

6





Output: O.T1.1 Study of data and information: ROMANIA



Author(s)/Subcontractors	Vizzio Pro ART SRL
Responsible organisation	Mare Nostrum NGO,PP
Reference	MARLITER Study of data and information: Romania. MARLITER BSB 138, Output: 0.T1.1, 2019.
	Authors: AnaMaria Grigoras
Point of contact	Angelica Paiu, angelica_iosif@marenostrum.ro
Output Version	V1.0

Dissemination Level						
PU	Public	\checkmark				
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. Geography	4
1.2. Marine litter definition	5
1.3. Literature review	5
1.4. Marine litter status in Romania	7
1.5. State of environment in Romania1	0
1.5.1. Nature and Biodiversity1	0
1.5.2. Soil protection1	1
1.5.3. Marine protection1	2
1.5.4. Waste management1	4
1.5.5. Air quality1	6
1.5.6. Noise1	6
1.5.7. Water quality and management1	6
1.6. Gaps of knowledge and information1	7
2. Policy making framework for environmental protection (especially waste management)1	9
2.1. International instruments1	9
2.2. European framework for environmental protection2	.0
Figure 5 - Evolution of the European marine litter framework	.6
2.3. Romanian framework for environmental protection2	.6
3. Stakeholders analysis	2
4. Strategies, practices, measures - reality	5
4.1. Regional and national strategies and action plans	5
4.1.1. National Waste Management Strategy3	5
4.1.2. National Waste Management Plan and National Program for the Prevention of Wast Generation	e 7
4.1.3. Black Sea Marine Litter Regional Action Plan3	7
4.1.4. Monitoring program3	8
4.1.5. Romania report - Programme of Measures (art.13, art. 14) under Marine Strateg Framework Directive	у 9
4.1.6. Local Action Plan for Environment	9
4.1.7. Strategy for Sustainable Development of Romania 2030	9
4.2. Awareness campaigns4	0
4.3. Blue Flag in Romania4	2
5. Monitoring status - what, how and who is measuring4	3
6. Recommendations: policy, mitigation and management actions (national and regional)5	7
6.1 Droventing measures	7

6.2.	Mitigating measures	58
6.3.	Removing measures	58
6.4.	Behaviour - changing measures	59
6.5.	Recommendations based on best practices for policy and public awareness	60
6.6. - works	Marine litter - stakeholder involvement in the prevention and reduction of r	narine litter 61
Referenc	es	65
ANNEX 1	- General Strategic Objectives for Waste Management	69
ANNEX 2	- Specific Strategic Objectives for Certain Waste Flows	73
ANNEX 3 Action Pl	- Work Programme for the Implementation of the Black Sea Marine Litt an (BS ML RAP)	ter Regional 77
Preventio	on of marine litter pollution	81
ANNEX 4	- Summary of the MSFD assessment	92
ANNEX 5	- Conclusions MSFD, D10	95
ANNEX 6	- Observation sheet	97

1. Status of marine litter and environment

1.1. Geography

Romania is situated in the South-Eastern part of central Europe, and is crossed by the Carpathian Arch. To the East, Romania has access to the Black Sea with a coastline of 247 km. Romania covers 238 391 km², of which approximately 8 500 km² consists of bodies of water. Romania is crossed by the Carpathian Arch, the eastern part of Europe's central mountain system. Romania's terrain is almost evenly divided between mountains, hills and plains, each of which covers some 30 per cent of the country's total surface area. Romania's geographical variety has led to a diversity of flora and fauna. Over 3,700 species of plants and 33,792 species of animals may be found within the country's borders.

Romania is characterized by a temperate continental climate. Climatic conditions are modified by the country's varied relief. The Carpathians function as a barrier to the Atlantic air masses, confining their oceanic influences to the west and centre of the country and keeping the continental climate influences of the Eastern European plains to the north. Generally, the winters are cold and cloudy with frequent snow and fog, while the summers are sunny with frequent showers and thunderstorms.

Of the 2,587 km total length of the Danube River, 1,075 km run within Romania's borders, making it the country's largest river. With the construction of the Danube-Black Sea and Danube-Rhine canals, it is the most important waterway to and from Western Europe.

