including marine litter.

In addition to this, the Strategic Action Plan for the Environmental Protection and Rehabilitation of the Black Sea, which was adopted in 2009, includes several management targets related to marine litter:

- Minimise ghost fishing caused by discarded, abandoned or lost fixed and floating nets, including those used in illegal/unregulated fishing activities.
- Amend national waste strategies and/or national coastal zone management plans with the aim of coastal and marine litter minimisation.

- Develop regional and national marine litter monitoring and assessment methodologies on the basis of common research approaches, evaluation criteria and reporting requirements.
- Promote/develop investment projects within national strategies/local plans to engineer, construct and install new solid waste recycling facilities, landfill sites and incineration plants, complying with BAT regulations.
- Provide adequate port reception facilities for ship-generated wastes according to MARPOL 73/78, Annex I, IV, V.
- Establish a harmonised fee/cost recovery system on ship-generated waste.

2.3. The EU legal and policy framework for marine litter

The Circular Economy Package and the EU Plastics Strategy

Published by the European Commission in 2014, the Circular Economy Package is the main policy framework to adopt, update, and develop legislation to promote a circular economy within Europe. As such, waste management, particularly plastic waste, is at the core of the Package and of the related Circular Economy Action Plan, which presents the strategy that the Commission will take in order to boost the market for secondary raw materials, to improve waste management, and to make production and consumption processes more sustainable.

As for marine litter, the Circular Economy Package confirms the target for reducing marine litter of 30% by 2020 for the ten most common types of litter found on beaches, as well as for fishing gear found at sea. To this purpose, the Commission declared the intention to adopt a strategy for plastics in the circular economy, which was adopted in 2018 with the aim of “transforming the way plastic products are designed, used, produced and recycled in the EU”.

The aim of the EU Plastics strategy is to protect the environment from plastic pollution while at the same time to foster growth and innovation. The Plastics Strategy set ambitious targets, whereby all plastic packaging on the EU market will be recyclable by 2030, the consumption of single-use plastics will be reduced and the intentional use of microplastics will be restricted.

The EU Plastics Strategy Annex I includes a list of future EU measures, while Annex II provides a list of measures recommended to national authorities and industry, both centred on: improving the economics and quality of plastics recycling; curbing plastic waste and littering; driving investment and innovation towards circular solutions; and harnessing global action.

The Marine Strategy Framework Directive (MSFD)

The Marine Strategy Framework Directive (MSFD; 2008/56/EC) is the major binding legal instrument to protect the marine environment in Europe. Under the MSFD Directive, Member States are required to assess, monitor, set environmental targets and measures, to achieve the Good Environmental Status (GES) of European oceans and seas by 2020. The GES is articulated along 11 qualitative descriptors, among which Descriptor 10 focuses on marine litter, requiring Member states to ensure that “properties and quantities of marine litter do not cause harm to the coastal and marine environment”.

Following the provisions of the MSFD, each Member State has to perform an initial environmental assessment; set environmental targets; establish data collection and monitoring activities; and to take action through both existing and new measures targeted, inter alia, at marine litter.

The Plastic Bags Directive

The aim of the Plastic Bags Directive (2015/720/EU) is to implement measures that will ensure that the annual per capita consumption of lightweight plastic bags will not exceed 90 bags by 31 December 2019 and 40 bags by 31 December 2025, and/or that lightweight carrier bags will not be provided free of charge at the point of sales of goods or products by 31 December 2018. These targets do not apply to very lightweight plastic bags.

Other EU Waste legislation

Several other EU legal acts aim to foster waste prevention, reduction/reuse/recycle, and to regulate waste discharge and disposal activities. As such, they are indirectly relevant to the issue of marine litter, as they include provisions to avoid the generation of waste, or to establish structures and mechanisms to recycle waste, as well as to avoid waste disposal into the environment. Table 5 summarises the main EU waste-related legal acts, which are relevant for the issue of marine litter.

Table 5. List of the EU legal acts for waste management that are relevant for the issue of marine litter, and their objectives.

EU legal act	Objective
Waste Framework Directive	Measures for preventing and reducing adverse effects from the generation and management of waste, for reducing the overall impacts of resource use and improving resource efficiency. The Waste Framework Directive also includes targets for the reuse and recycling of waste to 2020: <ul style="list-style-type: none"> • Preparing a minimum of 50% by weight of household and similar wastes (at least paper, metal, plastic and glass) for reuse and recycling; • Preparing a minimum of 70% of construction and demolition waste for reuse, recycling and recovery. To help them achieve these targets, Member States are obliged to develop waste management plans and waste prevention programmes.
Packaging and Packaging Waste Directive 94/62/EC	Harmonize national measures concerning management of packaging and packaging waste to prevent or reduce its impact on the environment
Port Reception Facilities Directive	Reduce the discharges, especially illegal discharges, of ship-generated waste and cargo residues into the sea by improving the availability and use of port reception facilities in EU Member State ports
Landfill Directive	In addition to defining technical requirements for landfill design and operation, the Landfill Directive also includes targets regarding the amount of waste that can be landfilled, eventually ensuring that landfilled waste would not exceed 35% of the total amount of biodegradable waste produced in 1995.
Waste from Electric and Electronic Equipment (WEEE)	Requirements for the provision of separate collection systems for WEEE from private households, and targets for minimum collection rates.
Battery Directive	Protect the environment by minimizing the negative impacts of batteries and waste batteries by prohibiting the marketing of

	batteries containing certain hazardous substances, defining measures to establish high level collection and recycling schemes, and fixes targets for collection and recycling activities.
End-of-life Vehicles (ELV) Directive	Setting of targets for reuse, recycling and recovery of ELVs and their components, pushes producers to manufacture vehicles without hazardous substances and aims at making the recycling of ELVs more environmentally friendly
Urban Waste Water Treatment (UWWT) Directive	Provisions for the collection, treatment and discharge of domestic waste water, mixed waste water and some industrial waste water.
REACH	Under the REACH, plastics recyclers are required to provide information on the types of chemicals included in recycled plastics. This will in turn facilitate the recycling of plastics, contributing to the EU vision of a circular economy.
Industrial Emissions Directive	Control of the emissions of solid particles, e.g. plastic pellets, from industrial operations

2.4. Bulgarian legislation and policies

The general framework set by the United Nations Convention on the Law of the Sea (UNCLOS), 1982, for protecting the marine environment is observed by all four countries, which are parties to the Convention. Bulgaria is actually dually represented: through the European Union and as sovereign states.

The International Convention for the Prevention of Pollution from Ships, MARPOL, and especially Annex V, dedicated to the prevention of pollution by garbage from ships is also implemented by all countries in the region.

The picture of international engagements of the four countries related to diminishing sea-based pollution as embodied in the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention and Protocol) is more diverse. Bulgaria is the only country, which is party to both the London Convention, 1972, and the Protocol of 1996, which introduced the “precautionary approach” and the “polluter pays principle”, and in effect prohibited all dumping, except for possibly acceptable wastes on the so-called “reverse list”.

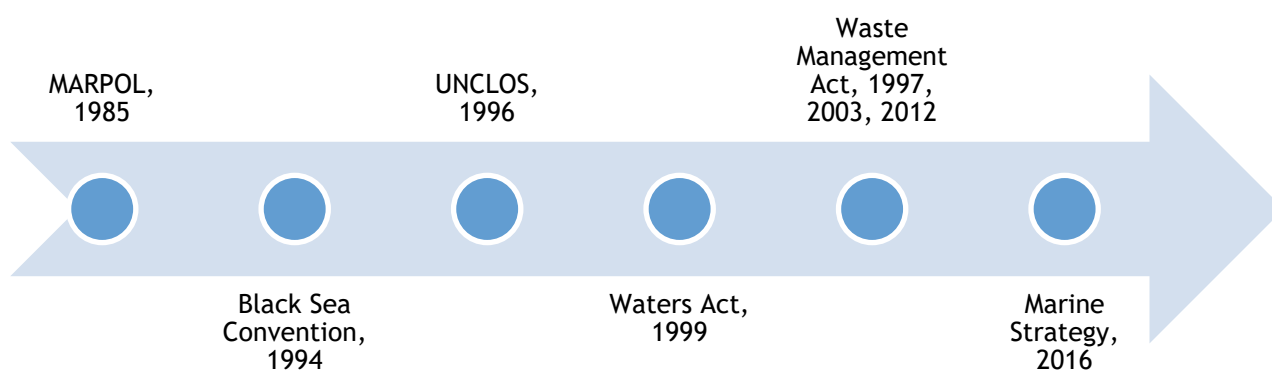
Bulgaria as an EU member is applying the European legislation related to protection of the marine environment. The Marine Strategy Framework Directive is of particular importance with regard to reduction of pollution from marine litter and the above three countries are at the implementation stage of their respective Programmes of Measures, encompassing also marine litter

Bulgaria is party to all global conventions described in paragraph 2.1. It is also an active member of the Convention on the Protection of the Black Sea against Pollution (Bucharest Convention). The most significant tool for marine litter in the Black Sea is the draft Black Sea Integrated Monitoring and Assessment Programme (BSIMAP) for the years 2017-2022. Development and implementation of the BSIMAP is stipulated in Article XV of the Bucharest Convention and its Protocols. BSIMAP is based on national monitoring programs, financed by the Black Sea states. Marine litter Guidelines for the Black Sea are expected to be developed under this programme. In addition, Bulgaria is also party to the Convention on co-operation for the protection and sustainable use of the Danube river (1994). The International Commission for the Protection of the Danube River (ICPDR) supports work for the reduction of plastic waste in the large river basin, which ultimately has an impact on the state of the Black Sea ecosystem.

As an EU member state since 2007, Bulgaria has transposed all relevant legislation concerning marine litter. The most important national legal acts on the topic are the Waste Management Act (2012), Environmental Protection Act (2002), Waters Act (1999), and Maritime Spaces, Inland Waterways and Ports of the Republic of Bulgaria Act (2000). There are also a number of by-laws, related to the implementation of the above acts or international conventions, as for example Regulation No 15/2004 for delivery and reception of ship-generated waste and cargo residues from all ships. Marine litter, however, is not included as a term in Bulgarian legal documents.

Bulgaria was among the first EU members, which introduced a product fee on plastic bags in 2011. Since then it has increased the fee per bag several times. According to producers and governmental estimates this measure has reduced the total number of bags reaching the market by 50% compared to the period before 2011 (Georgieva, 2017).

Policy timeline: ratification of international conventions and Bulgarian legislation



Currently, there is a National Plan for Waste Management 2014-2020. Waste management plans for the ports of Varna and Burgas have been adopted in 2016. On local level, where the sites for beach monitoring within the project are located, there is also a Municipal Plan for Development of Dolni Chiflik 2014-2020, approved by the local council with tourism development featuring prominently in the plan.

The Programme of Measures of the Marine Strategy of Bulgaria 2016-2021 includes regional level (to be implemented together with Romania) and national level measures. The relevant transnational measures are:

- Adoption of Regional Action Plan for Marine Litter for the Black Sea;
- Improvement of the management of ship generated waste;
- Coordinated organizing / supporting of annual campaigns to raise awareness of the business sector (merchants, beach concessionaires, beach users, fishermen, etc.) and the public (tourists, students, children, etc.) about the consequences for the marine environment caused by marine litter and the need for its recycling;
- Amend existing legislation, if necessary by introducing a permit regime for activities in the marine environment or other regulatory changes.

There are two planned national measures:

- Ensure the phased implementation of the requirements of the MSFD by providing the necessary information, incl. financing mechanisms and management decisions;
- Integration of “marine litter” in existing legislation.

3. Stakeholders analysis

Stakeholders are all parties to a policy action. Their interest or commitment to the issues in question can be measured or estimated, as well as their power in taking decisions about policies and measures. The position of stakeholders with regards to these two variables divides them in four groups as presented in Fig. 16.

Steps

Step 1- Set the scene; Activity 1 Involve experts and stakeholders

Purpose

To identify the actors who may potentially be affected by an action or policy. Enables the assessment of stakeholders' interests and identifies actors according to how they will be impacted, or how they will impact the situation. Moreover, it should support the successful implementation of policy. In summary, it is used to identify who should be addressed when developing a plan or policy, as well as how they should be engaged.

Overview

Stakeholder mapping clarifies the relationships, dependencies, interests and power balances of a stakeholder group. A matrix approach is often used to represent the different dimensions of various stakeholder attributes, including power, influence, interest and attitude (see an example in Figure 20). This type of understanding is critical when setting up stakeholder groups to ensure that a diversity of interests and attributes is presented, and to provide a foundation for stakeholder discussions. In other words, stakeholder mapping will enable the characterisation and visualisation of the existing stakeholders, their specific attributes and their linkages.

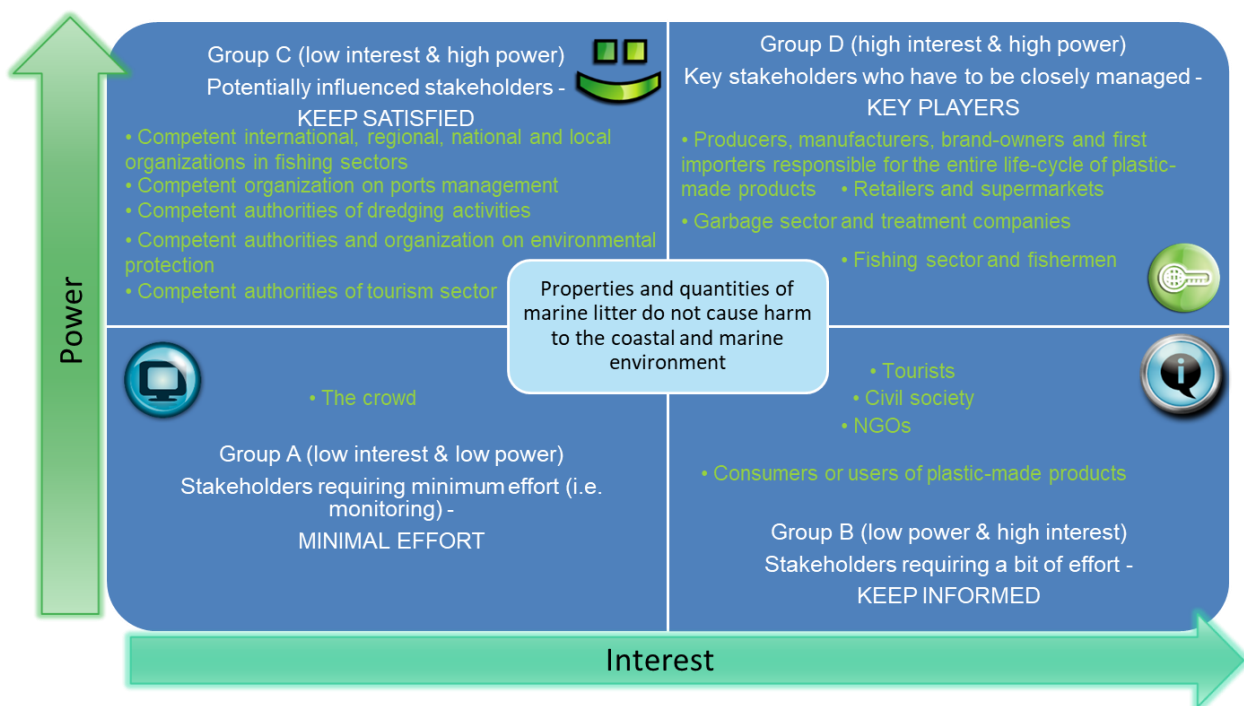


Figure 20. Power-Interest matrix for stakeholder's analysis or mapping.

Stakeholder analysis poses questions such as:

- Who is directly affected by the problem situation being addressed?
- What are the interests of various groups in relation to the problem?
- How do groups perceive the management problem that affects them?
- What resources do groups bring to bear (for good or bad) on the problem?
- What organisational or institutional responsibilities do the groups have?
- Who should benefit, or be protected from, management interventions?
- What conflicts may groups have with each other and with management strategies?
- What management activities may satisfy the interests of the various groups?

Tips

The importance of stakeholder analysis lies mainly in its ability to ensure that the many "actors" who need to be involved in the process are properly identified and characterised in terms of their interests in the particular circumstance and some of their interactions that relate especially to power. Without stakeholder analysis at the start of the policy and planning cycles it is likely that critical stakeholder will be omitted from the processes and that this will eventually lead to problems with policy implementation. It is an important analytical tool that also helps to promote transparency and effectiveness in the outcome. Even if this is not done in a formal manner, it needs to be done in an informal manner and is something that planning teams need to consider carefully in their initial roadmap planning phase as it affects how the entire policy planning and implementation process should be run, especially who should be involved and how.

Although there are several methods for the analysis in the literature, the method described here includes 4 steps (for more details see Appendix 5 within Deliverable 6.3):

Step 1-Definition of attributes to be mapped.

For example: the role of the stakeholder in the policy process, the scale at which the stakeholder acts, interest in the area addressed by the policy, attitude towards the policy, seniority of the stakeholder within his/her organisation, the power of the stakeholder to influence others, relationships or links to others and the definition of the organisation to which the stakeholder belongs.

Step 2-Application of the attributes to the stakeholders.

A table is created, in which each of the attributes is addressed for each stakeholder.

Step 3- Mapping of the attributes.

Different methods can be employed to do the mapping (e.g. Cmap Tools software and PRIMER software). Below some publications on this topic are listed under: Source of information and under Appendix.

Step 4-Analysis and discussion of the maps.

The maps will provide a foundation for the analysis of how stakeholders interact with others and also how they relate to the issue in question (e.g. MSFD and achievement of GES). This will provide the basis for discussion of different concerns such as:

- Variety and type of stakeholders
- Distribution of the attributes amongst the stakeholders
- Linkages between the stakeholders

A list of Bulgarian stakeholders is available as a separate Annex.

4. Strategies, practices, measures

Despite the serious problems in waste management in Bulgaria there have been some recent achievements reflecting favourably on the overall situation and indicating to possible ways of improvement of the situation with marine litter pollution. Marine litter is not specifically targeted by the national waste management legislation and improvement in the overall management of waste can lead to improvement of the overall situation with marine litter.

The Ministry of Environment and Water (MOEW) is responsible for the development and implementation and drafting of the national waste management policy as well as regulation of the activities in the public and private sectors. The MOEW performs some of the activities by the Executive Environmental Agency (EEA) and a network of 16 Regional Inspectorates of Environment and Water (RIEW) that are specialized control bodies of the Ministry and control the implementation of the waste management activities on their territories. Since 2009 Bulgaria has been implementing several strategic documents the more recent being the National Waste Management Plan (2014 - 2020). The achievements include improvement of separate collection and involvement of private sector; progress in waste management in the capital Sofia; establishment and development of national waste management; improvements in bio-waste policy (establishment of Biowaste Strategy, project on developing bio-waste regulations, establishment of compost quality assurance system and National Organization for Quality Assurance of compost); introduction of landfill tax and progressive increase.

4.1 National Waste Management Plan 2014 - 2020

The National Waste Management Plan (NWMP) plays a key role in achieving a resource-efficient and sustainable waste management, as the analysis of the current situation shows that in Bulgaria there is significant potential to improve waste prevention and its management, better use of resources, development of new markets and new jobs, as at the same time reduce the harmful effects of waste on the environment.

NWMP is based on the following principles:

- Prevention - waste should be reduced and avoided where it is possible.
- Extended producer responsibility and polluter pays - those who produce or contribute to waste generation or pollute the environment or current waste holders must cover the full costs for waste treatment and should manage them in a way that ensures high level of protection of the environment and human healthcare.
- Precaution - potential waste problems should be foreseen and avoided at the earliest possible stage.
- Self-sufficiency and proximity - waste should be disposed as near as possible to the place of their generation as waste generated in the EU should be treated within the union.
- Public participation - relevant stakeholders and authorities as the general public have the opportunity to participate in the development of waste management plans and waste prevention programs and have access to them after their development.

Bulgaria has developed a National Waste Prevention Programme (NWPP) in accordance with the requirements of the WFD and Article 50 of the Waste Management Act for the first time. NWPP is an integral part of NWMP and identifies measures for implementation of the highest level in the waste management hierarchy. The NWPP has significant impact on marine litter prevention,

The fourth NWMP is the transition from waste management to the efficient use of waste as resources and sustainable development by prevention of their generation, as far as possible.