There are around 3,500 lakes in Romania, of which many are small, freshwater mountain lakes. The large lakes are lagoons and coastal lakes on the Black Sea shore, such as Lake Razim and Lake Sinoe, or lakes situated along the Danube riverbanks.

Romania's climate and geographic relief is well suited for agriculture. The extensive Romanian plains are favorable to the growing of cereal crops, although cereal crops are also found in the Sub-Carpathians and in the Transylvanian Basin, where they occupy a high proportion of the total arable land. Wheat and maize are the major crops, followed by barley, rye and oats.

Constanta lies on the western coast of the Black Sea, 185 miles north of Istanbul and Bosphorus Strait (Turkey) and 99 miles north of Varna (Bulgaria). An ancient metropolis, Romania's oldest continuously inhabited and the country's largest sea port, Constanta traces its history some 2,500 years. The third largest city in Romania, Constanta is now an important cultural and economic centre, worth exploring for its archaeological treasures and the Old Town's architecture. Constanta is the fourth largest port in Europe, after Rotterdam, Antwerp and Marseille.

1.2. Marine litter definition

Marine litter (also called marine debris) has long been on the political and public agenda. It is recognized as a worldwide rising pollution problem affecting all the oceans and coastal areas of the world (Galgani et al. 2015; Ryan 2015;Thompson 2015). The increasing production and use of durable synthetic materials such as plastics has led to a gradual, but significant accumulation of litter in the marine environment, making it ever more difficult to tackle (Barnes et al. 2009; Kühn et al. 2015).

Marine litter is defined as "any persistent, manufactured or processed solid material discarded, disposed of or abandoned in the marine and coastal environment" (UNEP 2005, 2009). It is largely associated with diverse human activities occurring both on land and at sea, and is concomitant with the increasing use of synthetic materials, industrialization and urbanization of coastal areas, and inadequate disposal practices. Generally, it can be said that the problem of marine litter is rooted in the prevailing production and consumption pattern and the way we dispose of and manage waste. Marine litter originates from three main sources: land-based, riverine and ocean-based sources (Galgani et al. 2015; Browne 2015; Jambeck et al. 2015).

It is widely documented that marine litter has a wide range of adverse environmental, economic, social and public health and safety impacts (Newman et al. 2015). They are illustrated by marine litter injuring or killing wildlife by ingestion and/or entanglement (Jones 1995;Bugoni et al. 2001;Donohue et al. 2007;Allen et al. 2012; Bond et al. 2013;Baulch and Perry 2014; Kühn et al. 2015), altering ecosystems by introducing non-native species (Barnes 2002;CBD 2012;Kiessling et al. 2015), threatening sensitive habitats (e.g. corals, salt marsh) by moving along the seabed (derelict fishing gear) (Donohue et al. 2001;Arthur et al. 2014), posing risks to human health and safety (e.g. hazards to navigation) (Taylor et al. 2014), entailing economic costs to coastal towns/communities, fisheries, tourism, and other maritime industries (Ballance et al. 2000;Mouat et al. 2010;Jang et al. 2014;Newman et al. 2015).

1.3. Literature review

The literature review considered publications at a global, European and Regional Seas levels. It provides a succinct review of the current state of knowledge about marine litter, summarizing reliable and relevant information. The Black Sea is represented by the Black Sea Commission (BSC) or Bucharest Convention which works to protect the marine environment in this region. However, there is limited assessment of marine litter in the Black Sea, and a lack of comprehensive and systematic monitoring. As such, there is a **lack of comparable and reliable data**. This section primarily summarizes information in BSC's (2007) Marine Litter in the Black Sea Region: A Review of the Problem and UNEP's (2009) Marine Litter: A Global Challenge which reviews and summarizes data from each of the Regional Seas.

There are very limited data regarding the quantities and composition of marine litter in the Black Sea. BSC (2007) reports that some governmental and private institutions and NGOs in Bulgaria, Romania, Russia, Turkey and Ukraine have conducted marine litter research using different approaches and methods, including aerial surveys. National reviews are scarce and there is no aggregated information available. UNEP (2009) presents some of the results of local surveys, stating that vessel-based transect surveys estimated between 6.6 and 65.7 items/km2 of floating plastic litter, and beach surveys along the Turkish Black Sea coast recorded between 58 and 1,395kg litter per km. Local surveys and studies (BSC 2007,UNEP 2009,Topcu et al. 2012) state municipal waste/sewage and badly managed landfills as the most important sources of marine litter, followed by marine transport and ports and recreational activities. In contrast, a recent study by ARCADIS (2013) concluded from items found at beaches near Constanta, Romania, that recreational and tourism activities (both land- and sea-based) represent the most important source, with a huge amount of litter originating from recreational fishing (45%), followed by household and sanitary sources. ARCADIS 2013, also consider shipping/ports to represent only a minor source (8%).