Successful implementation of the plan will lead to the prevention and reduction of the harmful effects of waste on the environment and human health and reduce the use of primary natural resources.

The plan supports the central and local authorities to concentrate limited financial resources from national and EU sources on priority projects in the field of waste management.

Basis and approach for NWMP development

NWMP is developed in accordance with Art. 28 of WFD and Art. 49 of WMA. During the development of NWMP are taken into account legal requirements and a number of European and national programs and methodological documents, including:

- Roadmap of Resource Efficient in Europe
- General Union Environment Action Programme to 2020 “Living well, within the limits of our planet“
- . Green Paper on a European Strategy on plastic waste in the environment
Green Paper on a European Strategy on plastic waste in the environment, 2014
- . Europe 2020: National Reform Programme 2012-2020 and the Council Recommendation on the National Reform Programme
- . Methodological guidance note of European Commission, Environment DG:
„Preparing a Waste Management Plan“, 2012
- . Methodology for strategic planning in Republic of Bulgaria, April 2010, Council for Administrative Reform
- . The approach of NWMP developing is consistent with the requirement such a document to be easily understandable by non-specialists and the general public and also to provide an opportunity for narrow specialists to gain more detailed information by annexes to the main text of the analytical part.

The NWMP basic document contains:

- . Key conclusions from the analysis of the state of waste management
- . SWOT analysis (analysis of strengths and weaknesses, opportunities and threats)
- . Objectives and sub objectives
- . Action plan with Programmes with measures to achieve the objectives.

National waste prevention programme

Programme to achieve the objectives for preparing of re-use and recycle of municipal paper, metal, plastic and glass waste

Programme to achieve the objectives of biodegradable waste, including bio-waste

Programme to achieve the targets for recycling and recovery of construction and demolition waste

Programme to achieve the targets for recycling and recovery of widespread waste

Programme to improve the management hierarchy of other waste streams and reduce the risk to the environment from landfills for municipal waste

Programme to improve the capacity of institutions for waste management

Programme to improve the quality of information helping to make informed management decisions

Programme to improve awareness and participation of the population and business in waste management activities

The objectives, the selected alternative for their achievement and the programmes with measures were summarized in NWMP 2014-2020, as follows:

Objective 1: To reduce the harmful impact of waste by waste prevention and promoting reuse: National Waste Prevention Programme

Objective 2: To increase the amount of recycled and recovered waste by creating conditions for developing a network of facilities for treatment of all waste generated, thus to reduce the risk to the population and environment

Programme for achievement of objectives for preparation for re-use and recycling of municipal paper, metal, plastic and glass waste

- . Programme for achieving the objectives and requirements for biodegradable waste including bio-waste

- . Programme for achievement of objectives for recycling and recovery of construction and demolition waste

- . Programme for achievement of recycling and recovery targets of wide spread waste /WSW/

- . Programme for improvement of hierarchy of management of other waste streams and reducing environmental risk from municipal waste landfills

Objective 3: Waste Management ensuring a clean and safe environment - Programme for improvement of institutional capacity on waste management; Programme for improvement the information quality in order to support informed management decisions making

Objective 4: Making the public a key factor in applying the hierarchy of waste management Programme for improvement the awareness and participation of population and business in waste management activities

NWMP and NWPP as an integral part of it are developed for period 2014-2020. The plan deadline coincides with the period of programming and use of EU structural and investment funds for the period 2014-2020 and the deadline of the "Europe 2020: National Reform Programme". The period meets the requirements of the Waste Management Act, under which NWMP should be prepared for at least 6 years.

Waste streams within the NWMP

NWMP includes waste that is within the scope of the WFD, respectively WMA:

- . municipal waste
- . industrial waste
- . construction waste
- . hazardous waste

Wastes streams that are outside the scope of NWMP, respectively WFD and WMA, are presented in Annex No. 1 to the Plan.

4.2 National Waste Prevention Programme

The National Waste Management Programme (NWPP) is an important part of NWMP of Bulgaria, especially in relation to plastics in the marine environment. Decoupling economic growth from the increasing use of resources, resulting in a negative impact on man and nature, is a major goal in the field of environmental policy. This guiding principle of sustainable development is not only a guide for governmental actions, but also is a measure of the decisions of the economy and society. According to Art. 29 point 1 of the WFD each EU Member State should develop a waste prevention programmes. Provided objectives and measures should lead to decouple economic growth and environmental impact associated with waste generation (Article 29, point 2 of WFD and art. 50 of WMA). Waste prevention measures should be understood as any measure that is taken before a substance, material or product becomes waste and which contributes to reduce the amount of waste and its harmful effects on humans and nature or content of harmful substances in the waste. According to the WFD (Article 3, point 1) and according to Bulgarian Waste Management Act (§ 1, point 17 additional provisions), "Waste" means any substance or object which the holder discards or intends or is required to discard".

It is particularly important to emphasize that waste prevention has the highest priority in the waste management hierarchy. The biggest environmental load from the manufacture of a product and that is precisely why these loads are reduced by waste prevention measures. Moreover, in this way also reduces the adverse effects due to incineration, transportation and storage. Ultimately waste prevention means not arise waste, not to produce products which must be recycled or disposed. Different options for waste treatment are always associated with difficulties and stresses for environment. The waste does not disappear just like that, but by landfilling and incineration, recycling even by just changing a substance. For example, incineration, even by the most modern technologies brings emissions and /or residues that need to be stored. Any disposal interference in nature, while not at 100% excludes harmful environmental impacts. In the best case, waste is recovered, but even in this case, there are loads due to the use of energy and water. Therefore, the most adequate response to the problems of waste includes steps ahead of waste, namely, the waste prevention.

According to Art. 29 point 1 of the WFD each EU Member State should develop a waste prevention programmes. Provided objectives and measures should lead to decouple economic growth and environmental impact associated with waste generation (Article 29, point 2 of WFD and art. 50 of WMA).

National Waste Management Plan (NWMP) correlations

The National Waste Management Plan (NWMP) is part of the overall national planning system, which is why it represents the relationship between the National Waste Management Plan (NWMP) and other national programming documents. In developing the objectives of the National Waste Management Plan (NWMP), it has considered the analyses and forecasts of nine national plans from which directly or indirectly the measures set out in it are arising. In turn, the performance of the National Waste Management Plan (NWMP) will contribute, to a lesser or greater extent, to achieve the objectives of the national planning documents referred to below in this section.

4.3 National Development Programme: Bulgaria 2020

The National Development Programme: Bulgaria 2020 is the main strategic and programming documents, which specifies the objectives of development policies of the country until 2020 and is the basis for the programming of strategic documents related to the implementation of national policies. The document helps to optimize the programming Bulgaria 2020, by linking the national priorities of the Republic of Bulgaria to the EU objectives in the context of the Europe 2020 Strategy. The programme identifies eight national priorities, the third of which is: "Achieving sustainable integrated regional development and use of local potential". Its main sub-priority is "Creating conditions for protecting and improving the environment in the regions, to adapt to climate changes and for achieving sustainable and efficient use of natural resources."

It is provisioned that the objectives under this sub-priority be achieved by fulfilling a number of actions, including actions to improve the efficient use of resources by preventing waste, optimizing waste collection and implementing advanced technologies for separate collection of biodegradable waste composting, recycling and environmentally sound disposal. are specific targets for the recycling of at least 50% of municipal waste, 70% of construction waste, as well as the reduction and recycling of municipal and construction waste and reduced biodegradable municipal waste to 35% in 2020 compared to the level of 1995.

The expected outcomes of the implementation of measures are: growth of recovered and recycled waste, increased share of population served by systems for separate collection and transportation of waste; growth of composted biodegradable waste; growth of recovered and recycled and waste.

The National Waste Management Plan (NWMP) 2014-2020 is bound to another priority of the National Development Programme: Bulgaria 2020 - namely Priority 7 "Energy security and increasing resource efficiency", sub-priority 7.5. "Increasing the efficiency of resource use" areas of impact "Introduction of low-carbon, energy efficient and waste-free technologies" and "Recovery and recycling of large amounts of waste".

The implementation of programmed measures under the National Waste Management Plan (NWMP) derives from and contributes directly to the objectives and priorities of the National Development Programme: Bulgaria 2020, and in particular for achieving sustainable integrated regional development and use of local potential.

4.4 Strategic Action Plan for the Environmental Protection and Rehabilitation of the Black Sea 2009

The Strategic Action Plan for the Environmental Protection and Rehabilitation of the Black Sea 2009 provides a brief overview of the status of the Black Sea, based largely on information contained within the 2007 Black Sea Transboundary Diagnostic Analysis (BS TDA), and considering progress with achieving the aims of the original (1996) Black Sea Strategic Action Plan (BS SAP). The SAP 2009 builds upon BS SAP signed in 1996 (updated in 2002), by reorganizing the priorities and actions therein considering the progress in the region and the state of the environment. The updated (2009) version of the BS SAP describes the policy actions required to meet the major environmental challenges now facing the Black Sea: eutrophication/nutrient enrichment; changes in marine living resources; chemical pollution (including oil); and biodiversity/habitat changes, including alien species introduction, and includes a series of management targets. Marine litter however is not part of the challenges.

The TDA 2007 reconfirmed four priority transboundary environmental problems, requiring coordinated efforts by all Black Sea coastal States. It was determined that these areas of concern, and their causes, could be most effectively and appropriately addressed through the aims of four Ecosystem Quality Objectives (EcoQOs). The four EcoQOs and associated Sub EcoQOs are:

EcoQO 1: Preserve commercial marine living resources.

EcoQO 1a: Sustainable use of commercial fish stocks and other marine living resources.

EcoQO 1b: Restore/rehabilitate stocks of commercial marine living resources.

EcoQO 2: Conservation of Black Sea Biodiversity and Habitats.

EcoQO 2a: Reduce the risk of extinction of threatened species.

EcoQO 2b: Conserve coastal and marine habitats and landscapes.

EcoQO 2c: Reduce and manage human mediated species introductions

EcoQO 3: Reduce eutrophication.

EcoQO 4: Ensure Good Water Quality for Human Health, Recreational Use and Aquatic Biota.

EcoQO 4a: Reduce pollutants originating from land based sources, including atmospheric emissions.

EcoQO 4b: Reduce pollutants originating from shipping activities and offshore installations

Each EcoQO is assigned a number of management targets that address the immediate, underlying and root causes of the concern areas. For regional level interventions, the Black Sea coastal States and the international partners shall work collectively to take the required steps to fulfill those interventions. National level supporting interventions will be the responsibility of individual states.

In 2005, the Regional Activity on Marine Litter, supported by UNEP, was launched. During the following 3 years the two relevant Memorandums of Understanding (MoUs) between the Black Sea Commission (BSC) Permanent Secretariat and UNEP (Nairobi) were implemented. In 2007 the Report on Marine Litter in the Black Sea (incl. the text of the Draft Marine Litter Action Plan for the Black Sea) was adopted. It included recommendation for updating the BS SAP, on methodologies, monitoring and assessment, increased public awareness on marine litter in the Black Sea. A number of EU funded projects such as MARLISCO, CLEANSEA, MSFD Project, PERSEUS, STAGES etc. and the Berlin Conference on Marine Litter created capacity to work on marine litter issues. In 2015 BSC joined the UNEP Partnership on Marine Litter.

During its 31st BSC Regular Meeting (7-8th October 2015) the Commission welcomed the cooperation with UNEP and, in particular, implementation of marine litter related activities under the BSC PS - UNEP MoU. The Commission took note of the proposal of Bulgaria on the draft Regional Action Plan on Marine Litter Management in the Black Sea and to asked ESAS/LBS/PMA AGs to consider it and to follow the issue. At 34th BSC Regular Meeting (25-26th October 2018) the Regional Action Plan on Marine Litter in the Black Sea was adopted by BSC and tasked to further elaborate on Marine Litter Monitoring Guidelines. They will be further revised against concrete actions, considering experience of other Regional Sea Conventions (RSCs) and relevant projects and organizations.

4.5 Black Sea Marine Litter Regional Action Plan

The Black Sea Marine Litter Regional Action Plan (BS ML RAP) adopted in October 2018 is the first regional document focusing on marine litter. It includes definition of marine litter and basic guiding principles.

The overall objective of the BS ML RAP is to consolidate, harmonize and implement necessary environmental policies, strategies and measures for sustainable integrated management of marine litter issues in the Black Sea region.

The main objectives of the BS ML RAP are to:

- (a) Prevent and reduce to the minimum marine litter pollution in the Black Sea and its impact on ecosystem services, habitats, species, in particular the endangered species, public health and safety;
- (b) Remove to the extent possible already existent marine litter by using environmentally respectful methods;
- (c) Enhance knowledge on marine litter;
- (d) Achieve that the management of marine litter in the Black Sea is performed in accordance with accepted international standards and approaches as well as those of relevant regional organizations and as appropriate in harmony with programmes and measures applied in other seas;
- (e) Contribute to the full implementation of the Joint Work Plan on Marine Litter between UNEP/MAP and the BSC PS in order to achieve synergistic effects through coordinating activities; and
- (f) Contribute to the full implementation of the Memorandum of Understanding between the UNEP/MAP-Barcelona Convention and the BSC PS with the objective to consolidate and intensify their cooperation in order to achieve their common goals and objectives.

The BS ML RAP will be implemented as an integrated mechanism for the Black Sea cooperation in the field of management and abatement of marine litter pollution in order to achieve the BS ML RAP objectives and objectives set up in the Bucharest Convention and its Protocols.

The Contracting Parties to the Bucharest Convention may incorporate the provisions of the BS ML RAP into their national marine strategies, plans and/or programmes for the protection and rehabilitation of the Black Sea and the sustainable use of marine and coastal resources paying due attention to national, sectoral and intersectoral interactions.

4.6 Marine Strategy Framework Directive Programme of Measures

The main aim of the Marine Strategy Framework Directive (Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy) is to maintain or achieve a Good Environmental Status (GES) in the marine environment by 2020. To this aim, the EU Member States have to develop Marine Strategies, including a set of measures to achieve or maintain GES - the Program of Measures.

The Initial Assessment of the state of the marine environment (Art. 8 national report), definitions for Good Environmental Status (GES) (Art. 9 national report) and the definition of environmental targets and indicators (Art. 10 national report) formed the first part, and the

monitoring programmes under Article 11 were the second part of the Marine Strategy. The first part of the Marine Strategy was developed in 2012, and the second part - in 2014.

The Programme of Measures under Article 13 MSFD is the third part of the Marine Strategy of Republic of Bulgaria. The development of the PoMs in Bulgaria started in the beginning of 2015.

According to MSFD requirements, the momentary and future state of the marine environment has to be assessed and defined based on eleven qualitative descriptors (characteristics):

D1: Biodiversity

D2: Non-indigenous species

D3: Commercially exploited species

D4: Food webs

D5: Eutrophication

D6: Sea-floor integrity

D7: Alterations of hydrographical conditions

D8: Contaminants and their effects

D9: Contaminants in fish and other seafood

D10: Marine litter

D11: Underwater noise

In order to reduce the anthropogenic pressure on the marine environment caused by human activities it is necessary to plan and implement measures so as to ensure the achievement and maintenance of a good environmental status, according to MSFD requirements.

The present Program of Measures (PoMs) is planned to provide a reduction of anthropogenic pressure from human activities for which there are no measures planned under the updated Black Sea River Basin Management Plan (BSRBMP) or when existing measures are considered as not sufficient to achieve the GES.

The MSFD is being implemented in a coordinated way across Bulgarian administrations. The proposals for a Program of Measures in this consultation have been developed at a Bulgarian wide scale with input from experts and policy makers and in coordination with Romania.

This Program of Measures applies to the territorial marine waters (in their entirety from the shoreline to the border of EEZ) and the Exclusive Economic Zone of Republic of Bulgaria.

The implementation period of the measures included in the PoM will run from 2016 to 2021.

The MSFD PoMs combines measures addressed themes as eutrophication, prevention of the spread of invasive non-indigenous species, reduction of contaminants, conservation of biodiversity, reduction in the impact of human activities on seafloor, stimulation of sustainable use and management of marine resources (link to Black sea fish / shellfish stocks), reduction of amount of marine litter on beaches and marine environment, prevention and limitation of possible underwater noise pollution on Black sea mammals.

The new measures must be subject of a detailed characterisation which includes precise description of the measure and action/steps planned of its scope, link with drivers, characteristics and environmental targets defined as well as an estimation of their cost, the technical feasibility, an socio - economic assessment (cost-benefit and cost-effectiveness

analysis) and their environmental impact, which must be taken into account when prioritising measures and possible alternatives.

The programme of measures is structured on 9 themes: seven of them encompass the eleven qualitative descriptors of the marine environment, and two are additional themes: marine protected areas and general (crosscutting measures related to governance in the broad sense, such as coordination among administrations, public participation).

The relevant themes in the scope of Bulgarian PoM are:

- Biodiversity (Descriptors 1, 4, and 6)
- Non-indigenous species (Descriptor 2)
- Commercially exploited species (Descriptor 3)
- Eutrophication, Contaminants and their effects, and Contaminants in fish and other seafood (Descriptors 5, 8, and 9)
- Permanent alteration of hydrographical conditions (Descriptor 7)
- Marine litter (Descriptor 10)
- Underwater noise and Energy (Descriptor 11)
- Marine protected areas
- General measures

New national measures were developed by the Black sea Basin Directorate in the scope of the support project „Implementation of the Marine Strategy Framework Directive (MSFD) in Bulgaria - Development of Programmes of Measures under Article 13“ funded by the Advisory Assistance Programme (AAP) for Environmental Protection in the Countries of Central and Eastern Europe, the Caucasus and Central Asia (Advisory Assistance Programme, AAP) and coordinated by the German Federal Environment Agency (UBA) to the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety.

Total number of national measures: 6.

New transboundary measures were developed as common joint or coordinated measures between Bulgaria and Romania in the scope of EC project (DG Environment) “Technical and administrative support for the joint implementation of the Marine Strategy Framework Directive (MSFD) in Bulgaria and Romania - Phase 2”, funded by EC, DG Environment.

Total number of transboundary measures: 17.

5. Monitoring status

In recent years ever more increasing attention is paid to waste dumped into the marine environment from land-based and marine human activities. Most dangerous waste are plastic waste, as most of them are insoluble and non-degradable in marine environment.

Those that decompose, break apart into very small particles that enter the food chain, and thus have a direct negative impact on marine organisms and thereby indirectly on the human body (with the consumption of marine products).

Marine Strategy Framework Directive (MSFD 2008/56/EC) sets the basis for the integrated management of the marine environment. This includes integrated management of pressures, in this case of marine litter and their effect on the individual components of the marine environment and their reaction.

Until now monitoring under MSFD Descriptor 10 - Marine litter has not been done, with the exception of seasonal clean beaches campaigns, organized by NGOs. The development of current program under Descriptor 10 - Marine litter under MSFD will build on the results of the project "MISIS-Optimization of Integrated Monitoring System of the Black Sea in accordance with the Marine Strategy Framework Directive (MSFD)", within which is made once study on the availability of marine litter on the water surface and the seabed several transects starting from Romanian, Bulgarian and Turkish coast seawards.

Developed program under Descriptor 10 will monitor the quantity and composition (quality) of the litter on the beaches, floating freely in the sea surface and in the water column, deposited on the sea-floor and possible accumulation in biota.

It is planned to conduct a joint study with monitoring of Descriptors 3 "Commercially exploited fish and shellfish" and 9 „Contaminants in biota" (see Sections 6.4: Plans for information on the GES and 6.5. Plans for information purposes).

This program will provide information on the driving forces (tourism, urbanization, fishing), the pressure of introducing waste into the marine environment and impacts (loss of habitat, loss of biodiversity, injured and / or dead marine mammals and birds due to entanglement in networks, or swallowed waste, reducing the aesthetic appearance of the coastline and the sea surface).

Descriptor 10 allows for the integration of the monitoring program with the program of measures as periodic campaigns to clean the beaches or etc. initiatives under the motto "Fishing for litter" can provide information on the effectiveness of the measures. These initiatives can be an effective way to reduce waste on the beaches and in the sea, by engaging the fisheries sector.

Future monitoring under MSFD could provide data for specific types of fish, birds or mammals, victims of specific types of waste. This data can be used to determine the appropriate targets and management measures.