Mare Nostrum NGO conducted between 2014 - 2018, marine litter monitoring after the methodology included in the "Guidance on Monitoring of Marine Litter in European Seas" for beach litter. Thus, the proposed and used methodology involves the identification of beach samples of 100 m in length and covering the area from the water line to grassy/concrete area. These sectors are monitored each year, twice: April and October. These sessions provide information on the current state of Romanian shore, in terms of marine litter, but unfortunately these data are not fully recognized by the authorities, even they receive each time the report and are aware of them. All items found on the sampling unit are entered on the survey forms. On the survey forms, each item is given a unique identification number. The litter collected is disposed of properly. For this monitoring were selected 8 sectors of beaches: Vama Veche, Saturn, Costinesti, Eforie, Constanta, Mamaia Nord, Navodari, Corbu, with a total surface of 41.547 m². The total number of items recorded is 100.832, having a abundance of 2.42 items/m². 80% of the total items identified are represented by the polymer artificial materials, and then we have glass/ceramics with 5%, which means a huge difference. The cigarette butts ocupy the first place in the category of polymer artificial materials with 44.992 butts eliminated from Black Sea Romanian shores. Constanta is on the top list of the dirtiest sectors, with 22.612 elements of marine litter, followed by Navodari (17.848) and Saturn (15.356). All these data can be found on Marine Litter Watch developed by the European Environment Agency and were sent also to all interested stakeholders (Mare Nostrum report).

UNEP (2009) also report on a series of underwater surveys of marine litter. This revealed glass to be the most abundant (31%) material, followed by plastic (25%) and metal (21%). Data from the beaches of Crimea, Ukraine indicated a predominance of plastics (80-98%). In terms of items, plastic bottles, bags, packaging, and cigarette butts are the most abundant (BSC, 2007).

Solid waste management is one of the major environmental problems in the Black Sea region (Celik, 2002) and is a likely source of marine litter. Although very few studies of its extensiveness and sources have been made, illegal marine dumping has been known in all Black Sea coastal states for many years. For example, on the southern coast of the Black Sea, municipal and industrial solid wastes, mixed with hospital and hazardous wastes, are dumped on nearby lowlands and river valleys, directly adjacent to the coast, or at sea (Berkun et al., 2005). In addition, the narrowness of some strips of the Georgian and Turkish coasts leads to the erosion of landfill contents into the sea (UNEP, 2009). Illegal, unreported and unregulated (IUU) fishing in the Black and Azov Seas is also considered an important source of marine litter due to discarded and abandoned nets (UNEP, 2009).

In some areas, the high concentrations of fixed and floating illegal, unreported and unregulated fishing gear has resulted in the reduction of habitat space, obstacles for migration and an increase in incidental mortality (by-catch) of cetaceans, fishes and crustaceans (BSC, 2007;UNEP, 2009). Although no special research on abandoned nets has been conducted in the Black Sea region, the problem of 'ghost' fishing undoubtedly exists, at least in the shelf area. Ingestion and entanglement also present an important threat. Materials including coal slag, wood and paper, and cherry stones have been collected from the stomachs of the Black Sea common dolphins (*Delphinus delphis*) (Kleinenberg, 1956). Further, in the Spring of 1991, 194 dead dolphins and harbour porpoises (*Phocoena phocoena*), 18,424 turbot (*Psetta maeotica*), 143 sturgeon (*Acipenser spp.*), 401 spiny dogfish (*Squalus acanthias*) and 1,359 rays (*Raja clavata* and *Dasyatispastinaca*) were found entangled in bottom-set gillnets in Ukrainian waters (Birkun, 2002). In April 2002, 35 harbour porpoises were recorded as by-catch in the abandoned illegal gill and trammel nets in the Exclusive Economic Zone of Romania (Radu et al., 2003).

1.4. Marine litter status in Romania

In Romania there were no national or regional programs for strict monitoring of marine litter. In the last years were developed a few projects funded by European Commission and projects that were developed and implemented at regional level with private funds.

- "Marine Litter in Europe Seas: Social AwarenesS and CO-Responsibility MARLISCO (2012 2015) which goal is to raise public awareness, facilitate dialogue and promote co-responsibility among the different actors towards a joint vision for the sustainable management of marine litter across all European Seas. During this project were developed innovative mechanisms and tools, by effectively engage, inform and empower society, reaching the widest possible audience.
- "Policy-oriented marine Environmental Research in the Southern EUropean Seas" (2012-2015)the overall scientific objectives of PERSEUS are to identify the interacting patterns of natural and human-derived pressures on the Mediterranean and Black Seas, assess their impact on marine ecosystems and, using the objectives and principles of the Marine Strategy Framework

Directive as a vehicle, to design an effective and innovative research governance framework based on sound scientific knowledge.

- "Towards a Clean, Litter-Free European Marine Environment through Scientific Evidence, Innovative Tools and Good Governance" - CLEANSEA (2013 - 2015) aimed to generate new information on the impacts (biological, social and economic) of marine litter, develop novel tools needed to collect and monitor litter and protocols needed for monitoring data (litter composition and quantities) and evaluate the impact of mitigation strategies and measures in order to provide options to policy makers in the EU.CLEANSEA tackled the marine litter problem from a broad interdisciplinary perspective.
- "Sustainable technologies for the production of biodegradable materials based on natural chitinnanofibrils derived by waste of fish industry, to produce food grade packaging" - N-CHITOPACK (2012 - 2014) - the project focused on the use of bio-based materials (chitin waste material from the fishing industry) to offer a highly promising alternative to plastic food packaging. Chitin nano-fibrils are bacteriostatic, 100% bio-degradable and can be used by European packaging SMEs, and may contribute to increase their competitiveness in the market and to solving environmental challenges.
- Mare Nostrum NGO had started in 2005 the ongoing project COASTWATCH. This is a European project initiated in Ireland in 1987 in order to evaluate with young volunteers the problems faced by the European coastal areas. Mainly, the anthropic impact is analyzed, with an emphasis on numerical inventory of waste present on beach. In Romania, this project was dedicated to teachers and students. Annually, at least 18 schools and more than 500 students inventoried the Romanian beaches, usually in October November, marking in this way the International Black Sea Action Day. According the Mare Nostrum reports, more than 340 000 litter was inventoried and the artificial polymer materials predominated in all years.
- In addition to this, Mare Nostrum NGO started in 2014 the marine litter monitoring using the methodology included in the "Guidance on Monitoring of Marine Litter in European Seas", a guidance document within the Common Implementation Strategy for the Marine Strategy Framework Directive, published in 2013. The monitoring takes place twice per year, in April and in October, before and after summer season and were established 8 sampling sectors: Vama Veche, Saturn, Costinesti, Eforie, Constanta, Mamaia Nord, Navodari and Corbu, with a total surface of 41.547 m². In this way, Romania's obligation to monitor Descriptor 10 Marine litter in beach area is covered. All items found on the sampling unit are entered on the survey forms. On the survey forms, each item is given a unique identification number. The litter collected is disposed of properly. At the end, all data is introduced in Marine Litter Watch App, developed by the European Environment Agency. The recorded data shows that in 5 years, Mare Nostrum collected 100.832 items, and 2018 was the "dirtiest" year with more than 36.000 items (figure 1). The artificial polymeric material represents 80% of total and the cigarette butts are the most numerous: 44.992. Constanta sector is in the top of the list with 22.612 items, being followed

by Navodari (17.848) and Saturn (15.356). This monitoring will continue in the following years. Each time, is prepared a report per each session that is sent to the competent authorities, at national and regional level to inform them about the results and ask for new measures to reduce the amount of litter that ends on Romanian beaches, as each year the number is higher.