Competent authorities

Ministry of Environment and Waters (MoEW)

According to Art. 151, para. 1, p. 2k) of the Water Act and Art.101, para. 1 of Regulation № 1 / 11.04.2011 for monitoring of waters, the Minister of Environment and Waters organizes and manages water monitoring. According to Art. 3, para. 3, point 8 of the Regulation on the protection of the environment in marine waters (NOOSMV), the Minister of Environment and Waters approves the monitoring programs under Art. 11 and coordinates their development and implementation.

URL: www.moew.government.bg

Black Sea Basin Directorate - Varna (BSBD - Varna) to the Ministry of Environment and Waters (MoEW)

According to Art. 155, paragraph 4b) of the Water Act and Art. 107, para. 1 of Regulation № 1 / 11.04.2011 for monitoring of waters, the Director of the BSBD - Varna plans and participates in the implementation of water monitoring, summarizes and analyses data, including that for the chemical and ecological status of water. According to Art. 3, para. 4, point 4 of the Regulation on the protection of the environment in marine waters (NOOSMV), the Director of the Black sea basin Directorate plans, develops and coordinates the monitoring programs under Art. 11.

URL: <http://www.bsbd.org/>

Executive Environment Agency (EEA)

According to Art. 1 pt. 7 the Art. 13 para. 1 of the Law on Environmental Protection, the Executive Environment Agency carries out the management of the National System for Environmental Monitoring, including in respect of litter: <http://eea.government.bg/en>. According to Art. 45. (1) of the Waste Management Act, the Executive Director of the ExEA keep public registers containing information on persons carrying out activities related to litter and having for this purpose permits.

URL: <http://eea.government.bg/en>; URL: <http://eea.government.bg/bg>

Regional Inspectorates of Environment and Waters to the Ministry of Environment and Waters

Law on Waste Management <http://www.riosvbs.eu/>; <http://www.riosv-varna.org/>

Executive Agency "Maritime Administration" - Sofia to the Ministry of Transport, Information Technology and Communications with regional structures Varna and Burgas (related to the control of maritime routes): <http://www.marad.bg/>

Monitoring institutions

Institute of Oceanology - Institute of Oceanology, Bulgarian Academy of Sciences (IO-BAS). Its competences are defined in Art. 171, §2, pt. 3 of the Water Act and Art. 3, paragraph 11 of the Regulation on the protection of the environment in marine waters, approved by Decree № 273 from 23.11.2010, Prom. SG № 94 dated 30.11.2010, effective from 30.11.2010. Web: www.io-bas.bg

Executive Environment Agency (ExEA):

According to Art. 1 pt. 7 the Art. 13 para. 1 of the Law on Environmental Protection, the Executive Environment Agency carries out the management of the National System for Environmental Monitoring, including in respect of litter: <http://eea.government.bg/en>.

According to Art. 45. (1) of the Waste Management Act, the Executive Director of the ExEA keep public registers containing information on persons carrying out activities related to litter and having for this purpose permits.

Regional Inspectorates of Environment and Water, Ministry of Environment and Water

Under Chapter V "Enable and Control Litter" Section I. "Permits for litter management activities", Art. 67, (1) of the Law on Waste Management: "Permission to perform activities of waste treatment is issued by the Director of the RIEW, in whose territory the activities take place."

Chapter III "Requirements for collection, transportation and treatment of waste", Art. 29, (1) of the Law on Waste Management provides that the waste depending on their type, properties, composition and other characteristics are collected, transported and treated in a manner that will prevent their subsequent utilization.

(2) Prohibited the abandonment, illegal dumping and burning or other form of uncontrolled waste management.

Executive Agency "Maritime Administration" - Sofia to the Ministry of Transport, Information Technology and Communications with the regional structures of Varna and Burgas.
<http://www.marad.bg/>

The current Monitoring programme of Bulgaria is presented in its entirety in Annex 2.

Other monitoring tools

Marine LitterWatch, MLW (www.eea.europa.eu/themes/coast_sea/marine-litterwatch/marine-litterwatch)

Marine LitterWatch, developed by the European Environmental Agency (EEA) in accordance with the Shared Environmental Information System (SEIS) principles, is a mobile web tool to collect beach litter data through citizen science. MLW aims to help fill data gaps on beach litter relevant for MSFD purposes, at the same time as it explores the benefits of involving citizens in the collection and monitoring of marine litter. Marine LitterWatch primarily consists in a mobile application. It allows users to conduct beach litter monitoring surveys and support national monitoring programmes. Marine LitterWatch builds on the TSGML beach litter monitoring guidelines and the proposed Master List of litter items. The app also enables the collection of data from popular clean-ups. Data from popular clean-ups are treated as a separate dataflow. Marine LitterWatch also includes a public central database hosted by EEA. From this database, data can be retrieved and used in other databases and/ or further disseminated into a wider range of products (e.g. survey reports and maps). In 2013 MLW mobile application was tested for in volunteer clean-ups and national beach litter monitoring surveys and its potential to become a tool to perform proper beach litter surveys and popular clean-ups was highlighted, while its wider uptake and use will be essential for further fine-tuning, and for filling-in data gaps on beach litter.

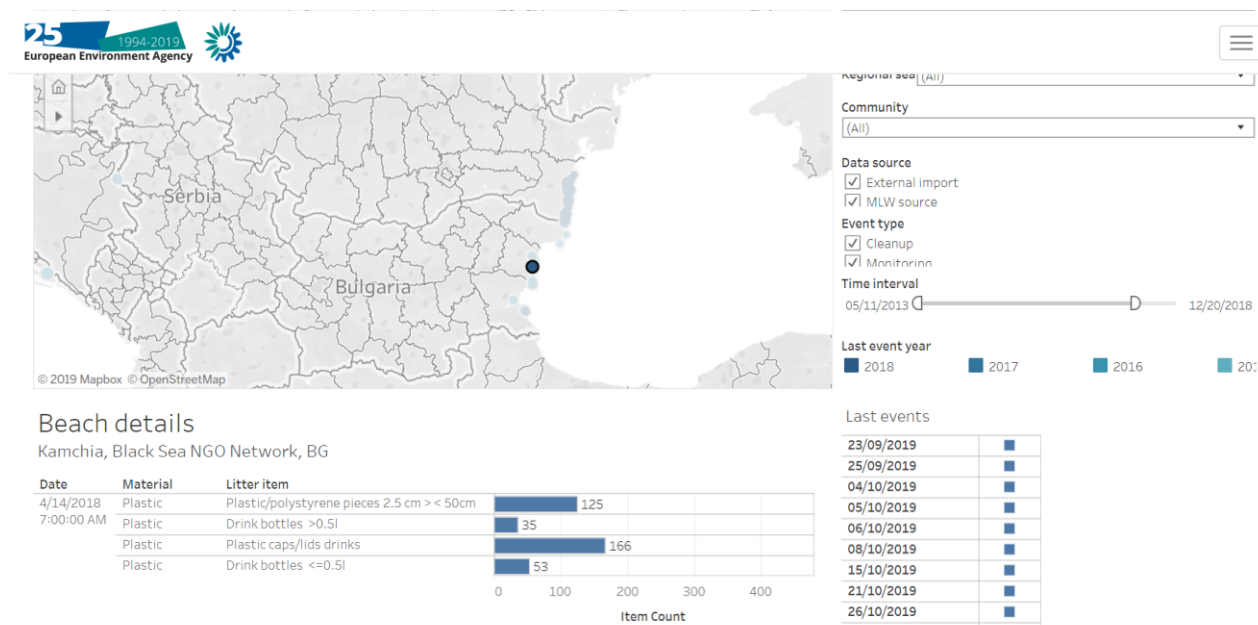


Figure 21. Marine Litterwatch data viewer

Source: EEA, 2019

In Bulgaria the application has been used in a number of projects (e.g. PERSEUS, MELTEMI, Wind2Win) both by research institutions and non-governmental organisations, such as the Black Sea NGO Network since 2015. Data generated during clean-up campaigns and dedicated monitoring activities is available from the EEA website (Fig. 21).

6. Recommendations: policy, mitigation and management actions

This chapter provides an account of examples of good practices - national, regional and international - in marine litter reduction and prevention. It also suggests ways and ideas how to use the best practices to transfer the experience and solutions to policy level. Most importantly the chapter provides recommendations based on best practices for policy and public awareness. The envisaged recommendations are grouped under the following categories: management of waste, legislative measures, port reception facilities, ship generated waste, fishing generated waste & derelict fishing gear, awareness raising and action (e.g. env. certification awards, motivation of citizens and groups for participation in monitoring - clean up actions; raising awareness campaigns; citizen science etc.), financial support and funding opportunities, monitoring and additional recommendations for measures and actions regarding marine litter (e.g. fostering collaboration between neighbouring/transboundary countries; coordination of authorities; controls; collaboration with scientists; policy implementation; political will; stakeholder engagement etc.)

Where there is enough information the good practices and recommendations can be further grouped according to specific criteria: long/short term, spatial scales, costs - effort, application, etc. when integrated in the policy toolbox. Inputs from stakeholders when available can also be incorporated in the toolbox.

The national experience of Bulgaria in addressing the issue of marine litter is given special attention. The Bulgarian good practices are mostly associated with EU and national initiatives and implemented projects aimed to collect, record and analyse marine litter. This analysis can serve as a source of ideas and inspiration for the MARLITER partnership, when it comes to deciding which practices are most applicable in each of the specific project countries for designing policies and measures. The Bulgarian experience in view of the regional Black Sea policies and planning is also highlighted.

Currently in Bulgarian legislation there are no specific measures to prevent and reduce marine litter in the Black Sea and on the Bulgarian coast. The various good practices, policies and economic tools are associated with solid waste management mostly. As there are significant gaps in the knowledge and information about the quantities, sources, patterns of distribution and influence of marine litter on the marine and terrestrial biota and most importantly man, the recommendations and good practices are selected in view of the basic environmental management principles - the Precautionary Principle, the Prevention at Source Principle, the Polluter Pays Principle.

The Extended Producer Responsibility (EPR) policy approach under which producers are given a significant responsibility - financial and/or physical - for the treatment or disposal of post-consumer products is also reviewed in the framework of the recommendations. Assigning such responsibility could in principle provide incentives to prevent wastes at the source, promote product design for the environment and support the achievement of public recycling and materials management goals.

Faced with increasing amounts of waste, many governments have reviewed available policy options and concluded that placing the responsibility for the post-consumer phase of certain goods on producers could be an option. Within the EU the trend is towards the extension of EPR to new products, product groups and waste streams such as electrical appliances and electronics.

Marine litter management like solid waste management is a complex process in which many actors and stakeholders are involved. There is already an understanding that marine litter is an enormous transboundary environmental problem, with increasing concern over it worldwide. Today it is evident that effective policy and reduction measures should be urgently put in place, not only on local and national level, but also on regional and sub-regional scale, while transnational cooperation remains a real challenge.

In view of the specific character of the Convention for the Protection of the Black Sea against Pollution (Black Sea Convention), which does not include any environmental management commitments, certain basic principles are to be integrated in the Black Sea Marine Litter Regional Action Plan (BS Marine Litter RAP) adopted at the 34th regular session of the Black Sea Commission in November 2018 but not widely available. As the project MARLITER focuses on the Black Sea environment and the management of marine litter on regional scale, it would be useful to be reminded of them.

“In implementing the BS ML RAP the Contracting Parties shall be guided by:

- (a) Integration principle by virtue of which marine litter management shall be an integral part of solid waste management and other relevant strategies;
- (b) Prevention principle by virtue of which any marine litter management measure should aim at addressing the prevention of marine litter generation at the source;
- (c) Precautionary principle by virtue of which where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation;
- (d) Polluter-pays principle by virtue of which the costs of pollution prevention, control and reduction measures are to be borne by the polluter, with due regard to the public interest;
- (e) Ecosystem-based approach by virtue of which the cumulative effects of marine litter on marine and coastal ecosystem, habitats and species with other contaminants and substances that are present in the marine environment should be fully taken into account;
- (f) Public participation and stakeholder involvement; and
- (g) Sustainable Consumption and Production principle by virtue of which current unsustainable patterns of consumption and production must be transformed to sustainable ones that decouple human development from environmental degradation.”

Those principles are integrated in the national legislation and wider political commitments of the Black Sea EU member countries. The situation with the other littoral states provides greater diversity. The suggestions of good and best practices and the recommendations for their promotion to policy level will be in line with the principles.

6.1 Management of waste

Several examples from Bulgaria provide suggestions for good practices in solid waste management, especially plastic waste, that can eventually find its way to the sea. Those involve land-based sources of waste. Urban solid waste management should be based on reduction at source, applying the following waste hierarchy as a priority order in waste prevention and management legislation and policy: prevention, preparing for re-use, recycling, other recovery, e.g. energy recovery and environmentally sound disposal. The examples from Bulgaria, the region and internationally reveal certain successful prevention and reduction at source measures and tools.

Recommendation: Apply adequate waste reducing/reusing/recycling measures in order to reduce the fraction of plastic packaging waste that goes to landfill or incineration without energy recovery. Improve prevention measures as part of urban solid waste management through improved (quantitative targets) recycling of packaging and waste packaging in combination with economic incentives for plastic waste recovery and recycling.

6.1.1 Ordinance on packaging and waste packaging in Bulgaria

The ordinance implemented the quantitative targets of the European Packaging and Packaging Waste Directive for recovery and recycling of packaging waste. It includes obligations for separate collection of packaging waste. It also introduced as a major organisational approach and collective systems for packaging recovery.

Initiating body - Ministry of Environment and Water

Involved Stakeholders - Ministry of Environment and Water, Local authorities, Economic operators, Customers

Funding source - Municipal tax on waste

Success of the measure/Tool - Very successful

Plastics form on average 27% of packaging waste for the period 2010-2016, reaching a total of 108 thousand tonnes in 2016. Until 2013 about 41% of plastic packaging is recycled. There is a substantial increase in the share of recycled plastic packaging since 2014, reaching 76% of the total waste flow in 2016.

Recommendation: Establish fiscal and economic instruments to promote the reduction of plastic bag consumption. Introduce economic tools aimed at the reduction of plastic waste through consumer behaviour addressing the plastic bags issue

6.1.2 Plastic Bag Product Fee in Bulgaria

The product fee was introduced on 1 October 2011. It covered shopping bags produced from polymers with thickness of less than 25 µm and size equal or smaller than 390x490 mm. The initial fee was 0.15 BGN (0.08 EUR) per bag and was gradually increased to 0.55 BGN (0.28 EUR) in 2014. In June 2016 the product fee of 0.55 BGN was extended to all plastic shopping bags with thickness of less than 50 µm. It is paid by all producers and importers of shopping bags to the State enterprise for environmental protection activities. All economic agents releasing shopping bags are legally obliged to conduct public awareness campaigns about the negative impact of plastic bags on the environment.

Initiating body - Ministry of Environment and Water

Involved Stakeholders - Ministry of Environment and Water, Producers and importers of plastic bags, Customers

Funding source - Product fee collected by all producers and importers of polymer bags.

Success of the measure/Tool - Very positive impact

Explanation - The plastic bag product fee has contributed to a 50% decrease in the usage of polymer bags according to the Ministry of Environment and Water. Surveys show that around 40% of customers avoid the use of thin plastic bags (under 50 µm) and have switched to multiple use bags (both plastic and textile) on a regular basis. While this has reduced the number of bags in the nature, there is no data about the impact on the marine environment since the introduction

of the tool. There are indications that monitoring, and enforcement may be insufficient as the collected product fee for 2017 corresponds to less than 15000 bags produced or released from 24 operators.

Recommendation: Limit the use of plastic bags use through a national reduction in consumption; and waste management/clean-up obligations for producers.

Plastic Bag Directive transposition into national law in Cyprus

In response to the European Plastic Bag Directive - Directive (EU) 2015/720 of the European Parliament and of the Council of 29 April 2015 amending Directive 94/62/EC as regards reducing the consumption of lightweight plastic carrier bags (Text with EEA relevance), the Republic of Cyprus has started collecting a tax of 0.05 euro on all lightweight plastic bags, starting June 2018. The initiating body was the Cypriot Government. Involved stakeholders include a wide range of categories: plastic bag producers and importers, supermarkets, traders, the general public. Funding source is the tax. The measure is too recent to assess its impact and what its influence on the environment and the marine environment may be. It is not possible to know its level of success. Nonetheless, examples from other Member States show that such instruments are successful. The measure is in line with the more recent Circular Economy package from May 21, 2019 on the new rules on single-use plastics to reduce marine plastic litter.

Plastic Bag Legislation in Greece

Imposition of a fee on plastic bags purchased at all shops, excluding street markets and kiosks has been introduced in Greece. Initiating body is the Ministry of Environment. Starting from Jan 1, 2018 a charge has been introduced for the purchase of 50-70 micron plastic bags of 0,03 € + VAT, which has been set to increase to €0.07 + VAT as of Jan. 1, 2019. The stakeholders involved are numerous - traders, producers and importers of plastic bags, customers. The measure is applied in all shops excluding kiosks and street markets. The success of the measure can be described as somewhat positive though it is early to say. Compliance seems higher in urban centres and in supermarkets, while it seems to be lower in rural areas and for the catering sector.

Plastic Bag Fee in Albania

EU candidate countries like Albania are also introducing measures to reduce plastic bags use. A fee on plastic bags was introduced for the economic operators in Tirana city, according to Order no. 15510, date 26.04.2017 of Mayor of Tirana Municipality. The fee is 3 leke/0.002 Euro for small plastic bags and 5 leke/0.005 Euro for big bags. However, the Order does not specify the difference between small and big plastic bag, in terms of volume. All economic operators have the legal obligation to introduce the plastic bag fee separately in the bill and to encourage buyers and consumers to replace the use of plastic bags with environmentally friendly packaging. Initiating body is the Tirana Municipality. The stakeholders involved are Ministry responsible for Environment, State Inspectorate on Environment, Tirana Municipality, economic operators, customers. The funding sources are the municipality budget and product fee collected by all economic operators. The measure is described as very successful. According to Tirana Municipality the plastic bag fee has contributed to a 50% decrease in the usage of polymer bags. The citizens/consumers of Tirana have started using paper or textile bags instead of plastic bags.

6.2. Legislative measures - part of the groups of measures laid down in the Bulgarian and Romanian marine strategies in the chapter on marine litter.

Recommendations: Integrate the term ‘marine litter’ in the Bulgarian national legislation to provide opportunities for the planning and respective allocation of resources and funding for measures addressing the marine litter problem in Bulgaria

6.2.1 Introduction of the term ‘marine litter’ in the Bulgarian national legislation

The aim of the action, performed by NGOs mostly with Black Sea NGO Network as central actor, is to introduce a legal definition of ‘marine litter’ (or solid waste in the marine environment) with the aim of horizontal integration of the policies and activities for preventing and mitigating the release of litter in the marine environment. It is an issue that has been identified by EU expert analysis and recommendations for improvement of measures related to Descriptor 10 and the programme of measures of the MSFD.

The action has started in 2014 and involves NGO advocacy activities and expert input with analysis and suggestions for introducing the term in the Bulgarian legislation. The institutions addressed are the Ministry of Environment and Water directly and through its subordinate agencies the Black Sea Basin Directorate and the Regional Environment Agencies in Varna and Burgas, as well as the committee on the environment and water at the National Assembly. responsible for the national environmental policy initiatives. Members of the Bulgarian Parliament from all political parties were addressed, as well as the numerous government institutions and agencies (listed below) associated with the issue. The Black Sea NGO Network took part in the public discussion (January 2016) on the implementation on the first period of MSFD and provided recommendations and suggestion how to integrate the term in the national legislation with a draft for a law on the amendments to the Bulgarian waste management act, involving definition of the term and its integration in the law. The ministry of environment has recognized the significance of the issue and supported the idea in principle, but it was not implemented and not included into the revised national programme for waste management. The motive was the complexity of the issue and the involvement of many institutions, as well as the pending amendments to the MSFD in May 2017.

The issue has been addressed in the new Programme of Measures of Bulgaria for the MSFD second cycle in the period 2018 - 2024. It is Measure 21: Integration of "marine litter" in the existing legislation - national measure. It envisages amendments to the existing Bulgarian legislation in order to integrate all existing legislative documents concerning the different types of waste and the routes of their entry into the marine environment.

It is supported by one of the results of a completed project "Towards a clean, waste-free marine environment through research, innovative tools and good governance" (funded under the EEA Financial Mechanism 2009-2014), which shows that problems in the Bulgarian legislation are not so much about the lack of legislative and regulatory documents as it is about their implementation and compliance. The results of this project will support the implementation of the Measure 21 "Integration of the term ‘marine litter’ in the existing legislation" part of the Program of Measures of Bulgaria under Art. 13 of MSFD 2008/56 / EC.

Initiating body - Black Sea NGO Network

Involved Stakeholders: Ministry of Environment and Water; Ministry of Tourism; Ministry of Transport, Information Technologies and Communications; Black Sea Basin Directorate; Executive Agency of Fisheries and Aquaculture; other government institutions, local authorities; economic operators

Funding sources: EEA grants, national budget, EU funds and volunteer work

Success of the measure/tool: Somewhat successful with

Explanation of the level of success: The action is initiated and supported by the NGO sector in Bulgaria mostly. Despite the recommendations of the EC monitoring bodies and experts assessing the implementation of the MSFD in Bulgaria, the national competent authorities are slow in taking concrete steps toward its accomplishment. The issue as such has been recognized in the expert community. The introduction of a legal definition of “marine litter” in the Bulgarian legislation has been included as a measure in the national Marine strategy, adopted in 2016. It is not yet implemented in the national legislation.

The number of institutions and stakeholders to be involve in this complex legal and public involvement process is very big. The basic initiating and responsible institutions are the Ministry of Environment and Waters (MOEW) and the Black Sea Region Basin Directorate (BSBD). Other involved institutions are: Ministry of Tourism (MT), Ministry of Transport, Information Technology and Communications (MTITC), Executive Agency "Maritime Administration" (IAMA), State Enterprise "Port Infrastructure" (DPPI), Regional Inspectorates of Environment and Water - Varna and Burgas, Ministry of Energy (MOE), Ministry of Agriculture and Food (MAF), Executive Agency for Fisheries and Aquaculture (NAFA), district administrations and municipalities, port operators, beach concessionaires, NGOs, professional fisheries associations etc.

Recommendations: Definition for the term ‘marine litter’ incorporated in the Black Sea Marine Litter Regional Action Plan to be adopted and implemented on national level

6.2.2 Support for the adoption and implementation of Black Sea Marine Litter Regional Action Plan and respective Black Sea Marine Litter National Action Plan

The development, adoption and implementation of Black Sea Marine Litter Regional Action Plan has been discussed by the Black Sea Commission, regional and EU experts for a good number of years. It is now part of the Program of Measures of the Marine Strategy of the Republic of Bulgaria (2016) as Measure 3: Adoption and implementation of the Black Sea Marine Litter Regional Action Plan, a transboundary measure, bilateral scope. Bulgaria and Romania, as EU Member States, are more involved in the development and implementation of the Marine Litter Action Plan at regional level. This plan may be based on other existing marine litter plans for the rest of the maritime regions (MED, OSPAR, HELCOM and UNEP). The Action Plan adopted at 34th Regular Meeting of the Commission on the Protection of the Black Sea against Pollution on October 24-25, 2018 in Istanbul, Turkey (not mentioned in the record of the session at the BSC website) is circulated informally in the regional expert community. The Action Plan contains definition for ‘marine litter’ as follows:

“For the purpose of the BS ML RAP:

Marine litter, regardless of the size, means any persistent, manufactured or processed solid material discarded, disposed of or abandoned in the marine and coastal environment. Marine litter consists of items that have been made or used by people and deliberately discarded or unintentionally lost into the sea and on beaches including such material transported into the marine environment from land by rivers, draining or sewage systems or winds. It mainly consists of plastics, wood, metals, glass, rubber, clothing and paper.”

It can provide good basis for adoption of definition on national level to be integrated in the national legislation. After the formal adoption of the Black Sea Marine Litter Regional Action

Plan it can be part of the next envisaged document Black Sea Marine Litter National Action Plan.

Initiating body: Bulgaria at the 30th Black Sea Commission meeting in 2014. First draft was presented in 2015.

Involved Stakeholders: Black Sea contrived regional governments - signatories of the Black Sea Convention and the Black Sea Commission

Funding sources: EU and national funds

Success of the measure/tool: Somewhat successful

Explanation of the level of success: The complex and difficult process is hampered by regional political confrontations that make prospects uncertain. The definition for marine litter can be a stepping stone to adoption of national legislation.

6.3 Port reception facilities

The disposal of ship-generated waste poses a significant threat to the marine environment, has an impact on human health and has costly economic consequences. Although land-based sources are the main causes of waste in marine waters, marine sources are responsible for a significant share of marine litter, with their share in the EU being approximately 32% but reaching 50% in some EU marine basins.

6.3.1 Improving plans for the receiving and treatment of ship waste in the Bulgarian ports of national significance

Recommendations: Establish and operate an effective system for functioning of port reception facilities to encourage compliance and environmentally friendly disposal of waste from vessels

Port reception fee in Bulgaria

Port reception fee is applied in accordance with the MARPOL 73/78 Convention, and especially its Annex V on garbage, as the primary international instrument to control marine litter pollution from ships, including fishing vessels and leisure crafts. In Bulgarian ports the fee depends on the gross tonnage of the vessel. Solid waste above a certain volume for each category is charged additionally.

Initiating body: State Enterprise Port Infrastructure

Involve stakeholders: State Enterprise Port Infrastructure, ship owners

Funding sources: ship owners

Success of the measure/tool: Not known

Reason for the measure of success: Port reception fees are usually not meant to reduce ships' waste directly, but portions of these fees can be used to improve waste management infrastructures in ports and support the development of innovative programmes to reduce the introduction of marine litter into the sea.

Recommendations: Improve the state of port reception facilities in Bulgarian ports of public transport and the available plans for receiving and treatment of waste aimed at the improvement of environmental management and performance of ports

An important project for the improvement of environmental performance of Bulgarian ports of public transport is under way. It is entitled 'Technical assistance for the preparation and

implementation of the project "Delivery, installation and commissioning of port reception facilities in Bulgarian ports for public transport of national importance'. The project aims to improve the efficiency of waste management in ports of national importance by updating the plans for treatment of waste and introducing requirements for complementary facilities for prevention and response to operational discharges or emergency pollution and adapting them to the current regulatory framework. Solid waste management is part of this improvement and is going to address the improvement of disposal of solid waste to regional landfills. The project envisages development and creation of conditions for prevention and reduction of pollution to improve predictability and safety of port operations and water transport by developing an integrated information platform for the control and monitoring of waste management activities in Bulgarian public transport ports. The project also envisages investment activities to improve the technical capacity for receiving ship-generated waste in public transport ports of national importance, including the introduction of complementary facilities for prevention and response to operational or emergency pollution. This is a project involves direct support to the improvement of environmental performance of the Bulgarian ports. It provides support to the development of innovative programme to reduce the introduction of marine litter into the sea.

Initiating body: national government and State Enterprise Port Infrastructure

Involve stakeholders: national government, State Enterprise Port Infrastructure, EU

Funding sources: EU funds, national government funds, State Enterprise Port Infrastructure funds. Total project value: BGN 1 560 000, Grant: BGN 1 320 000, European Regional Development Fund: BGN 1 122 000, National co-financing to the grant: BGN 198,000, Funding from SEPI: BGN 240,000; Start of project: 02/20/2018; Project end: 08/31/2023

Success of the measure/tool: Not known

Reason for the measure of success: In process of implementation

6.3.2 Examples from the Mediterranean

Recommendations: Consider the introduction of indirect fee system for collection of ship waste

Indirect Fee System for the Collection of Ship Waste in Cyprus

The Cypriot Port Authority, in accordance with National and EU legislation (ΚΔΠ. 771/2003 - 2000/59/EK) has implemented an 'Indirect Fee System' which means that every ship that enters Cypriot ports is charged a fee that gives it the right to dispose of its waste (solid waste, sludge (from burning of fuel) and sewage), regardless of whether or not the ship will actually dispose of any waste. The quantity of waste that these ships are allowed to dispose of is defined as "reasonable" for the specific type of ship. The Indirect Fee System provides an incentive for ships to deliver their waste to ports rather than to dispose of them at sea.

This system is also known as the "no charge" solid waste system. It is considered in a new proposal of the EC which requires all Union ports to introduce a 100% "no charge" solid waste system in order to eliminate economic incentives for ships to dump their solid waste at sea. This is an important change proposed by the Commission.

The treatment of the collected waste in Cyprus depends on its type. Recyclables are collected separately and sent for recycling, mixed waste is sent for disposal and, where possible, sewage waste is sent to sewage treatment facilities in Cyprus.

Very often, ship waste is caught in fishing vessel nets. There should be no economic measures to prevent the transport of this waste to the port. The Commission seeks to promote the transfer of passively recovered waste by including it in the 100% indirect fee system.

Initiating body: national government of Cyprus

Involved stakeholders: national government, port authorities, shipowners

Funding sources: Cypriot Government initially, later the measure became self-sustained

Success of the measure/tool: Somewhat positive impact

Reason for the measure of success: It is estimated that every year a total of about 15,400 cubic meters of waste is collected through this system at the three main Cypriot ports (Limassol, Larnaca and Vasilikos). This waste is comprised mainly (about 90%) of waste originating from the preparation of food and other activities taking place in the ships' bars and restaurants. An additional 2100 cubic meters of sewage and sewage sludge are collected. Ships have no economic incentive to dispose of solid waste at sea. More coordinated efforts are necessary to eliminate disposal of solid waste at sea.

Recommendations: Consider measures for improvement of the cost effectiveness of the system for recovery of ship-generated waste in ports

Cost recovery system for ship-generated waste in Greece

Following the EU Port Reception Facilities Directive and national legislation, ports in Greece may impose fees for waste discharge depending on the type and quantity of waste. The initiating bodies are some local port authorities. Subject to this measure are all ships, regardless of their flag, as ships arriving at the port of an EU country, excluding warships and ships belonging to or operated by a state for non-commercial governmental purposes. Success of the measure has not been assessed yet.

6.4 Ship generated waste

Recommendations: Reduce single use plastics on board ferries and cruise vessels get solid waste in ways that most effectively protect human health and the environment

Young environmental campaigners from Glasgow have enlisted Scotland's best-known ferry operator, Caledonian MacBrayne, in their campaign to ban disposable plastic straws. Known as the Ocean Defenders, the group from Sunnyside Primary School have highlighted drinking straws as a classic example of damaging single-use plastics: unnecessary, wasteful of resources and, in this case, not even recyclable. They have been promoting their campaign #NaeStrawAtAw all around Scotland, and quickly caught the attention of the CalMac community board. When Sunnyside Ocean Defenders first got in contact with CalMac last year we knew we needed to hear more about their campaign,' said environmental manager Klare Chamberlain. 'The company is extremely concerned about marine litter and the blight it can have on the marine environment across the west coast. 'We have been working with our suppliers over the last year or so to identify alternatives to single-use plastics, and with our waste contractors to ensure than any alternatives can be suitably managed. 'Our procedures are also changing so that straws are only available on request. All other sources of single use plastics on board are also under review and we hope to be able to announce further changes over the coming months.'

6.5 Fishing generated waste & derelict fishing gear

Each year, 8 million tons of plastic enter into the seas and oceans, with fishing generated waste and derelict fishing gear accounting for a significant proportion of them. The Great Garbage

Patch in the Pacific is made of floating waste and already known worldwide, and 46% of its composition is fishing gear.

How this gear and waste got into the sea: through abrasion (broken small pieces of plastic fall into the water), with intentional disposal and in the event of an accident.

20% of EU countries' fishing nets and gear are intentionally thrown away or lost in accidents, which is around 640 thousand tons a year. 27% of all marine litter on beaches comes from fishing nets and gear and only 1.5% of old fishing nets and gear are recycled.

Impact: on the marine environment - the seabed is polluted and biodiversity decreases - costs amount to € 10.7 billion globally; on the health and life of marine living organisms - marine life gets entangled and strangled in abandoned nets - this is ghost fishing; and chemical pollution is detrimental to species diversity; on human health - marine litter items carry pathogens and bacteria and accumulate toxicity along the food chain.

Tourism losses - from polluted beaches and seawater; the costs for cleaning beaches and the coast amount to EUR 630 million annually; between 1 and 5% loss of revenue for fisheries and aquaculture; \$ 30 million cost to the navigation sector from damage to machinery, accidents, etc.)

Recommendations: Establish and operate an inclusive business model for collection and recycling of nets and fishing gear waste from the fishing industry with involvement of fishermen, local communities, businesses, NGOs and other stakeholders.

Collection and recycling of fishing nets and gear

How to directly and efficiently reduce marine litter from the fishing industry, what kind of waste from fishing can be recycled and how to organize the participants in the process of waste collection and recycling and the use of the resulting product?

The answer naturally relates to fishing and the conservation of marine biodiversity. One of the most harmful and dangerous types of marine litter is the lost or abandoned fishing nets and fishing gear. Many marine species and birds are entangled, injured and killed, and the phenomenon is known as "ghost fishing". Many of the nets are of high-quality fiber that is successfully recycled. Fishermen also often discard old and torn nets.

Collecting and recycling fishing gear after the end of their useful lives and returning them to the production cycle with a successful business model is a task that has first been accomplished by some NGOs. They helped create and establish an inclusive business model engaging various directly involved stakeholders. These are local fishing communities, local authorities, other local agencies and various businesses. The beginners were World Animal Protection, Fathoms Free, Living Sea, International Fund for Animal Welfare/ Animals Protection, launching initiatives to tackle the problem of ghost fishing on a global scale. In the beginning, they collected and recycled old fishing nets that they took from fishermen, and in return they gave them goods - shoes, socks, T-shirts, backpacks, sports accessories - made of fibers and materials from recycled nets and other fishing gear waste. The value of the nets received by fishermen was being returned to their community in the form of commodities.

Gradually systems of incentives for fishermen have been created to become aware and seek the benefits of their responsible environmental behavior. The collection of old nets has been facilitated, floats with bells and marking buoys for nets have been distributed, and fishermen have been involved in trawling projects for litter and drifting nets. In addition, local authorities

and the general public have brought in diversity and revenue with supportive events such as festivals, musicals and artistic events, such as sculpture or installation from old networks.

Recommendations: Establish logistical network for collection and recycling of old fishing nets and fishing gear toward a comprehensive inclusive business model

Transportation of old fishing nets and gear and further processing

Various businesses have been added to the joint efforts to build a comprehensive inclusive business model with many stakeholders involved. A major challenge has been the logistics of collecting and storing old fishing nets. The nets must be cleaned of remnants of fish and marine organisms, stored in containers and transported to the processing plants that are not close by. Only two plants in the EU are specialized in recycling of fishing nets - in Slovenia and Denmark. Although plastic recycling has been around for decades, not everyone is as specialized. Therefore, long-distance transport and customs clearance of containers are also elements of logistics.

Transportation, mechanization and further processing - chemical repolymerization or mechanical shredding and recycling - include additional business units. Business models have been expanding, most often to public-private partnerships that also engage manufacturers, researchers, marketing platforms for new high quality products, new materials, brands, marine sports and activity consumer groups, and others.

These successful business models are better known by their project names, initiatives and products, all related to the recycling of fishing nets. They return resources to the fisheries communities, create a zero waste cycle, foster a responsible attitude to nature, generate business profits and create conditions for sustainable use of marine resources.

Recommendations: Establish successful brand names and products from recycled fishing nets and gear - sports, water sports, fashion

Successful brand names and products

Bureo participates in a partner network for marketing known for the implementation of products from NetPlus material produced from recycled fishing nets. It is committed to persuading industry leaders to integrate NetPlus products into their supply chains. Together with other organizations seeking to bring a new dimension to industry standards, Bureo works closely with these partners to expand and replicate responsible materials and production solutions for the benefit of the ocean and all of us. An iconic brand is a skateboard with a top made entirely of recycled fishing nets off the coast of Chile.

Fourth Element, UK is among the world leaders in the production of various swimwear. Its center is in Cornwall, South West England, a seaport with surf clubs, divers, sailing and water sports enthusiasts, and many volunteers for diving and environmental campaigns. Fourth Element uses the Ocean Positive concept for marketing and engagement with marine environmental issues.

The company's swimwear is made of ECONYL, a 100% recyclable nylon fiber, with a significant portion coming from recycled fishing nets. Every year, ghost fishing pollutes the ocean with about 600,000 tonnes of abandoned nets. The Italian company Aquafil has refined its manufacturing technology to produce high quality nylon fiber, mainly from recycled nets (78%) with other nylon waste additives. Based on this fiber, the British company produces a series of products, but there are others similar to it.

Recommendations: Employ novel technological solutions for recycling of fishing waste and gear

Technological solutions - improvement in the opportunities for recycling

RETRAWL is a particularly interesting technological project of Plastix A / S, Denmark and partners: <http://www.plastixglobal.com> using innovative recycling technology that converts fishing waste and gear, mainly old fishing nets, trawls, ropes and steel elements, into high quality new products. It closes production cycles up to international standards and contributes to the transition from a linear to a more circular maritime economy. At the same time, technology offers enormous potential for a global solution to some of the marine litter problems, namely ghost fishing, which not only causes severe damage to marine life and the marine environment, but also entails significant economic losses. Innovative elements of technology and processes solve a serious waste stream problem, contribute to a more circular blue and green economy and reduce waste disposal, marine pollution, CO2 emissions and the loss of valuable resources, while meeting the objectives of enhancing the capacity and viability of economy. The project partners seek to extend the exploitation of the technology to other European and global markets with an initial focus on Spain and to explore and implement a closed or near-closed cycle, suitable as a business model for the maritime industry.

6.6. Awareness raising and action (e.g. env. certification awards, motivation of citizens and groups for participation in monitoring- clean up actions; raising awareness campaigns; citizen science etc.)

Recommendations: -Motivate citizens, environmental NGOs and students to participate in citizen science beach litter monitoring and clean-ups of beaches to help collect data and protect the coastal and marine environment.

-Mobilize local coastal communities for awareness raising on prevention of marine litter

-Raise public awareness for sustainable management of marine litter and create mechanisms for marine litter reduction

GOOD PRACTICES

- Since the mid 1990-ies beach clean ups have been a popular form of awareness raising on the environmental state of the Black Sea. Since 1996 International Black Sea Day October 31st has regularly involved beach cleanup activities of the coastal communities in all littoral countries. The date is now firmly established in the environmental calendar of Bulgaria and the other coastal states.

With the implementation of the MSFD governments and the third sector have been working for the creation of mechanisms that enable society to perceive the impact of litter on the marine environment, to identify land-based activities that are involved and collectively arrive at solutions to reduce that impact - in particular solutions that can be implemented locally but have a regional effect.

Initiating bodies of the campaigns have been governments, environmental NGOs, scientific institutes, businesses, Black Sea local authorities etc. Involved stakeholders included governments, NGOs, businesses, educational and scientific institutions, concerned citizens, local communities.

Funding sources have been various, mostly funding from EU and national programmes and also volunteer work.

Success of the measure/tool - very successful. The measure has had a very positive impact on society.

Raising awareness about marine litter is included as a special measure in the Bulgarian Marine Strategy, adopted in 2016 within the framework of the MSFD. This is cross-border Measure No 5: Coordinated organization / support of conducting annual awareness campaigns for the business sector (merchants, beach concessioners, beach users, fishermen, etc.) and the public (tourists, students, children, etc.).), with regard to the effects on the marine environment caused by marine litter and the need for its recycling. Responsible institutions are the Ministry of Environment and Waters and the Black Sea Basin Directorate.

GOOD PRACTICES

- Marine LitterWatch communities and monitoring in combination with cleanups

The Marine Litter Watch is a European Environment Agency initiative that aims to combat the marine litter problem. Through a participatory science approach this initiative empowers individuals and communities to take up action and fill in the data gaps that hamper the implementation of essential measures towards litter-free coasts and seas. The app Marine LitterWatch has been produced under the PERSEUS 7FP project and used by the Black Sea NGO Network as registered community since 2014.

The Marine LitterWatch offers a unique opportunity to individuals and communities to join forces towards providing reliable, accurate and comparable marine litter data. The data collected feed directly into the European Environment Agency database underlining the need for urgent action and will strengthen policy implementation at local, national, European and Regional Seas Conventions levels in meeting targets and commitments set in tackling marine litter.