Figure 1 - Monitoring of marine litter in Romania (2014 - 2018), Source: Mare Nostrum reports

Furthermore, the National Institute for Marine Research and Development "Grigore Antipa" was also involved in some international projects that tackled marine litter and had some pilot studies related to it. One of this was "A comparative study of marine litter on the seafloor of coastal areas in the Eastern Mediterranean and Black Seas" (2014) when abundance, spatial distribution and qualitative composition, of benthic marine litter, were investigated in five study areas from the Eastern Mediterranean and Black Seas (Saronikos, Patras and Echinades Gulfs; Limassol Gulf; Constanta Bay). Then, in 2012 was published "Marine Litter Watch App as a tool for ecological education and awareness raising along the Romanian Black Sea coast". This publication presents the results of a monitoring action of NIMRD on 2 sandy beaches (Ammos and Flora) and 1 mixed beach (Vama Veche - 2 Mai). Surveys have been made in January - April 2015, as well as during the high tourist season (Summer 2015). The main wastes were cigarette butts and plastic containers. With reference to the litter categories identified, artificial polymer materials were by far the most common category of litter items on European beaches, as well as on the Romanian beaches investigated, which once again confirms the fact that plastic and related materials are the most severe threat to the marine and coastal environment, being hardly degradable.

1.5. State of environment in Romania

1.5.1. Nature and Biodiversity

By the end of 2015, 22.56% of the national land area of Romania was covered by Natura 2000 (EU average 18.1%), with Birds Directive SPAs covering 14.83% (EU average 12.3%) and Habitats Directive SCIs covering 16.68% (EU average 13.8%). There were 539 Natura 2000 sites in Romania, including 9 marine sites. The terrestrial sites consisted of 148 Special Protection Areas designated under the Birds Directive, and 382 Sites of Community Importance (SCI's) designated for the protection of habitats and other species. In 2016 Romania resumed the designation process by designating new SPAs and proposing new pSCIs. The implementation of the Nature Directives represents a considerable challenge for the country. The Romanian administration of Natura 2000 appears to struggle with a lack of administrative capacity and there are also problems due to a lack of knowledge and data. Only a minority of the Natura 2000 sites are managed by professional bodies, the majority having only voluntary administrators. The implementation of Natura 2000 goals is further affected by a lack of spatial planning. According to the latest report on the conservation status of habitats and species covered by the Habitats Directive 38, 63% of the habitats' biogeographic assessments were favorable in 2013 (EU 27: 16 %). On the other hand, 28 % are considered to be unfavorable-inadequate39 (EU27: 47%) and 7 %are unfavorable - bad (EU27: 30%).



Figure 2 - Conservation status of habitats and species in Romania in 2007/2013 (%) Source: The EU Environmental Implementation Review Country Report - ROMANIA

As for the species, 19 % of the assessments were favorable in 2013 (EU 27: 23%), 66 % unfavorable-inadequate (EU27: 42%), and 6% unfavorable-bad (EU27: 18%). This is depicted in Figure 2.1t was found that habitats in Romania have achieved the best conservation status in the EU, while the conservation status of species is the worst. The implications of these findings are still to be fully addressed in the protection and management of the Natura 2000 sites.

Beyond Natura 2000 areas, the natural environment of Romania is characterized by a variety of traditional landscapes. Extensively managed, high-nature value farmland and forests support remarkable biological diversity, but such areas are under threat due to agricultural intensification and the abandonment of traditional, extensive management practices.

1.5.2. Soil protection

Soil is an important resource for life and the economy. It provides key ecosystem services including the provision of food, fibre and biomass for renewable energy, carbon sequestration, water purification and flood regulation, the provision of raw and building material. Soil is a finite and extremely fragile resource and increasingly degrading in the EU. Figure 3 shows the different land cover types in Romania in 2012.







The annual land take rate (growth of artificial areas) was 0.15% over the period 2006-2012, well below the EU average (0.41%). It represented 1,917 hectares per year and was mainly driven by housing, services and recreation as well as industrial and commercial sites. The percentage of built up land in 2009 was 1.58%, well below the EU average (3.23%). The soil water erosion rate in 2010 was 2.84 tons per ha per year, close to EU28 average (2.46 tones). There are still not EU-wide datasets enabling the provision of benchmark indicators for soil organic matter decline, contaminated sites, pressures on soil biology and diffuse pollution.