Marine LitterWatch community members in the Black Sea coastal countries have done a lot toward providing a baseline value for marine litter on the coastal beaches providing results comparable to and consistent with the results of scientific surveys.

One-month pilot beach surveys, conducted annually in the whole EU, employ a harmonised monitoring approach, following the “Guidance Document on Monitoring of Marine Litter in European Seas” developed in 2013 by the Technical Group on Marine Litter of the Marine Strategy Framework Directive, a European Union legislation that aims to protect Europe’s seas and ensure its sustainable use. Citizen science concerning beach litter monitoring has performed a dual role, a combination of monitoring and awareness raising.

The measure can be described as very successful in terms of the EU regional seas. It needs promotion in the Black Sea neighbourhood countries.

The Marine Litter Watch Month is an initiative carried out in close collaboration with the Aarhus University, Roskilde University, Black Sea NGO Network, Keep Sweden Tidy, Swiss Litter, HELMEPA, Legambiente, Marine Conservation Society, Mare Nostrum, MARNOPA, MIO-ECSDE, Plastic Change, Portuguese Association of Marine Litter, EMBLAS+ and Surfrider Foundation Europe.

Communities have collected more than 1 million beach litter items with 2340 beach surveys and registered them to MLW database during 6 years. 80 % of these items were plastics. Top 5 items

are cigarette butts, plastic pieces, plastic cups/lids drinks, polystyrene pieces and glass or ceramic fragments.

Recommendations: Make funds available for investments in solutions to marine plastic pollution

Examples of best practices:

Zero Waste Scotland has made funds available for investment in solutions to marine plastic pollution

The government of Scotland has created a fund to support solutions for capture, collection and recovery of plastics in the ocean. The full extent of funds available to address marine plastic pollution in Scotland totals £1 million. Along with support from the European Regional Development Fund, £1m total includes funding from Marine Scotland for trials of demonstration technologies, to address litter sinks - areas of coastline where wind direction and tidal motion cause marine litter to accumulate - and removal of marine plastic pollution. Zero Waste Scotland has supported the fund creation as they believe Scotland's marine environment is increasingly suffering from people's throwaway habits, and very visibly when it comes to the proliferation of single-use plastics. It is an issue people across Scotland are keen to see action on. Through these funds, the government is looking to invest in innovative projects which prevent plastics entering the marine environment or propose operational solutions to capture, collect, recover and reprocess marine waste plastics - allowing them to be processed for high value recovery. These projects have the potential to benefit the environment, economy and the Scottish coastlines. Zero Waste Scotland, which is working with Young Enterprise Scotland to encourage grant applications from young innovators.

6.6.1 Monitoring

This section focuses on short accounts of good practices related to real life application of marine litter monitoring data. The monitoring data usually serve to inform management and policy, being also of interest to a wide audience of stakeholders including resource managers, scientists, policy makers, and the public. The good practices often touch upon additional recommendations for measures and actions regarding marine litter: support to science, use of citizen science, often employing innovative methods, waste management, transboundary contacts.

In order to address the issue of marine litter with its numerous implications for marine life, habitats, safety of navigation, economy and human health, we need to understand the sources, movements, and impact of litter along the coasts and in the marine environment. Development of marine litter monitoring programmes seeks to gain this understanding through the collection of data. These data can answer important research questions, such as what and where are marine litters source(s), are there depositional patterns, and what are the most common or most damaging types of marine litter. Answering such questions can then inform the development of management and policy strategies that address the problems of marine litter on a local, regional, national as well as international scale.

The examples of good practices seek to illustrate how sound science provides information of the sources, threats and solutions surrounding the problem. Science can also highlight findings from the analysis of marine litter monitoring programmes and interpret data to demonstrate the behavior, abundance, movements and impacts related to marine litter. Other examples demonstrated how data findings have lead to the development of new management or policy strategies for agencies, campaigns, businesses, industry, and others.

Additionally, the descriptions exhibit how monitoring programme data can evaluate the effectiveness of existing marine debris related strategies, such as plastic bag bans, by tracking the presence of plastic bags within our seas and coastlines overtime. Developing policies and management procedures is arguably one of the most effective means for truly reducing marine litter in our environment. Learning about how data leads to the development of new, or restructuring of existing, strategies highlights the importance of monitoring programs and will likely guide marine debris reduction and prevention strategies in order to protect the future of our marine resources.

GOOD PRACTICES

Recommendation: Employ citizen science to address monitoring and research issues where resources and circumstances allow it

Citizen science: divers survey marine litter deposited on the seabed of the Israeli Mediterranean coast

Public participation in scientific research, citizen science (CS), has long been used to tackle research questions that would otherwise not have been addressed due to lack of resources, time or geography. Marine litter survey programs worldwide are a good example of information collection relying on CS. In 2015, scientists joined forces with the Society for the Protection of Nature in Israel and The Israeli Diving Federation to establish the divers' volunteer program "Mishmar Hayam" (Sea Guard), which supports marine conservation through citizen science. From March 2016 - July 2017, 11 surveys were conducted in seven different sites in the northern part of Israel. Additional data was collected during 20 supervised underwater cleanups. Surveys found that plastic was the most common material on the seafloor, up to 84% of the items. Debris at four sites was primarily fishing-related marine litter and all the sites are used for recreational fishing, suggesting that most litter originates from the adjacent coast. The information collected by the divers will help document the extent of marine debris along the Israeli coast and is crucial to understanding of litter sources and finding solutions to the problem.

Recommendation: Make necessary provisions for the assessment of seabed litter because of its fundamental role for the achievement of GES in the European Seas, role in the assessment and design of measures to manage marine litter and evaluate the effectiveness of national and international regulations

Assessment of seabed litter in the Northern and Central Adriatic Sea (Mediterranean) over six years

The National Research Council of Italy - Institute of Marine Science, Italy has been involved in monitoring of seabed litter in the Northern and Central Adriatic Sea (Mediterranean) over six years. Temporal and spatial occurrence of anthropogenic debris on the seabed is much less investigated in respect to the sea surface and shores, due to sampling difficulties and costs. However, detecting marine benthic litter is fundamental for developing policies aimed at achieving the Good Environmental Status (GES) in European Seas by 2020, as requested by the Marine Strategy Framework Directive (MSFD).

In this context, the researches aimed to estimate seafloor litter abundance, composition, spatial distribution and main sources in the North-Central Adriatic Sea (GSA 17) over a six-year period. It represents the longest data set available on this issue up to date in the basin.

The sampling area has a surface of 36,742 km² and extends from the Italian coast to the 12 nm limit of the Croatian national waters. Six surveys were conducted in fall from 2011 to 2016 and 67 stations were sampled each year, distributed over the area following a depth-stratified random design (0-30 m; 31-50 m; 51-100 m).

Litter items were collected using a “rapido” trawl, a modified beam trawl commonly used by the Italian fishermen to catch benthic species. Marine litter in the catches was classified in 6 major categories (plastic, metal, glass, rubber, wood, other). Plastic was dominant in terms of weight. The highest concentration of litter was found close to the coast likely due to high coastal urbanization, river inflow, extensive navigation and the morphological-hydrological features of the basin.

These data provide useful information to implement necessary measures to manage marine litter to minimize this type of anthropogenic pollution in the Adriatic region. The systematic monitoring of marine litter, on regional scale, may be also useful to evaluate the effectiveness of national and international regulations.

Recommendation: Make necessary provisions for the optimization of urban waste design in view of litter receptacles placement, size, design, ergonomic characteristics etc. and routes of pedestrian movement and traffic in coastal cities so as to prevent solid waste entering the sea

Optimization of Urban Waste Design

Scientists from the University of Washington, United States have joined forces with experts of the U.S. Environmental Protection Agency (EPA) to optimize management of urban waste in a coastal city and area in Seattle to better manage waste and prevent it from entering the ocean.

Most people take less than two seconds to consider where they put their trash. With 80% of trash in the ocean coming from land, a strategic plan for implementing trash receptacles in the right places, designs, and ratios has the potential to be a key trash management tool. EPA’s Region 10 Trash Free Waters is a project based on results obtained from a Seattle-based study conducted in partnership with University of Washington (UW). EPA’s UW Capstone intern created a protocol based on California’s Urban Rapid Trash Assessment methodology to locate and track urban litter hotspots.

Strategic bin placement is a critical component of aquatic trash prevention. The data from this research demonstrates the importance of public receptacle type and placement as well as the pitfalls of insufficient bin supply. Using ArcGIS technology, litter hotspots in three water adjacent neighbourhoods in Seattle, WA were mapped and characterized according to prevailing waste sorting policy. This type of monitoring can be used to inform city planning by integrating consideration of land-use and aquatic trash prevention into bin placement criteria as an upstream solution to marine litter. The monitoring results and study revealed ways to predict trash generation and target bin placement based on business and census data layers.

Recommendation: Integrate monitoring results into beach management to prevent litter from accumulating on the beach and entering the sea

Preliminary management recommendations based on marine litter research on Turkish northeastern Mediterranean beaches

Scientists from the Middle East Technical University, Turkey have sampled several Turkish beaches along the northeastern Mediterranean for litter analyses in November 2015, April 2016 and August 2016. Beach litter studies revealed not only the composition and abundance of the

litter accumulating on the beaches but also their sources for different seasons. Direct deposition at the beaches was identified as the most important vector compared to transportation from other regions. Litter abundance was higher either in areas of proximity to debris-polluted waters or to the city centre. In all cases plastics constituted the bulk of total litter. Among plastics, PET (Polyethylene Terephthalate) bottles and their lids were the most prominent items especially during the summer tourist season. Manufacturing was found to be the main sector producing litter compared to others through the percentage of general snack packaging and fishing related items collected. Cigarette smoking related litter items were also estimated in high quantities. Results from the study combined with those from marine litter literature, as well as other relevant studies and activities (on protected areas, protected turtle species, awareness programs etc.) enable the team to suggest region-specific management recommendations for decreasing the litter problem. These include deposit schemes to reduce PET bottle consumption, the expansion of public drinking water fountains; deployment of innovative cigarette stub collectors, establishment of litter collectors in rivers and most importantly large-scale awareness raising programs, especially incorporating local scientific community knowledge. Therefore, close cooperation between scientists and decision-makers is increasingly important in producing prompt managerial actions.

Recommendation: Integrate monitoring results into efforts to establish sources of plastic pollution and combat plastic waste at source

A wooden, scientific “message in a bottle” - German university team researches sources and dispersal of macroplastics through large-scale public participation experiment

Regular beach cleanups provide insight into quantitative and qualitative changes of litter over time and are a tool to raise public awareness. Yet there is agreement that it is necessary to combat plastic waste at its sources. Since mid-2016, an interdisciplinary project (Macroplastics Pollution in the Southern North Sea - Sources, Pathways and Abatement Strategies) from the Carl von Ossietzky University Oldenburg, Germany, has been researching the input and dispersal of macroplastics. Combining numerical models with monitoring, experimental field work, stakeholder analysis and citizen science, it aims to identify the origins of plastic pollution along the German North Sea coastline, the major tributaries Ems, Weser and Elbe, and in the German Bight. The goal is to provide governmental and non-governmental organisations with solid data and improved knowledge of the sources, pathways and accumulation areas of marine debris in order to devise acceptable and effective abatement strategies. A core component of this project is the release of wooden drifters - 9,000 to 10,000 per season - over a 2-year period at selected locations which are likely plastic litter source points. Each drifter is branded with an individual ID and a message in German and English, inviting every finder to report ID, date and location via the project website. Almost 50 % of the >24,000 drifters released so far have been registered from places in Germany, the Netherlands, Denmark and Norway. These data are used to validate and improve drift models, identify litter hotspots, and infer the possible sources of beached litter due to the known release points of the wooden drifters (back-tracking). The scientific team has developed GIS-based results of report patterns and experiences from this unique, large-scale public participation experiment.

Recommendation: For modelling plastics dispersal and deposition in the Black Sea, use transferable skills, citizen science support, to quantify the sources and address the challenges associated with 3 dimensionality and bottom deposition

Citizen science and increased knowledge on marine litter: from the global and regional to the Black Sea

Oceanographer Prof. Emil Stanev, from the scientific team of the Oldenburg University that carried out the “message in a bottle” experiment, recommends use of the transferrable skills and knowledge to quantify the sources of marine litter in the Black Sea and address the challenges associated with 3-dimensionality and bottom deposition. The problems facing the world ocean apply to the Black Sea as well. Mismanaged plastic waste enters the Black Sea and available methods and knowledge can be used to quantify the amounts. What makes abatement of pollution difficult is the fact that it is associated with complex oceanographic processes. Lagrangian drifters and Argo floats can help understand the patterns of movement and deposition of plastics in the Black Sea. It is clear litters in the Black Sea have peculiarities different from deposition patterns in the ocean. Accumulation of marine litter from rivers has been studied. Further research is necessary to establish accumulation areas, reasons for the accumulation, seasonal variations etc. Research and monitoring results can support management decisions for the sea basin and the rivers discharging into the Black Sea.

Recommendation: Use baseline assessment of information on the most important sources including the potential long-range transport of litter/plastic for design of trans-boundary measures and spatial and temporal trend assessments in the region

A combined approach on surveying marine litter in Arctic Greenland

The global pollution of plastic in the ocean has today also made their clear marks in the Arctic marine environment adding on to the local sources. A study of teams from Aarhus University, Denmark and Greenland Institute of Natural Resources has provided the first systematic analyses of amounts and composition of marine litter in Greenland. It provides the first baseline information useful for assessments of the most important sources including the potential long-range transport into the Arctic region. In a combined approach conducted in 2016-2017, the team studied environmental indicators for beach litter, plastic particles ingested by northern fulmar (*Fulmarus glacialis*) and microplastic in a gradient from an urban area using sediments and biota. Microplastic characterization has been supported by FTIR analyses. Relatively high amounts and the composition of beach litter in West Greenland indicate the importance of local sources whereas litter in East Greenland mostly originates from sea-based activities and potential long-range transport. Data from fulmars from two sampling locations also indicates a relative high impact with 35 % of birds that contained more than 0.1 g plastic in their stomachs dominated by polymers with densities $< 1 \text{ g cm}^{-3}$ indicating main contribution from floating plastics. Microplastic studies showed a clear gradient from local urban sources and in sediments it was dominated by polymer materials with densities $> 1 \text{ g cm}^{-3}$. The data can potentially be used as a first input for establishment of baseline levels used for future spatial and temporal trend assessments in the region. Project outcome has been disseminated to the Greenlandic EPA and political commissions and potential local actions towards combating local sources have been discussed.

6.6.2 Additional recommendations for measures and actions regarding marine litter

e.g. fostering collaboration between neighboring/transboundary countries; coordination of authorities; controls; collaboration with scientists; policy implementation; political will; stakeholder engagement etc.

GOOD PRACTICES

Recommendations: Support and test the introduction of innovative scientific solutions to replace plastics and reduce their use; encourage the change of consumer behavior toward new products reducing the use of plastics

Edible films and coatings as alternative for plastic packaging

Plastics now pollute every corner of Earth including seas and oceans but waste disposal sites and cost-intensive burning and recycling only shift the problem and cause new environmental concerns. Biodegradable composite plastic sounds like a good idea but so far it hasn't been a very successful one. Biodegradable alternatives to conventional plastics are available but currently they are non-sustainable. Cellulose, its derivatives, chitin, chitosan and other polysaccharides have great potential to contribute to material recovery, reduction of landfill and use of renewable resources. But cellulose-based polymers utilize more nonrenewable fossil fuels and are more polluting during manufacture than petrol-based polymers. Cellulose-paper industry pollutes the environment as well.

Edible films and coatings are the only type of biodegradable polymer packaging that does not require individual collection and special disposal conditions. Edible films and coatings are biodegradable polymeric materials that demonstrate the mechanism of biodegradation under the action of intracellular and non-cellular enzymes. Edible films and coatings have been produced experimentally by team of scientists under Prof. Tatsiana Savitskaya of Belarusian State University and tested in cooperation with marketing researchers from the University of Economics in Varna. The wide range of food products and medicines that could use edible films and coatings (made of starch mostly) can reduce the use of plastics in packaging. Products with edible coatings can save time and the cost of waste disposal.

References

- Andrady A, 2015. Persistence of plastic litter in the oceans. In: Bergmann M, Gutow L, Klages M (eds) *Marine Anthropogenic Litter*. (pp. 57-72) Springer, Cham.
- Andrady A, Neal M, 2009. Applications and societal benefits of plastics. *Philosophical Transactions of the Royal Society of London B: Biological Sciences*, 364(1526), 1977-1984.
- Aytan U, Valente A, Senturk Y, Usta R, Sahin F, Mazlum R, Agirbas E, 2016. First evaluation of neustonic microplastics in Black Sea waters. *Marine environmental research*, 119, 22-30.
- BSBD, 2013. Initial assessment and GES Report. http://www.bsbd.org/bg/page_1722859.html (Accessed 20.02.2019)
- BSBD, 2018. Assessment of the current state of waters within the Black Sea are for basin management for 2017. https://www.bsbd.org/UserFiles/File/annual%20reports/Doklad_2017.pdf (Accessed 10.05.2019)
- Berov D, 2018. Monitoring of floating litter in the Bulgarian Black Sea coastal waters, 18-27 September 2018. <https://wind2win.com/monitoring> (Accessed 8.05.2019)
- Black Sea Commission, 2009. Marine Litter in the Black Sea Region, 2009. http://www.blacksea-commission.org/_publ-ML.asp (Accessed 20.02.2019)
- Derraik J, 2002. The pollution of the marine environment by plastic debris: a review. *Marine pollution bulletin*, 44(9), 842-852
- European Commission, MSFD Technical Subgroup on Marine Litter. 2013. Guidance on monitoring of marine litter in European seas. Luxembourg, Publications Office. doi:10.2788/99475
- Galgani F, Leaute JP, Moguedet P, Souplet A, Verin Y, Carptentier A, Goraguer H, Latrouite D, Andreal B, Cadiou, Y, Mahe JC, Poulard JC, Nerisson P, 2000. Litter on the Sea Floor Along European Coasts. *Marine Pollution Bulletin* 40: 516-527
- Galgani F, Hanke G, Maes T, 2015. Global Distribution, Composition and Abundance of Marine Litter. In: Bergmann M, Gutow L, Klages M (eds) *Marine Anthropogenic Litter*. Springer, Cham.
- Galgani F, Hanke G, Werner S, De Vrees L, 2013. Marine litter within the European Marine Strategy Framework Directive. *ICES J Mar Sci* 70: 1055-1064.
- Georgieva, M, 2017. The consumption of plastic bags is diminishing. *Capital*, 6 December 2017. https://www.capital.bg/biznes/kompanii/2017/12/06/3092110_potreblenieto_na_nailonovi_tor_bichki_spada/ (Accessed 10.04.2019) [in Bulgarian]
- Ioakeimidis C, Zeri C, Kaberi H, Galatchi M, Antoniadis K, Streftaris N, et al., 2014. A comparative study of marine litter on the seafloor of coastal areas in the Eastern Mediterranean and Black Seas. *Marine Pollution Bulletin*, 89(1-2), 296-304.
- Jambeck JR, Geyer R, Wilcox C, Siegler TR, Perryman M, Andrady A et al 2015. Plastic waste inputs from land into the ocean. *Science*, 347:768-771.
- Keskin Ç, Ulman A, Zylich K, Raykov V, Daskalov G, Pauly D and Zeller D, 2017. The Marine Fisheries in Bulgaria's Exclusive Economic Zone, 1950-2013. *Frontiers in Marine Science*, 4:53. doi: 10.3389/fmars.2017.00053
- Lechner A, Keckeis H, Lumesberger-Loisl F, Zens B, et al., 2014. The Danube so colourful: a potpourri of plastic litter outnumbers fish larvae in Europe's second largest river. *Environmental pollution*, 188, 177-181.