1.5.3. Marine protection

Romania's coastal and marine area is facing increasing pressures mainly due to population growth, urbanization, and development of agriculture, fisheries and industry. The coast is subject to erosion, water pollution, declining renewable resources, loss of biological diversity, wet losses and landscape damage. The need to face the future impact of climate change in combination with finding adaptive responses is also a problem. The main pressures faced by the coastal and marine area are:

- increased environmental risks due to climate change;
- rising sea levels that increase incidence of extreme storms and phenomena as tornadoes/marina thrombi;
- coastal erosion;
- sea water increased temperature;
- marine salty water intrusion into coastal aquifers;
- salinity changes;
- biological diversity reduction.

The urbanization of the coastal area is mainly a result of population concentration, holiday homes, uncontrolled tourism development and leisure activities. The relationship between environment and tourism has a special significance, the protection and preservation of the environment being probably the essential condition for progress and complexity: on the one hand, the natural environment through its components provides basic resources for tourism sector, and on the other hand, tourism has a positive and negative impact on environment by modifying its components. The number of tourists has increased steadily since 2012, reaching a peak in 2017, over 1 247 541 arrivals, up by 12% compared to 2016. The high density of beach visitors can cause chemical or nutrient pollution, direct destruction of mollusk populations by crushing shells, the generation of non-degradable hazardous waste (PET packing - plastic bottles, lids, plastic glasses, packing, plastic bags). Pollution is one of the critical problems caused mainly by the development of urban centers, port and transport activities. Uncontrolled disposal of solid waste and wastewater disposal have a negative impact on the quality of marine water, taking into account the fact that the recovery time of marine water quality is slow and the consequences for the marine environment are obvious.

In 2017, maritime ports (Constanta, Constanta Sud-Agigea, Midia and Mangalia) had a total traffic of 53,379,154 tons of cargo (figure 4). According to NIS, 32 million tons of goods were transported in the maritime sector by the end of 2010 and traffic rose to 60 million tons in 2016, being represented by products at risk of pollution: oil and petroleum products, chemicals, and coal and tar derivatives.



Figure 4 - Intensity of Black Sea maritime traffic - 2017 (source: Marine Traffic)

Due to global pressures (food, housing, transport, fuel), in the recent years the need for natural resources increased. The complex connections between climate change, biodiversity, resource use, health and increasing pressures, lead to increased uncertainty and risks associated with the environment. The negative trends of the environment cause serious and irreversible damage to ecosystems and services provided by them. Also, economic growth and the development of modern technologies in recent decades have brought new levels of comfort into our lives. This had led to an even greater demand for products and services and, implicitly, to an increasing demand for energy and resources. The way we produce and consume contributes to many of today's environmental issues such as global warming, pollution, exhaustion of natural resources and loss of biodiversity. Many of products we buy and use every day have a significant impact on the environment, from materials used to manufacture them to the energy they need to use and waste resulting from their use.

In 2012, Romanian marine protected areas covered 1887.5 square kilometers of their marine waters in the Black Sea. The country's six nationally designated Marine Protected Area sites almost entirely overlapped with the Natura 2000 sites.

The Transboundary Diagnostic Analysis of the Black Sea confirms (2007) that isolation from the flushing effects of the open ocean, coupled with its huge catchment, has made the Black Sea particularly susceptible to eutrophication.

1.5.4. Waste management

Preventing waste generation by using modern and innovative technologies and converting waste into a resource are the main objectives of European policy, as well as the legislation in the field, which must be fully implemented across the European Union. This includes the application of the waste hierarchy and the effective use of economic instruments to ensure the phasing out of landfills, the imitation of energy recovery to non-recyclable materials, the use of recycled wastes as a major and reliable source of raw materials for the EU, hazardous waste and reducing their generation, eradication illegal shipments of waste and removing obstacles in the internal market so that all recycling activities are carried out at the highest environmental standards. The aforementioned aspects are all the more evident in Romania, where the relatively low living standards, as well as the insufficient implementation of clean technologies, negatively influence the efficiency of resource use.

In terms of the amount of municipal waste collected through its own services, specialized offices of city halls or different companies, in 2016, it was collected 5260 thousand tons per capita/year. Of the total amount of municipal waste collected by sanitation operators, 79% is household waste and assimilable waste.

It should be noted that collection of municipal waste is not generalized at national level. Municipal waste management involves the collection, transport, recovery and disposal, including the monitoring of landfills after closure.

The responsibility for the municipal waste management rests to local governments, which, by its own means or through concession of the service to an authorized operator, must ensure the collection (including separate collection), transport, treatment, recovery and disposal of waste. Some of the collected municipal waste is sent directly to final recovery (material or energy) or disposal, while another part is sent to intermediate treatment facilities (sorting stations, composting plants). The disposal of municipal waste is achieved exclusively by storage. At the end of 2017, 40 compliant landfills for municipal waste were licensed to operate in Romania.

In accordance with EUROSTAT (Municipal Data Collection Guidelines) recommendations, municipal waste is any domestic and assimilable waste generated by households, institutions, business units and economic operators. Also, are included bulk waste (including POPs from population), park waste, gardens and street cleaning, as well as the contents of street bins. Thus, regarding the indicators on municipal waste at national level, we have 5,136,029 tons of municipal waste generated and 683,771 tons of municipal recycled waste (including composting, in 2016. The recycled rate achieved for municipal waste was 13.31% (2016).

Another indicator is the total quantity of packing used in Romania, expressed in kg per capita and year. Based on legislation in force, economic operators report the data on packaged and packaging waste.

Table 1 - Packing placed on market (tones) by type of material (2011 - 2015)

Year/Material	2011	2012	2013	2014	2015
Glass	139730	160259	149205	164521	194347
Plastic	278810	298042	290279	336818	359036
Paper/cardboard	293100	303108	311578	388017	441764
Metal	55230	58333	54406	65666	66830
Wood	225540	239774	248660	289691	334573
Others	100	41	11	24	11
Total	992510	1059557	1054139	1244737	1396562

Source - National Agency for Environmental Protection

As can be observed in the table above, the packing material has increased from 992,510 in 2011 to 1,396,562 in 2015. Part of this became marine litter.

Table 2 - Recycled packing waste by type of material (2011 - 2015)

Source: National Agency for Environmental Protection

Year/Materia	2011		2012		2013		2014		2015	
t		=		=	=	=		=	-	-
	tones	%								
Glass	83790	59.97	106192	66.26	73467	49.24	89103	54.16	79874	41.10
Plastic	112460	40.34	152852	51.29	149940	51.65	149769	44.47	167554	46.70
Paper	191990	65.50	211698	69.84	232580	74.65	323556	83.39	394300	89.30
Metal	34410	62.30	32398	55.54	28732	52.81	42147	64.18	42845	64.10
Wood	73390	32.54	98660	41.15	71902	28.92	77071	26.60	96203	28.80
Others	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Total	49604	49.9	60180	56.8	55662	52.8	68164	54.7	78077	55.9
	0	8	0	0	1	0	6	6	6	1

As can be seen in the last table, the total packing waste recycled has increased, from 496,040 tons in 2011 to 780,776 in 2015, and the percentage is 55.91%.

European Union waste management policies aim to reduce the impact of waste on the environment and health and to improve the EU's energy efficiency. In order to be effective, they target each stage of the resource's lifetime. Waste management remains a key challenge for Romania. The country's performance is characterized by extremely low recycling (5%) and slightly higher composting (11%), and high landfilling (82 %) rates, contrary to the waste hierarchy and the recycling targets set at EU level. Furthermore, Romania is late in adopting waste management plans and waste prevention programmes (the national waste management plan was adopted in 2004 and was valid until 2013), which are the best tools to reflect on the existing policies and find realistic solutions to achieve the targets on waste management.

1.5.5. Air quality

Air quality in Romania continues to cause concern. For 2013, the European Environment Agency estimated that about 25 330 premature deaths were attributable to concentrations of fine particulate matter, 430 to ozone concentrations and 1 900 to nitrogen dioxide concentrations. The emission of several air pollutants has decreased significantly in Romania. Reductions between 1990 and 2014 for sulphur oxides (-79%), nitrogen oxides (-53%), ammonia (-46%) as well as volatile organic compounds have been registered related to nitrogen dioxide in two air quality zones (Bucharest and Brasov). For 2014, the Romanian authorities have communicated exceedances above the EU air quality standards related to particulate matter (PM10) in one zone (Bucharest).