- Moncheva S, Stefanova K, Krastev A, Apostolov A, Bat L, Sezgin M, Sahin F, Timofte F, 2016. Marine litter quantification in the Black Sea: a pilot assessment. *Turkish J. Fisher. Aquatic Sci.* 16, 213-218.
- National Statistical Institute, 2018. Production of packaged goods and packaging. <http://nsi.bg/en/content/5175/production-packaged-goods-and-packaging> (Accessed 11.01.2019)
- OSPAR, Commission, 2010a. OSPAR Guideline for Monitoring Marine Litter on the Beach in the OSPAR Maritime Area. https://www.ospar.org/ospar-data/10-02e_beachlitter_guideline_english_only.pdf
- OSPAR, Commission, 2010b. OSPAR Marine Litter Beach Questionnaire. https://www.housing.gov.ie/sites/default/files/publications/files/annex_4_-_ospar_beach_q_0.pdf
- Öztekin A, Bat L, 2017a. Microlitter Pollution in Sea Water: A Preliminary Study from Sinop Sarikum Coast of the Southern Black Sea. *Turkish Journal of Fisheries and Aquatic Sciences*, 17, 1431-1440.
- Öztekin A, Bat L, 2017b. Seafloor Litter in the Sinop İnceburun Coast in the Southern Black Sea. *International Journal of Environment and Geoinformatics*, 4 (3), 173-181.
- Palazov et al., 2017. MARLEN project report. Marine litter, eutrophication and noise assessment tools.
- Simeonova A, Chuturkova R, Yaneva V, 2017. Seasonal dynamics of marine litter along the Bulgarian Black Sea coast. *Marine pollution bulletin*, 119(1), 110-118.
- Simeonova A, Chuturkova R, 2019. Marine litter accumulation along the Bulgarian Black Sea coast: categories and predominance. *Waste management*, 84, 182-193.
- Stevens E, 2002. *Green plastics: an introduction to the new science of biodegradable plastics*. Princeton University Press.
- Thompson R, 2015. Microplastics in the marine environment: Sources, consequences and solutions. In: Bergmann M, Gutow L, Klages M (eds) *Marine Anthropogenic Litter*. (pp. 185-200) Springer, Cham.
- Topçu E, Öztürk B, 2010. Abundance and composition of solid waste materials on the western part of the Turkish Black Sea seabed. *Aquatic Ecosystem Health & Management*, 13(3), 301-306.
- Topçu E, Tonay A, Dede A, Öztürk A, Öztürk B, 2013. Origin and abundance of marine litter along sandy beaches of the Turkish western Black Sea coast. *Marine environmental research*, 85, 21-28.
- UNEP, 2016. *Marine Litter Legislation: A Toolkit for Policymakers*. United Nations Environment Programme (UNEP), Nairobi.
- UNEP and GRID-Arendal, 2016. *Marine Litter Vital Graphics*. United Nations Environment Programme and GRID-Arendal. Nairobi and Arendal. www.unep.org, www.grida.no
- UNEP and NOAA, 2012. *The Honolulu Strategy - A Global Framework for Prevention and Management of Marine Debris*. <http://www.unep.org/gpa/documents/publications/honolulustrategy.pdf>
- Veiga JM, Fleet D, Kinsey S, Nilsson P, Vlachogianni T, Werner S, Galgani F, Thompson RC, Dagevos J, Gago J, Sobral P and Cronin R, 2016. Identifying Sources of Marine Litter. MSFD GES TG Marine Litter Thematic Report; JRC Technical Report; EUR 28309; doi:10.2788/018068

Appendix 1

List of categories of litter items, MSFD Technical Subgroup on Marine Litter (EC, 2013)

Master List of Categories of Litter Items										
TSC ML General - Code	OSPAR- Code	UNEP- Code	General Name	Level 1 - Materials	Core	Beach	Seafloor	Floating	Biota	Micro
G1	1	PL05	4/6-pack yokes, six-pack rings	Artificial polymer materials	x	x				
G2		PL07	Bags	Artificial polymer materials	x		x	x		
G3	2	PL07	Shopping Bags incl. pieces	Artificial polymer materials		x				
G4	3	PL07	Small plastic bags, <i>e.g.</i> freezer bags incl. pieces	Artificial polymer materials		x				
G5	112		Plastic bag collective role; what remains from rip-off plastic bags	Artificial polymer materials		x				
G6	4	PL02	Bottles	Artificial polymer materials	x		x	x		
G7	4	PL02	Drink bottles ≤0.5l	Artificial polymer materials		x				
G8	4	PL02	Drink bottles >0.5l	Artificial polymer materials		x				
G9	5	PL02	Cleaner bottles & containers	Artificial polymer materials	x	x				
G10	6	PL06	Food containers incl. fast food containers	Artificial polymer materials	x	x	x			
G11	7	PL02	Beach use related cosmetic bottles and containers, <i>e.g.</i> Sunblocks	Artificial polymer materials		x				
G12	7	PL02	Other cosmetics bottles & containers	Artificial polymer materials	x	x				
G13	12	PL02	Other bottles & containers (drums)	Artificial polymer materials	x	x				
G14	8		Engine oil bottles & containers <50 cm	Artificial polymer materials		x				
G15	9	PL03	Engine oil bottles & containers >50 cm	Artificial polymer materials		x				
G16	10	PL03	Jerry cans (square plastic containers with handle)	Artificial polymer materials		x				
G17	11		Injection gun containers	Artificial polymer materials		x				
G18	13	PL13	Crates and containers / baskets	Artificial polymer materials		x	x	x		
G19	14		Car parts	Artificial polymer materials		x				
G20		PL01	Plastic caps and lids	Artificial polymer materials			x			
G21	15	PL01	Plastic caps/lids drinks	Artificial polymer materials		x				
G22	15	PL01	Plastic caps/lids chemicals, detergents (non-food)	Artificial polymer materials	x	x				
G23	15	PL01	Plastic caps/lids unidentified	Artificial polymer materials		x				
G24	15	PL01	Plastic rings from bottle caps/lids	Artificial polymer materials		x				
G25			Tobacco pouches / plastic cigarette box packaging	Artificial polymer materials		x				
G26	16	PL10	Cigarette lighters	Artificial polymer materials	x	x				
G27	64	PL11	Cigarette butts and filters	Artificial polymer materials		x	x			
G28	17		Pens and pen lids	Artificial polymer materials		x				
G29	18		Combs/hair brushes/sunglasses	Artificial polymer materials		x				
G30	19		Crisps packets/sweets wrappers	Artificial polymer materials		x				

Master List of Categories of Litter Items

TSG_ML General- Code	OSPAR- Code	UNEP- Code	General Name	Level 1 - Materials	Core	Beach	Seafloor	Floating	Biota	Micro
G31	19		Lolly sticks	Artificial polymer materials		x				
G32	20	PL08	Toys and party poppers	Artificial polymer materials	x	x				
G33	21	PL06	Cups and cup lids	Artificial polymer materials	x	x				
G34	22	PL04	Cutlery and trays	Artificial polymer materials		x				
G35	22	PL04	Straws and stirrers	Artificial polymer materials		x				
G36	23		Fertiliser/animal feed bags	Artificial polymer materials		x				
G37	24	PL15	Mesh vegetable bags	Artificial polymer materials		x				
G38			Cover / packaging	Artificial polymer materials				x		
G39		PL09	Gloves	Artificial polymer materials			x	x		
G40	25	PL09	Gloves (washing up)	Artificial polymer materials	x	x				
G41	113	RB03	Gloves (industrial/professional rubber gloves)	Artificial polymer materials	x	x				
G42	26	PL17	Crab/lobster pots and tops	Artificial polymer materials		x				
G43	114		Tags (fishing and industry)	Artificial polymer materials		x				
G44	27	PL17	Octopus pots	Artificial polymer materials		x				
G45	28	PL15	Mussels nets, Oyster nets	Artificial polymer materials		x				
G46	29		Oyster trays (round from oyster cultures)	Artificial polymer materials		x				
G47	30		Plastic sheeting from mussel culture (Tahitians)	Artificial polymer materials		x				
G48			Synthetic rope	Artificial polymer materials			x	x		
G49	31	PL19	Rope (diameter more than 1cm)	Artificial polymer materials	x	x				
G50	32	PL19	String and cord (diameter less than 1cm)	Artificial polymer materials	x	x				
G51		PL20	Fishing net	Artificial polymer materials			x	x		
G52		PL20	Nets and pieces of net	Artificial polymer materials	x	x				
G53	115	PL20	Nets and pieces of net < 50 cm	Artificial polymer materials		x				
G54	116	PL20	Nets and pieces of net > 50 cm	Artificial polymer materials		x				
G55		PL18	Fishing line (entangled)	Artificial polymer materials			x			
G56	33	PL20	Tangled nets/cord	Artificial polymer materials		x				
G57	34	PL17	Fish boxes - plastic	Artificial polymer materials		x		x		
G58	34	PL17	Fish boxes - expanded polystyrene	Artificial polymer materials		x		x		
G59	35	PL18	Fishing line/monofilament (angling)	Artificial polymer materials	x	x	x			
G60	36	PL17	Light sticks (tubes with fluid) incl. packaging	Artificial polymer materials		x				
G61			Other fishing related	Artificial polymer materials			x			
G62	37	PL14	Floats for fishing nets	Artificial polymer materials	x	x				
G63	37	PL14	Buoys	Artificial polymer materials		x		x		

Master List of Categories of Litter Items

TSG_ML General- Code	OSPAR- Code	UNEP- Code	General Name	Level 1 - Materials	Core	Beach	Seafloor	Floating	Biota	Micro
G64			Fenders	Artificial polymer materials		x				
G65	38	PL03	Buckets	Artificial polymer materials		x				
G66	39	PL21	Strapping bands	Artificial polymer materials	x	x	x			
G67	40	PL16	Sheets, industrial packaging, plastic sheeting	Artificial polymer materials		x	x	x		
G68	41	PL22	Fibre glass/fragments	Artificial polymer materials		x				
G69	42		Hard hats/Helmets	Artificial polymer materials		x				
G70	43		Shotgun cartridges	Artificial polymer materials		x				
G71	44	CL01	Shoes/sandals	Artificial polymer materials		x				
G72			Traffic cones	Artificial polymer materials		x				
G73	45	FP01	Foam sponge	Artificial polymer materials		x				
G74			Foam packaging/insulation/polyurethane	Artificial polymer materials				x		
G75	117		Plastic/polystyrene pieces 0 - 2.5 cm	Artificial polymer materials		x				
G76	46		Plastic/polystyrene pieces 2.5 cm > < 50cm	Artificial polymer materials		x				
G77	47		Plastic/polystyrene pieces > 50 cm	Artificial polymer materials		x				
G78			Plastic pieces 0 - 2.5 cm	Artificial polymer materials		x				
G79			Plastic pieces 2.5 cm > < 50cm	Artificial polymer materials		x		x		
G80			Plastic pieces > 50 cm	Artificial polymer materials		x		x		
G81			Polystyrene pieces 0 - 2.5 cm	Artificial polymer materials		x				
G82			Polystyrene pieces 2.5 cm > < 50cm	Artificial polymer materials		x		x		
G83			Polystyrene pieces > 50 cm	Artificial polymer materials		x		x		
G84			CD, CD-box	Artificial polymer materials		x				
G85			Salt packaging	Artificial polymer materials		x				
G86			Fin trees (from fins for scuba diving)	Artificial polymer materials		x				
G87			Masking tape	Artificial polymer materials		x				
G88			Telephone (incl. parts)	Artificial polymer materials		x				
G89			Plastic construction waste	Artificial polymer materials		x				
G90			Plastic flower pots	Artificial polymer materials		x				
G91			Biomass holder from sewage treatment plants	Artificial polymer materials		x				
G92			Bait containers/packaging	Artificial polymer materials		x				
G93			Cable ties	Artificial polymer materials		x	x			
G94			Table cloth	Artificial polymer materials				x		
G95	98	OT02	Cotton bud sticks	Artificial polymer materials	x	x	x			
G96	99	OT02	Sanitary towels/panty liners/backing strips	Artificial polymer materials		x	x			

Master List of Categories of Litter Items										
TSG_ML General- Code	OSPAR- Code	UNEP- Code	General Name	Level 1 - Materials	Core	Beach	Seafloor	Floating	Biota	Micro
G97	101	OT02	Toilet fresheners	Artificial polymer materials		x				
G98		OT02	Diapers/nappies	Artificial polymer materials		x	x			
G99	104	PL12	Syringes/needles	Artificial polymer materials		x	x			
G100	103		Medical/Pharmaceuticals containers/tubes	Artificial polymer materials		x				
G101	121		Dog faeces bag	Artificial polymer materials	x	x				
G102		RB02	Flip-flops	Artificial polymer materials		x				
G103			Plastic fragments rounded <5mm	Artificial polymer materials						x
G104			Plastic fragments subrounded <5mm	Artificial polymer materials						x
G105			Plastic fragments subangular <5mm	Artificial polymer materials						x
G106			Plastic fragments angular <5mm	Artificial polymer materials						x
G107			cylindrical pellets <5mm	Artificial polymer materials						x
G108			disks pellets <5mm	Artificial polymer materials						x
G109			flat pellets <5mm	Artificial polymer materials						x
G110			ovoid pellets <5mm	Artificial polymer materials						x
G111			spheruloids pellets <5mm	Artificial polymer materials						x
G112		PL23	Industrial pellets	Artificial polymer materials	x				x	
G113			Filament <5mm	Artificial polymer materials						x
G114			Films <5mm	Artificial polymer materials						x
G115			Foamed plastic <5mm	Artificial polymer materials						x
G116			Granules <5mm	Artificial polymer materials						x
G117			Styrofoam <5mm	Artificial polymer materials						x
G118			Small industrial spheres (<5mm)	Artificial polymer materials					x	
G119			Sheet like user plastic (>1mm)	Artificial polymer materials					x	
G120			Threadlike user plastic (>1mm)	Artificial polymer materials					x	
G121			Foamed user plastic (>1mm)	Artificial polymer materials					x	
G122			Plastic fragments (>1mm)	Artificial polymer materials					x	
G123			Polyurethane granules <5mm	Artificial polymer materials				x		
G124	48	PL24	Other plastic/polystyrene items (identifiable)	Artificial polymer materials		x	x	x		
G125	49	RB01	Balloons and balloon sticks	Rubber	x	x	x	x		
G126		RB01	Balls	Rubber		x		x		
G127	50		Rubber boots	Rubber		x	x	x		
G128	52	RB04	Tyres and belts	Rubber	x	x	x	x		
G129		RB05	Inner-tubes and rubber sheet	Rubber		x				
G130			Wheels	Rubber	x	x				
G131		RB06	Rubber bands (small, for	Rubber		x				

Master List of Categories of Litter Items

TSG_ML General- Code	OSPAR- Code	UNEP- Code	General Name	Level 1 - Materials	Core	Beach	Seafloor	Floating	Biota	Micro
			kitchen/household/post use)							
G132			Bobbins (fishing)	Rubber		x	x			
G133	97	RB07	Condoms (incl. packaging)	Rubber		x	x			
G134	53	RB08	Other rubber pieces	Rubber		x	x	x		
G135		CL01	Clothing (clothes, shoes)	Cloth/textile				x		
G136		CL01	Shoes	Cloth/textile			x			
G137	54	CL01	Clothing / rags (clothing, hats, towels)	Cloth/textile	x	x	x			
G138	57	CL01	Shoes and sandals (e.g. Leather, cloth)	Cloth/textile		x				
G139		CL02	Backpacks & bags	Cloth/textile		x				
G140	56	CL03	Sacking (hessian)	Cloth/textile		x				
G141	55	CL05	Carpet & Furnishing	Cloth/textile		x	x	x		
G142		CL04	Rope, string and nets	Cloth/textile		x	x	x		
G143		CL03	Sails, canvas	Cloth/textile		x		x		
G144	100	OT02	Tampons and tampon applicators	Cloth/textile	x	x				
G145	59	CL06	Other textiles (incl. rags)	Cloth/textile		x	x	x		
G146			Paper/Cardboard	Paper/Cardboard			x			
G147	60		Paper bags	Paper/Cardboard		x				
G148	61	PC02	Cardboard (boxes & fragments)	Paper/Cardboard	x	x	x	x		
G149		PC03	Paper packaging	Paper/Cardboard				x		
G150	118	PC03	Cartons/Tetrapack Milk	Paper/Cardboard	x	x				
G151	62	PC03	Cartons/Tetrapack (others)	Paper/Cardboard	x	x				
G152	63	PC03	Cigarette packets	Paper/Cardboard		x				
G153	65	PC03	Cups, food trays, food wrappers, drink containers	Paper/Cardboard	x	x				
G154	66	PC01	Newspapers & magazines	Paper/Cardboard		x		x		
G155		PC04	Tubes for fireworks	Paper/Cardboard		x				
G156			Paper fragments	Paper/Cardboard		x				
G157			Paper	Paper/Cardboard					x	
G158	67	PC05	Other paper items	Paper/Cardboard		x	x	x		
G159	68	WD01	Corks	Processed/worked wood		x				
G160	69	WD04	Pallets	Processed/worked wood	x	x	x	x		
G161	69	WD04	Processed timber	Processed/worked wood		x				
G162	70	WD04	Crates	Processed/worked wood	x	x		x		
G163	71	WD02	Crab/lobster pots	Processed/worked wood		x				
G164	119		Fish boxes	Processed/worked wood	x	x				
G165	72	WD03	Ice-cream sticks, chip forks, chopsticks, toothpicks	Processed/worked wood	x	x				

Master List of Categories of Litter Items

TSG_ML General- Code	OSPAR- Code	UNEP- Code	General Name	Level 1 - Materials	Core	Beach	Seafloor	Floating	Biota	Micro
G166	73		Paint brushes	Processed/worked wood		x				
G167		WD05	Matches & fireworks	Processed/worked wood		x				
G168			Wood boards	Processed/worked wood				x		
G169			Beams / Dunnage	Processed/worked wood				x		
G170			Wood (processed)	Processed/worked wood			x			
G171	74	WD06	Other wood < 50 cm	Processed/worked wood		x				
G172	75	WD06	Other wood > 50 cm	Processed/worked wood		x				
G173		WD06	Other (specify)	Processed/worked wood	x		x	x		
G174	76		Aerosol/Spray cans industry	Metal	x	x				
G175	78	ME03	Cans (beverage)	Metal	x	x	x	x		
G176	82	ME04	Cans (food)	Metal	x	x	x			
G177	81	ME06	Foil wrappers, aluminium foil	Metal		x				
G178	77	ME02	Bottle caps, lids & pull tabs	Metal	x	x				
G179	120		Disposable BBQ's	Metal		x				
G180	79	ME10	Appliances (refrigerators, washers, etc.)	Metal		x	x			
G181		ME01	Tableware (plates, cups & cutlery)	Metal		x				
G182	80	ME07	Fishing related (weights, sinkers, lures, hooks)	Metal		x	x	x		
G183		ME07	Fish hook remains	Metal					x	
G184	87	ME07	Lobster/crab pots	Metal	x	x				
G185			Middle size containers	Metal			x			
G186	83	ME10	Industrial scrap	Metal		x				
G187	84	ME05	Drums, e.g. oil	Metal		x	x			
G188		ME04	Other cans (< 4 L)	Metal		x				
G189		ME05	Gas bottles, drums & buckets (> 4 L)	Metal		x				
G190	86	ME05	Paint tins	Metal		x				
G191	88	ME09	Wire, wire mesh, barbed wire	Metal		x		x		
G192		ME05	Barrels	Metal				x		
G193			Car parts / batteries	Metal		x	x			
G194			Cables	Metal		x	x			
G195		OT04	Household Batteries	Metal		x				
G196			Large metallic objects	Metal			x			
G197			Other (metal)	Metal			x	x		
G198	89	ME10	Other metal pieces < 50 cm	Metal		x				
G199	90	ME10	Other metal pieces > 50 cm	Metal		x				
G200	91	GC02	Bottles incl. pieces	Glass/ceramics	x	x	x			
G201		GC02	Jars incl. pieces	Glass/ceramics		x	x			

Master List of Categories of Litter Items

TSG_ML General- Code	OSPAR- Code	UNEP- Code	General Name	Level 1 - Materials	Core	Beach	Seafloor	Floating	Biota	Micro
G202	92	GC04	Light bulbs	Glass/ceramics	x	x				
G203		GC03	Tableware (plates & cups)	Glass/ceramics		x				
G204	94	GC01	Construction material (brick, cement, pipes)	Glass/ceramics		x				
G205	92	GC05	Fluorescent light tubes	Glass/ceramics	x	x				
G206		GC06	Glass buoys	Glass/ceramics		x				
G207	95		Octopus pots	Glass/ceramics		x				
G208		GC07	Glass or ceramic fragments >2.5cm	Glass/ceramics		x	x			
G209			Large glass objects (specify)	Glass/ceramics			x			
G210	96	GC08	Other glass items	Glass/ceramics	x	x	x			
G211	105	OT05	Other medical items (swabs, bandaging, adhesive plaster etc.)	unidentified		x				
G212			Slack / Coal						x	
G213	181, 109, 110	OT01	Paraffin/Wax	Chemicals		x			x	
G214			Oil/Tar	Chemicals					x	
G215			Food waste (galley waste)	Food waste					x	
G216			various rubbish (worked wood, metal parts)	undefined					x	
G217			Other (glass, metal, tar) <5mm	unidentified						x

Appendix 2

MONITORING FACT SHEET	
Title: D10 Marine Litter	
1. General	
1.1 Subject area	<p><i>What is monitored – programme ID (BLKXX-DY)</i></p> <p>Programme name: MARINE LITTER (ML)</p> <p>Programme ID: BLKBG_D10_Marine litter</p>
1.2 Definition/Description	<p><i>Definition of items monitored/description of general approach</i></p> <p>Descriptor 10 – Marine litter - monitoring concept within the model Driver-Pressure-State-Impact-Response, DPSIR:</p> <p>In recent years ever more increasing attention is paid to waste dumped into the marine environment from land-based and marine human activities. Most dangerous waste are plastic waste, as most of them are insoluble and non-degradable in marine environment. Those that decompose, break apart into very small particles that enter the food chain, and thus have a direct negative impact on marine organisms and thereby indirectly on the human body (with the consumption of marine products).</p> <p>Marine Strategy Framework Directive (MSFD 2008/56 / EC) sets the basis for the integrated management of the marine environment. This includes integrated management of pressures, in this case of marine litter and their effect on the individual components of the marine environment and their reaction.</p> <p>Until now monitoring under MSFD Descriptor 10 - Marine litter has not been done, with the exception of seasonal clean beaches campaigns, organized by NGOs. The development of current program under Descriptor 10 - Marine litter under MSFD will build on the results of the project "MISIS-Optimization of Integrated Monitoring System of the Black Sea in accordance with the Marine Strategy Framework Directive (MSFD)", within which is made once study on the availability of marine litter on the water surface and the seabed several transects starting from Romanian, Bulgarian and Turkish coast seawards.</p> <p>Developed program under Descriptor 10 will monitor the quantity and composition (quality) of the litter on the beaches, floating freely in the sea surface and in the water column, deposited on the sea-floor and possible accumulation in biota.</p> <p>It is planned to conduct a joint study with monitoring of Descriptors 3 "Commercially exploited fish and shellfish" and 9 „Contaminants in biota" (see Sections 6.4: Plans for information on the GES and 6.5. Plans for information purposes).</p> <p>This program will provide information on the driving forces (tourism, urbanization, fishing), the pressure of introducing waste into the marine environment and impacts (loss of habitat, loss of biodiversity, injured and / or dead marine mammals and birds due to entanglement in networks, or swallowed waste, reducing the aesthetic appearance of the coastline and the sea surface).</p> <p>Descriptor 10 allows for the integration of the monitoring program with the program of measures as periodic campaigns to clean the beaches or etc. initiatives under the motto "Fishing for litter" can provide information on the effectiveness of the measures. These initiatives can be an effective way to reduce waste on the beaches and in the sea, by engaging the fisheries sector.</p> <p>Future monitoring under MSFD could provide data for specific types of fish, birds or mammals, victims of specific types of waste. This data can be used to determine the appropriate targets and management measures.</p>
1.3 Competent authority/ies	<p><i>Which authorities are responsible (links to www)</i></p> <p>Ministry of Environment and Waters (MoEW)</p> <p>According to Art. 151, para. 1, p. 2k) of the Water Act and Art.101, para. 1 of Regulation № 1 / 11.04.2011 for monitoring of waters, the Minister of Environment and Waters organizes and manages water monitoring. According to Art. 3, para. 3, point 8 of the Regulation on the protection of the environment in marine waters (NOOSMV), the Minister of Environment and Waters approves the monitoring programs under Art. 11 and coordinates their development and implementation.</p> <p>URL: www.moew.government.bg</p> <p>Black Sea Basin Directorate - Varna (BSBD - Varna) to the Ministry of Environment and Waters (MoEW)</p> <p>According to Art. 155, paragraph 4b) of the Water Act and Art. 107, para. 1 of Regulation № 1 / 11.04.2011 for monitoring of waters, the Director of the BSBD - Varna plans and participates in the implementation of water monitoring, summarizes and analyses data, including that for the chemical and ecological status of water. According to Art. 3, para. 4, point 4 of the Regulation on the protection of the environment in marine waters (NOOSMV), the Director of the Black sea basin Directorate plans, develops and coordinates the monitoring programs under Art. 11.</p> <p>URL: http://www.bsbd.org/</p> <p>Executive Environment Agency (EEA)</p> <p>According to Art. 1 pt. 7 the Art. 13 para. 1 of the Law on Environmental Protection, the Executive Environment Agency carries out the management of the National System for Environmental Monitoring, including in respect of litter: http://eea.government.bg/en.</p> <p>According to Art. 45. (1) of the Waste Management Act, the Executive Director of the ExEA keep public registers containing information on persons carrying out activities related to litter and having for this purpose permits.</p> <p>URL: http://eea.government.bg/en; URL: http://eea.government.bg/bg</p> <p>Regional Inspectorates of Environment and Waters to the Ministry of Environment and Waters</p> <p>Law on Waste Management</p> <p>http://www.riosvbs.eu/; http://www.riosv-varna.org/</p> <p>Executive Agency "Maritime Administration" - Sofia to the Ministry of Transport, Information Technology and Communications with regional structures Varna and Burgas (related to the control of maritime routes): http://www.marad.bg/</p>
1.4 Monitoring institutions	<p><i>Which institutions carry out the monitoring etc (links to www)</i></p> <p>Institute of Oceanology - Institute of Oceanology, Bulgarian Academy of Sciences (IO-BAS). Its competences are defined in Art. 171, § 2, pt. 3 of the Water Act and Art. 3, paragraph 11 of the Regulation on the protection of the environment in marine waters, approved by Decree № 273 from 23.11.2010, Prom. SG № 94 dated 30.11.2010, effective from 30.11.2010.</p>

	<p>Web: www.io-bas.bg</p> <p>Executive Environment Agency (ExEA): According to Art. 1 pt. 7 the Art. 13 para. 1 of the Law on Environmental Protection, the Executive Environment Agency carries out the management of the National System for Environmental Monitoring, including in respect of litter: http://eea.government.bg/en. According to Art. 45. (1) of the Waste Management Act, the Executive Director of the ExEA keep public registers containing information on persons carrying out activities related to litter and having for this purpose permits.</p> <p>Regional Inspectorates of Environment and Water, Ministry of Environment and Water Under Chapter V "Enable and Control Litter" Section I. "Permits for litter management activities", Art. 67, (1) of the Law on Waste Management: "Permission to perform activities of waste treatment is issued by the Director of the RIEW, in whose territory the activities take place." Chapter III "Requirements for collection, transportation and treatment of waste", Art. 29, (1) of the Law on Waste Management provides that the waste depending on their type, properties, composition and other characteristics are collected, transported and treated in a manner that will prevent their subsequent utilization. (2) Prohibited the abandonment, illegal dumping and burning or other form of uncontrolled waste management.</p> <p>Executive Agency "Maritime Administration" - Sofia to the Ministry of Transport, Information Technology and Communications with the regional structures of Varna and Burgas. http://www.marad.bg/</p>
--	---

1.5 Additional information	<p>Where can additional information be found (e.g. via a web link)</p> <p>Waste management Act - Art. 1, paragraph 1: "This law regulates the measures and the controls to protect the environment and human health by preventing or reducing the adverse impacts of the generation and management of waste and by reducing overall impacts of resource use and by increasing the efficiency of that use". http://www.moew.government.bg/files/file/Waste/Legislation/Zakoni/ZUO.pdf</p> <p>Law of the Sea, inland waterways and ports of the Republic of Bulgaria URL: http://www.marad.bg/upload/docs/ZakMP_28112014.doc</p> <p>Black Sea Commission - BSIMAP. URL: http://www.blacksea-commission.org/bsimap.asp</p> <p>MSFD Guiding Improvements in the Black Sea Integrated Monitoring System (MISIS) project. URL: http://www.misisproject.eu</p> <p>Project, funded by EU FP7 "Oceans of Tomorrow" "Towards a Clean, Litter-Free European Marine Environment through Scientific Evidence, Innovative Tools and Good Governance", 2013 www.cleansea-project.eu</p> <p>MARine Litter in Europe Seas: Social Awareness and CO-Responsibility – MARLISCO. URL: http://www.marlisco.eu/</p> <p>MARELITT. URL: http://www.marelitt.eu/</p>
2. Monitoring requirements and purpose	
2.1 Necessity	<p>Listed below are direct references to the monitoring requirements – EU directives, Black Sea Commission agreements, national plans, research programme requirements, other.</p>

MSFD Article 11	<p>Marine Strategy Framework Directive (MSFD)</p> <p>Art. 11 Monitoring programs</p> <p>1. On the basis of the initial assessment made pursuant to Article 8, paragraph 1, Member States shall establish and implement coordinated monitoring programs for the ongoing assessment of the environmental status of their marine waters on the basis of indicative lists of elements set out in Annex III, and the list set out in Annex V, and by reference to the environmental targets established pursuant under Article 10.</p> <p>2. Member States sharing a marine region or subregion shall draw up monitoring programmes in accordance with paragraph 1 and shall, in the interest of coherence and coordination, endeavour to ensure that:</p> <p>(a) monitoring methods are consistent across the marine region or subregion so as to facilitate comparability of monitoring results;</p> <p>(b) relevant transboundary impacts and transboundary features are taken into account.</p> <p>Annex III, table 2 Pressure - other physical disturbance (marine litter)</p> <p>Systematic and / or intentional release of substances - Introduction of other substances - solid, liquid or gas - in marine waters, resulting from their systematic and / or intentional release into the marine environment, as permitted in accordance with other Community legislation and / or international conventions.</p>
Directive of Habitats (Directive 92/43/EEC) Article 11	<p>Art. 11</p> <p>Member States shall undertake surveillance of the conservation status of the natural habitats and species referred to in Article 2 with particular regard to priority natural habitat types and priority species.</p>
BWD Article 9	<p>Art. 9</p> <p>2. Bathing waters shall be inspected visually for pollution such as tarry residues, glass, plastic, rubber or any other waste. When such pollution is found, adequate management measures shall be taken, including, if necessary, information to the public.</p>
MARPOL 73/78 Annex V	<p>This instrument regulates quantities of various wastes that vessels may discharge into the sea. The Regulations for the Prevention of Pollution by Garbage from Ships (Annex V) has a special relation to the ML problem because any garbage or solid waste thrown out overboard can be considered as ML. This annex specifies distances from land and methods by which different types of garbage may be disposed from all types of vessels and fixed or floating platforms.</p> <p>According to Regulation 5 of Annex V, the Black Sea is defined as a Special Area with much stricter requirements on the disposal of garbage than in many other maritime areas of the world. Any discharges of garbage (except food waste) are prohibited here.</p>

Directive 2000/59/EEC Art. V Annex I	<p>Article 5</p> <p>Plans for the reception and handling of waste</p> <p>1. Suitable plan for receiving and processing waste is developed and implemented for each port following consultations with stakeholders, in particular with port users or their representatives, taking into account the requirements set out in Articles 4, 6, 7 10 and 12. Detailed requirements for the development of such plans are set out in Annex I.</p> <p>3. Member States shall evaluate and approve the plan for the reception and processing of waste, monitor its implementation and ensure its re-approval at least every three years and after significant changes in the operation of the port.</p>
---	--

Bucharest Convention and its Protocols	<p>Convention on the Protection of the Black Sea Against Pollution</p> <p>URL: http://www.blacksea-commission.org/bssap2009.asp</p> <p>Art. 10</p> <p>Pollution by dumping</p> <p>1. The Contracting Parties shall take all appropriate measures and cooperate in the prevention, reduction and control of pollution caused by dumping, the Protocol for the protection of the marine environment of the Black Sea Against Pollution by Dumping which is an integral part of this Convention.</p> <p>Art. 14</p> <p>Contamination by hazardous wastes in transboundary movements Contracting countries take consistent with international law and cooperate in preventing pollution of the marine environment of the Black Sea due to hazardous wastes in transboundary movement as well as the removal of their illegal transfer to the protocol which they should adopt.</p> <p>Art. 15</p> <p>Scientific and technical cooperation and control</p> <p>1. The Contracting Parties shall cooperate in conducting scientific research aimed at protecting and preserving the marine environment of the Black Sea, and where appropriate, joint research programs, and exchange relevant scientific data and information.</p> <p>4. The Contracting Parties, inter alia, through the Commission and, if necessary, and in cooperation with international organizations they consider to be competent, complementary or joint monitoring programs covering all sources of pollution and establish systems to control pollution of the Black Sea, incorporating the bilateral and multilateral programs for monitoring, measurement, evaluation and analysis of the risks or effects of pollution of the marine environment of the Black Sea.</p> <p>Strategic Action Plan for the Black Sea 2009</p> <p>URL: http://www.blacksea-commission.org/bssap2009.asp</p> <p>The draft amendment of the integrated program for monitoring and evaluation of the Black Sea (BSIMAP) to the Black Sea Commission, marine litter have been proposed as a parameter of observation. Upon acceptance by the Member - States, this will lead to a common approach for the assessment of marine litter between them.</p>
---	--

Protocol for the Protection of the Black Sea against pollution from land - based sources and activities (2009)	<p>Protocol for the Protection of the Black Sea against pollution from land - based sources and activities (2009)</p> <p>Art. 11</p> <p>1. Under the provisions of, and the monitoring programs provided for in Art. 15 of the Convention, and if necessary, in cooperation with the competent international organizations, the Contracting Parties:</p> <ul style="list-style-type: none"> a) Collect information and data on the conditions of the marine environment and coastal areas of the Black Sea in terms of their physical, biological and chemical characteristics; b) Collect information and data and prepare and maintain a register maintained by the inflow of substances listed in Annex I of this report, including information on the distribution of sources and quantities of these substances into the marine environment of the Black Sea; c) a system to assess the state of the marine environment and coastal areas of the Black Sea; d) systematically to assess, as far as possible, the levels of pollution coastal areas, particularly in relation to activities and substances listed in Annex I, and periodically to provide information about them; <p>2. The Contracting Parties shall cooperate in the establishment of a regional monitoring program as compatible national monitoring programs and to facilitate the process of preservation, improvement and exchange of data and information.</p>
2.2 GES criteria	<p>GES criteria and indicators (see Commission Decision of 1 September 2010) relevant for the programme are:</p> <p>10.1. Characteristics of litter in the marine and coastal environment</p> <ul style="list-style-type: none"> – Trends in the amount of litter washed ashore and/or deposited on coastlines, including analysis of its composition, spatial distribution and, where possible, source (10.1.1.) — Trends in the amount of litter in the water column (including floating at the surface) and deposited on the seafloor, including analysis of its composition, spatial distribution and, where possible, source (10.1.2) - Trends in an amount, distribution and, where possible, a composition of micro-particles (in particular micro-plastics) (10.1.3) <p>10.2. Impacts of litter on marine life</p> <ul style="list-style-type: none"> – Trends in the amount and composition of litter ingested by marine animals (e.g. stomach analysis) (10.2.1)
2.3 Features, pressures and impacts	<p>List relevant features and pressures from MSFD Annex III</p> <p>MSFD Annex III</p>

	<p>Pressure and impacts</p> <p>Other physical disturbance</p> <p>— marine litter</p> <p>Systematic and / or intentional release of substances</p> <p>- Introduction of other substances - solid, liquid or gas - in marine waters, resulting from their systematic and/or intentional release into the marine environment, as permitted in accordance with other Community legislation and / or international conventions.</p>
2.4 GES	<p><i>Assessment of GES (GES as defined in the article 9 reporting)</i></p> <p>GES definition in descriptor D10: The quantities of marine litter deposited on the shore are negligible and does not affect the beach aesthetic view. There are no marine litter floating at the sea surface, in the water column or deposited on the sea-floor as well close to coastal "hot spots" as sources of waste - estuaries, resorts, urbanized areas, public beaches and seaports, and in the open marine water. Reduction of registered cases of found injured and / or dead marine mammals, seabirds and fish, as a result of imported marine litter in the environment.</p> <p>GES definition on criterion 10.1, indicator 10.1.1: The amount of marine litter washed ashore (disposed) is negligible and does not spoil the visual aesthetics of the beach.</p> <p>GES definition on criterion 10.1, indicator 10.1.2: The amount of the waste in the water column (including floating on the water surface) and these deposited on the seafloor are minimal and do not lead to significant changes in the biotic and abiotic part of the marine environment.</p> <p>GES definition on criterion 10.1, indicator 10.1.3: not defined.</p> <p>GES definition on criterion 10.2, indicator 10.2.1: Reduction of registered cases of marine litter found in the digestive tract of marine organisms (marine mammals (dolphins), sea birds and fish) and these injured and / or dead as a result of contact with the marine litter.</p> <p>Describe how the program:</p> <p>a. takes into account the needs for assessment of the descriptor and its goals - the program will provide information on trends in quantity of marine litter on beaches, sea surface, sea-floor trends will be used to assess the state of the environment in this descriptor. Data will be collected using standardized forms for monitoring to ensure coherence and consistency in assessments of Descriptor 10 in the Black Sea region.</p> <p>b. account of the needs of providing data / information to support assessment in D.10 - the program will provide information on trends in the quantities of marine litter by coastal expeditions (indicator 10.1.1) and bottom trawling and inspection of sea surface. (10.1.2);</p>
	<p>c. helps to determine the distance from achieving the GES and trends in the status - the program will provide data for medium and long-term trends of marine litter accumulated on beaches entering the marine environment from the shores and beaches (floating on the water surface, floating in the water pillar) deposited on the seabed and the tendency to accumulate in marine organisms (in - especially plastic micro particles). Simultaneously with better information and work aimed to increase the capacity of institutions commit monitoring marine litter, efforts will be made to fully adapt existing European methodologies to Bulgarian conditions. Based on the obtained data will be updated for definition GES, targets and indicators to achieve this in terms of marine litter. After accumulating enough data from studies in the second cycle of the MSFD will determine whether it is achieved GES, and if not, the distance from achieving it.</p> <p>d. address natural and climatic variability and distinguish them from the effect caused due to anthropogenic pressure – the program does not address the natural and climatic variability, given that the waste is with entirely anthropogenic origin. The program will provide information only for the pressure from human activities and impact on the marine environment. Monitoring of human activities will try to distinguish land-based activities (urbanization, industry) and sea-based activities (fishing, shipping), in order to develop effective measures to this type of pressure.</p> <p>e. respond to the risk of failure of GES - the information of the planned monitoring will show whether GES and targets are achieved and will help to assess the trends observed indicators. When registering a lack of improvement or a resistant negative trends, actions will be taken to identify the specific sources of pressure and, if necessary, additional measures to reduce the impacts and subsequent monitoring to assess the impact of the measures.</p>
2.5 Environmental targets MSFD	<p><i>Relevant MSFD targets defined in the article 9 reporting</i></p> <p>Pressure target</p> <p>10.1.1. Target: Decreasing trend in the amount of marine litter washed ashore and/or deposited on coastlines.</p> <p>10.1.2. Target: Decreasing trend in the amount of marine litter floating on the water surface, in the water column and deposited on the seafloor.</p> <p>Regarding criterion 10.1, indicator 10.1.3 "Trends in the amount, distribution and, where it can be established - the composition of the micro particles (in particular plastic micro particles), defining environmental target will be made conducting a preliminary study of the content and trends in the accumulation of micro particles in biota and after gathering enough data will be updated.</p> <p>Regarding criterion 10.2, indicator 10.2.1 indicator "Trends in the amount and composition of waste consumed by marine animals (an analysis of stomach contents), defining environmental target will be done carrying out a preliminary study on the content and trends in the accumulation of microparticles in biota and after gathering enough data will be updated.</p>

Habitats Directive (Directive 92/43/EEC)	<p>Habitats Directive (Directive 92/43/EEC) the Council of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora)</p> <p>This Directive aims to contribute towards ensuring biodiversity through the conservation of natural habitats and of wild fauna and flora in the European territory of the Member States for which the contract is valid.</p>
Bathing Waters Directive (Directive 2006/7/EC)	<p>Bathing Waters Directive (Directive 2006/7/EC)</p> <p>The purpose of the Directive is to preserve, protect and improve the quality of the environment and to protect human health by complementing Directive 2000/60/EC, according to Art. 1, para. 2. The directive requires adequate management measures to halt the pollution Art. 9 of the Directive.</p>
Convention for the Protection of Black Sea Against Pollution Black Sea Strategic Action Plan (BS SAP, 2009)	<p>Black Sea Strategic Action Plan (BS SAP, 2009)</p> <p>3.3 Management targets and priority status required to meet the EcoQOs</p> <p>(18) Amend national waste strategies and/or national coastal zone management plans with the aim of coastal and marine litter minimisation.</p> <p>(19) Develop regional and national marine litter monitoring and assessment methodologies on the basis of common research approaches, evaluation criteria and reporting requirements.</p> <p>(20) Promote/develop investment projects within national strategies/local plans to engineer, construct and install new solid waste recycling facilities, landfill sites and incineration plants, complying with BAT regulations.</p> <p>(53) Continue/improve rehabilitation /construction and monitoring of wastewater treatment plants.</p> <p>(60) Provide adequate port reception facilities for ship-generated wastes according to MARPOL 73/78</p> <p>(61) Establish a harmonised fee/cost recovery system on ship-generated waste.</p> <p>(62) Develop system for identification of illegal pollution sources from vessels and off-shore installations</p> <p>(63) Develop/establish a harmonised enforcement system in cases of illegal discharges from vessels and off-shore installations, including technical means and fines.</p>

Directive 2000/59/EC of the European Parliament and of the Council of 27 November 2000 on port reception facilities for ship-generated waste and cargo residues	Article 1 Purpose The purpose of this Directive is to reduce the discharges of ship-generated waste and cargo residues into the sea, especially illegal discharges, from ships using ports in the Community, by improving the availability and use of port reception facilities for ship-generated waste and cargo residues, thereby enhancing the protection of the marine environment.				
Article 1					
2.6 Spatial allocation	Table of where monitoring is required				
		EEZ	12-nm zone	Coastal waters	Transitional waters
MSFD		X	X	X	
BWD		-	-	X	X
Directive 2008/949/EC		X	X	X	
MARPOL 73/78		X	X	X	
Directive 2000/59/EC		X	X	X	
Convention for the Protection of the Black Sea Against Pollution		X	X	X	X
3 Monitoring concept					
3.1 General description of relevant sub programmes in monitoring programme	Marine litter - characteristics and abundance / volume. Elements / features monitored: Pressure on the marine environment/Marine litter Parameters: Distribution / distribution in space and time, concentration: quantity and type of marine litter (marine litter washed ashore /deposited/ on the beaches, floating on the sea surface, in the water column and deposited on the sea-floor: Quantity and type of beach litter: number of items /100m or 50 m); Size of beach area (m) and number of ML items/m2; Number of ML items on the seafloor (20 m - 800 m)/ km² (collected in bottom trawl surveys); Shallow sea-floor (<20m): items/m2 or items/ 100 m; Deep-sea marine litter: items/km2 or items/ha; number of items / m2; Floating surface marine litter: Size of ML (2,5-50cm): items/100m or items/km2; colour and shape; polymer type Litter microparticles - abundance/volume				

	<p>Elements / features monitored: Pressure on the marine environment/Marine litter Parameters: Size of microparticles<5mm; Number of microparticles per unit weight of beach material [particles/kg]; Number of particles (microparticles) / m³ sea surface water; Number of ML items on the seafloor (20 m - 800 m)/ km² (collected in bottom trawl surveys); Number of items / ml sediments, colour and shape; polymer type.</p> <p>Litter inputs - land-based (riverine) sources Elements / features monitored: Pressure on the marine environment/Marine litter Parameters: Distribution / distribution in space and time, concentration: Quantity and type of litter items: items/hour (number of items per unit time); number of individual type of items; size of the area (cm²; m²); items size range > 2,5 - 50 cm</p> <p>Physical disturbance from dredging and disposal (landfill) of dredging material Elements / features monitored: Disposal of waste (dredge) Parameters: Imports of pollutant per unit area and per unit time.</p> <p>Activities related to the extraction of living resources (fisheries, including fishing) Observed elements / features: Activity (aquaculture) Parameters: distribution / degree of expansion in the temporal and spatial range, intensity</p> <p>Activities with permanent infrastructures (e.g. ports) or structural changes (e.g. coastal defences) Elements/features monitored: Activity/ Man-made structures (incl. construction phase: port operations submarine cable and pipeline operations. Parameters: Distribution/extent in space and time, intensity</p> <p>Sea-based mobile activities (shipping) Elements/features monitored: Activity/ Transport Parameters: Distribution/extent in space and time, intensity</p> <p>Coastal human activities (e.g. tourism, sports, eco-tourism). Parameters: Distribution / distribution in space and time, intensity</p> <p>Land - based activities (ex. Urbanization, industry, agriculture) Parameters: Distribution / distribution in space and time, intensity.</p>
3.2 Description of monitoring network	This program will build on the results of the project "MISIS-Optimization of Integrated Monitoring System of the Black Sea in accordance with the Framework Marine Strategy Directive (MSFD)", within which in 2013 was made a single study on the availability

	<p>of marine litter the water surface and the seabed transect "Galata"</p> <p>The scope of the program will be limited to the coastal and territorial waters of Bulgaria. Monitoring of ML deposited on the deep sea-floor in EEZ will not be conducted, only surveys for floating surface ML will be conducted.</p> <p>Monitoring indicator 10.1.1 - Network Monitoring beach will include waste collection (> 2,5 cm - macro), sorting and classification by type, counting the total amount of waste and by types, making the data and supporting information in standardized protocols according to European guidelines on monitoring of marine litter in the MSFD. Monitoring places: urban beaches around Varna and Burgas Bays and unguarded beaches near river mouths. Beaches in leeward side of coastal defences function as a trap for marine litter and also could be included in the monitoring network. Method of monitoring: at least one area (section) of coastline with a length of 100 m for slightly or moderately polluted beaches and 50 meters of highly contaminated beaches (all selected observation points).</p> <p>Frequency: at least 2 times a year: before and after the summer tourist season. Maximum: 4 times a year (seasons)</p> <p>Indicator 10.1.2 -- Transects / polygons for monitoring will be determined on the basis of an initial study to identify the main shipping routes and zones of increased trawl fishing pressure. To be economically viable, the monitoring program of marine litter floating on the sea surface, in the water column and deposited the sea-floor could be integrated with the monitoring program in descriptor D3 "Commercially exploited fish and shellfish" to use the method to bottom trawling. Monitoring of the waste deposited on the seabed will also include analysis of the composition, spatial distribution of the waste and specify the possible source of contamination.</p>
3.3 Threats, activities and measures	<p><i>Which threats are identified</i></p> <p>Marine pollution with waste and their negative impact on marine organisms</p> <p><i>Which human activities will be measured by the programme</i></p> <p>Sea-based mobile activities (shipping)</p> <p>Activities producing seafood (aquaculture) - information on planned activities and measures to reduce pollution from waste will be sourced from RBMP WFD 2000/60 / EC.</p> <p>Activities with permanent infrastructure (ex. Ports) or structural changes (such as coastal protection) - information on planned activities and measures to reduce pollution from waste water areas of ports will be purchased from RBMP WFD 2000/60 / EC.</p> <p>Coastal human activities (ex. Tourism, recreation, sports and eco-tourism)</p> <p>Land-based activities (ex. Urbanization, industry, agriculture) - information on planned activities and measures to reduce pollution from waste, including by the inflow of rivers will be purchased from RBMP WFD 2000/60 / EC.</p> <p>Waste disposal (dredging)</p>

	<p><i>Which measures will be measured by the programme</i></p> <p>Implementation of the program Descriptor 10 – Marine litter will also provide information on the implementation of the measures included in the program of measures in RBMP according to WFD 2000/60/EC.</p> <p>Monitoring of the marine litter on the beaches can be considered as a preventive measure to reduce their accumulation as during their monitoring, they will be collected and transmitted for further processing and / or disposal of relevant sites for this.</p> <p>Additional measures for the purposes of the MSFD will be developed after evaluating the results of future research in 2015.</p>
3.4 Data management	<p><i>How and where are data managed? How and where can data be accessed? (General description – programme level)</i></p> <p>According to Art. 94, art. 95 and Art. 107, paragraph 1 of Regulation № 1 for water monitoring data is collected by the Black sea basin Directorate – Varna (BSBD-Varna), where they are stored, summarized and analysed at basin level.</p> <p>BSBD monitors and evaluates data at the basin level pursuant to Art. 96 of the same Regulation. Access to data is provided according to the Access to Public Information Act (APIA).</p> <p>Not yet developed information system compliant with INSPIRE standards. Periodic reports will be prepared on the state of the environment, including information and Descriptor 10 Marine litter. They will be published on the websites of BSBD-Varna: www.bsbd.org and the Ministry of Environment and Water: www.moew.government.bg</p> <p>Executive Environment Agency (EEA) supports the National System for Environmental Monitoring (NEMS) in accordance with Art. 1, p. 7 of the Law on Environmental Protection, which includes information system for the waste.</p>
4. Assessment	
4.1 Assessments	<p><i>Existing assessments</i></p> <p>National Report on the Initial assessment of the marine environment (Art. 8, MSFD) published in ReportNet platform EC.</p> <p>URL: http://cdr.eionet.europa.eu/bg/eu/msfd8910/msfd4text/envubapw</p> <p>BSC, 2008. <i>State of the Environment of the Black Sea (2001 - 2006/7)</i>. Edited by Temel Oguz. Publications of the Commission on the Protection of the Black Sea Against Pollution (BSC) 2008-3, Istanbul, Turkey, 448 pp., URL: http://www.blacksea-commission.org/publ-SOE2009.asp</p>
4.2 Assessment of GES	<p><i>Will assessment of GES be carried out by the programme</i></p> <p>The program will provide initial data on the basis of which will evaluate the GES.</p> <p>Necessary changes to the program to ensure data GES are listed in Section 6.</p>

5. Literature	
	<p><i>List of relevant literature</i></p> <p>N. Zampoukas, A. Palialexis, A. Duffek, J. Graveland, G. Giorgi, C. Hagebro, G. Hanke, S. Korpinen, M. Tasker, V. Tornero, V. Abaza, P. Battaglia, M. Caparis, R. Dekeling, M. Frias Vega, M. Haarich, S. Katsanevakis, H. Klein, W. Krzysinski, M. Laamanen, J.C. Le Gac, J.M. Leppanen, U. Lips,</p> <p>http://publications.jrc.ec.europa.eu/repository/bitstream/JRC88073/lb-na-26499-en-n.pdf.pdf</p> <p>Black Sea Commission, 2009, Marine Litter in the Black Sea Region. Black Sea Commission Publications. URL: http://www.blacksea-commission.org/publ-marine_litter.asp</p> <p>Cheshire, A.C., Adler, E., Barbiere, J., Cohen, Y., Evans, S., Jarayabhand, S., Jetric, L., Jung, R.T., Kinsey, S., Kusui, E.T., Lavine, I., Manyara, P., Oosterbaan, L., Pereira, M.A., Sheavly, S., Tkalin, A., Varadarajan, S., Weneker, B., Westphalen, G. (2009). <i>UNEP/IOC Guidelines on Survey and Monitoring of Marine Litter</i>. UNEP Regional Seas Reports and Studies, No. 186; IOC Technical Series No. 83: xii + 120 pp. URL: http://www.unep.org/regionalseas/marinelitter/publications/docs</p> <p>Galgani, F., D. Fleet, J. V. Franeker, S. Katsanevakis, T. Maes, J. Mouat, L. Oosterbaan, I. Poitou, G. Hanke, R. Thompson, E. Amato, A. Birkun and C. Janssen (2010): Marine Strategy Framework Directive. Task Group 10 Report Marine Litter. Scientific and Technical Research Series. Office for Official Publications of the European Communities: 48, Luxembourg. URL: http://publications.jrc.ec.europa.eu/repository/handle/111111111/13625</p> <p>MSFD GES Technical Subgroup on Marine Litter, 2011, Marine Litter - Technical Recommendations for the Implementation of MSFD Requirements, EUR – Scientific and Technical Research series, Luxembourg: Publications Office of the European Union, 91 pp. URL: http://publications.jrc.ec.europa.eu/repository/handle/111111111/22826</p> <p>Guidance on Monitoring of Marine Litter in European Seas, MSFD Technical Subgroup on Marine Litter (Descriptor 10): http://publications.jrc.ec.europa.eu/repository/bitstream/JRC83985/lb-na-26113-en-n.pdf</p> <p>Claessens, M., De Meester, S., Van Landuyt, L., De Clerck, K., Janssen, C.R., 2011. Occurrence and distribution of microplastics in marine sediments along the Belgian coast. Mar. Pollut. Bull. 62, 2199–2204. URL: http://www.vliz.be/imisdocs/publications/247943.pdf</p>
6. Activities required to implement the concept	

6.1 Changes to the current monitoring programme	<p><i>Necessary changes and recommendations</i></p> <p><i>Describe <u>necessary</u> changes for the programme to cover the requirements of MSFD. Description in general terms.</i></p> <p>At this stage the proposed program Descriptor 10 - Marine litter does not fully meet the requirements of the MSFD in terms of design and implementation.</p> <ul style="list-style-type: none"> - Related to the achievement of the GES (indicator 10.1.1) about the quantity of marine litter, washed ashore and those floating on the water surface, in the water column and deposited the sea-floor collection of a sufficient set of data is necessary. At this stage, the data are insufficient to assess the actual situation. - Better coordination with other institutions / organizations providing information related to the status or impact on the marine environment; - Provide sufficient capacity to the competent authorities and organizations (such as human resources, expertise and equipment) for the design and monitoring of the marine environment; - Improve the management of data and information relating to the state of the marine environment; improve access to national and regional databases and data from projects funded by the EC and other financial instruments.
6.2 Gaps: GES information	<p><i>If not yet adequate for data and information needs to assess GES, describe when the programme will be considered fully adequate</i></p> <p>The program will provide the necessary information to assess GES for the next assessment in 2018.</p>
6.3 Plans: Plans for GES information	<p><i>If the programme is not considered fully adequate for data and information needs to assess GES, describe what plans are in place to make it fully adequate (e.g. to fill gaps in data methods, understanding or capacity). Describe timeframe, priorities and obstacles.</i></p> <p>In the period 2015-2016, it is planned study together with monitoring of Descriptors 3 "Commercially exploited fish and shellfish" and D9 "Contaminants in biota", including collection of data on the main sources of marine litter, baselines quality and quantity of marine litter. Monitoring collection campaigns will be performing with quantitative counting and classification of beaches litter. Also in conducting monitoring of the Descriptor 9 exploration of microparticles in biota will be carried out, which will provide initial information and indicator 10.1.2 and indicator 10.1.3.</p> <p>Will also attempt to apply existing European methods and practices regarding monitoring of marine litter under the MSFD. After analysing the data collected from the survey and testing methodologies, proposal will be made to improve the current monitoring program and put into effect in 2017</p> <p>Improvements will include, where appropriate and expansion of transects for conducting monitoring, change of observation sites according to human pressure.</p> <p>Based on the information gathered for the second cycle of implementation of the MSFD will be defined definition of DES on indicator 10.1.3 "Trends in the amount, distribution and, where possible, composition of micro-particles (in particular microplastics)".</p> <p>Work on the coordination of monitoring activities in Descriptor 10 - Marine litter between Bulgaria and Romania (use of harmonized</p>

	<p>methodology), and, if necessary, update the definition of GES.</p> <p>Actions have been taken to increase the capacity of the Black Sea Basin Directorate with commitments on the implementation of the MSFD, planning monitoring programs, the programs of measures, etc.</p> <p>The period 2015 - 2016 were expecting the development of new modules to the Water Information System for in Bulgaria. One of the planned modules will include data and information on the implementation of the MSFD, programs and subprograms for monitoring, data from the monitoring, data to achieve GES, targets, indicators of individual descriptors, measures and their implementation and others.</p> <p>Improve coordination with other institutions / organizations providing information relating to the status or impact on the marine environment.</p>
6.4 Gaps: Target information	<p><i>If not yet adequate for data and information needs to assess targets, describe when the programme will be considered fully adequate</i></p> <p>The program is expected to provide adequate information to evaluate the targets for GES for the next assessment in 2018.</p>
6.5 Plans: Plans for information on targets	<p><i>If the programme is not considered fully adequate for data and information needs to assess targets, describe what plans are in place to make it fully adequate (e.g. to fill gaps in data methods or capacity). Describe timeframe, priorities and obstacles.</i></p> <p>Described in Section 6.3. (Plans to provide information for GES) planned research is expected to provide and update information / clarification of targets. The results will be shared with Romania, to provide greater coherence in the next implementation of the MSFD, and also within the Commission for Protection of the Black Sea against Pollution.</p> <p>Changing the existing Bulgarian legislation with the aim of integrating all existing legislative documents concerning various types of waste and ways of entering the marine environment.</p> <p>In support of this is one of the results of the current project "Towards a clean, free of litter into the marine environment through research, innovative tools and good governance" which shows that the problems in the Bulgarian legislation related to the implementation and observance of laws.</p> <p>Work on adapting the developed guidance to monitoring marine litter from MSFD Technical Subgroup on Marine Litter ("Guidance on Monitoring of Marine Litter in European Seas", 2013) to the Bulgarian conditions, including increasing the capacity of institutions and institutes conducting monitoring of marine litter and non-governmental organizations. Adaptation or development of national and regional methodologies for monitoring and assessment of marine litter. Use of standardized protocols for monitoring and classifying types of litter, found on beaches.</p> <p>Work on the coordination of monitoring activities in Descriptor 10 - Marine litter between Bulgaria and Romania: Bulgaria and Romania need to review and develop together agreed indicators to assess the status of their marine waters, taking using assessment and recommendations of the Commission, as far as possible in the period 2015 - 2018 respectively, and based on information</p>
	<p>collected by the monitoring carried out in this period.</p> <p>Increase campaigns to enhance public awareness of the cause negative effects of litter on the marine environment, in - particularly as a result of the widely used plastic products (as packaging, bags, toys).</p> <p>Increase campaigns to clean the unguarded beaches of discarded litter from the sea.</p> <p>Increasing volunteers included in the annual cleaning campaigns and training (students, citizens, other administrations, unless the competent authorities).</p>
6.6 Plans: Plans for information on measures	<p><i>If relevant: If the programme is not considered fully adequate for data and information needs to assess measures describe what plans are in place to make it fully adequate (eg. to fill gaps in data methods or capacity). Describe timeframe, priorities and obstacles.</i></p> <p>Monitoring in Descriptor 10 allows integration of the monitoring program with the program of measures as periodic campaigns to clean the beaches or etc. "Fishing for litter" could be an effective way both to reduce litter in the sea, and for providing updated information on the effectiveness of the measures. "Fishing for litter" should engage and fisheries sector to reduce waste due to fishing activities.</p> <p>Based on information gathered from surveys conducted in 2015 in the program of measures under Art. 13 of MSFD 2008/56/EC will put forward measures to reduce litter in the marine environment. The measures will be integrated with existing measures in the first RBMP WFD 2000/60 / EC and the updated program of measures in the second RBMP the limitation of waste going inland water bodies (rivers, coastal lakes, estuaries) and hence in marine waters.</p>

Joint Operational Programme Black Sea Basin 2014-2020

The publication is edited by the Black Sea NGO Network.

Varna, July 2019

Joint Operational Programme Black Sea Basin 2014-2020 is co-financed by the European Union through the European Neighbourhood Instrument and by the participating countries: Armenia, Bulgaria, Georgia, Greece, Republic of Moldova, Romania, Turkey and Ukraine.

This publication has been produced with the financial assistance of the European Union. The contents of this publication are the sole responsibility of the Black Sea NGO Network and can in no way be taken to reflect the views of the European Union.