1.5.6. Noise

Excessive noise is one of the main causes of health issues. To alleviate this, the EU *acquis* sets out several requirements, including assessing the exposure to environmental noise through noise mapping, ensuring that information on environmental noise and its effects is made available to the public, and adopting action plans with a view to preventing and reducing environmental noise where necessary and to preserving the acoustic environment quality where it is good. Romania's implementation of the Environmental Noise Directive is delayed. The noise mapping for the most recent reporting round, for the reference year 2011, is mostly complete. Action plans for noise management in the current period have been adopted for 53% of agglomerations, 3.7% of major roads and 33.33% of major railways. For airports, the Romanian authorities have fulfilled all their obligations.

1.5.7. Water quality and management

Romania reported the status of 3262 rivers, 131 lakes, 2 transitional, 4 coastal and 142 groundwater bodies. 64% of natural surface water bodies achieve a good or high ecological status and only 38% of heavily modified or artificial water bodies achieve a good or high ecological potential. 94% of surface water bodies, 90% of heavily modified and artificial water bodies and 87% of groundwater bodies achieve good chemical status. 100% of groundwater bodies are in

good quantitative status. The main pressure on Romanian surface waters is diffuse pollution that affects 33% of water bodies. Flow regulation and morphological alterations affect 13% and point sources of pollution affect 8% of water bodies. Romania is considered rich in water resources as it has a much higher theoretical availability of freshwater resources than the European average.

In 2015, in Romania out of 50 bathing waters, 32.0% were of excellent quality, 46.0% of good quality and 20% of sufficient quality. One bathing water was of poor quality or non-compliant.

The most significant water management issues are related to the organic pollution caused by untreated wastewater from agglomerations, industrial units and agricultural farms, by nutrient pollution, caused mainly by agglomerations and agricultural activities, by hazardous substances pollution due to industrial or agricultural activities, and the pressures from hydromorphological alterations.

The flood protection and control activities represent also one of main water management issue in Romania. 12.7% of Romania's territory is covered by floodplains which are prone to flood events. The country's flood management activities involve a mixture of short-, medium- and long-term policies to protect life, assets and the environment.

1.6. Gaps of knowledge and information

Marine debris is a complex cultural and multi-sectoral problem that imposes tremendous ecological, economic, and social costs around the world. One of the substantial barriers to addressing marine debris is the absence of adequate scientific research, assessment, and monitoring. There is a **gap in scientific research** to better understand the sources, fates, and impacts of marine debris (NRC, 2008). Scalable, statistically rigorous and, where possible, standardized monitoring protocols are needed to monitor changes in conditions as a result of efforts to prevent and reduce the impacts of marine debris. Although monitoring of marine debris is currently carried out (often on the basis of voluntary efforts by non-governmental organizations), the protocols used tend to be very different, preventing comparisons and harmonization of data across regions or timescales (Cheshire et al., 2009).

There is a gap in information needed to evaluate impacts of marine debris on coastal and marine species, habitats, economic health, human health and safety, and social values. More information is also needed to understand the status and trends in amounts, distribution and types of marine debris. There is also a gap in capacity in the form of new technologies and methods to detect and remove accumulations of marine litter, as well as in means of bringing home to the public in all countries the significance of marine debris and the important part that the public can play in combating it. Besides, the ways in which waste management is conducted are often a barrier. This is a global problem, but waste is managed on a very local level. Truly biodegradable, naturally occurring, biopolymers are becoming more wide spread and commercially available. There is a need to pursue truly biodegradable biopolymer alternatives to plastic (Chanprateep, 2010).

Despite the existing schemes against marine litter at international level, our current knowledge of the quantities and the degradation of litter in the marine environment and its potential physical and chemical impacts on marine life are scarce. Specific data gaps were identified in a number of studies. For instance, very little data exist on quantities, trends, sources and sinks of marine litter in the Black Sea and very little is known about the extent and nature of the problem at Romanian coast. Also, there is no information regarding amounts and composition, transport, origin and impacts of marine litter on the seafloor or in the water column. In addition, illegal, unreported and unregulated fishing activities and their contribution to litter generation, quantities and impacts of derelict fishing gear and micro-particles were referred to. Further data are needed in relation to large-scale and long-term monitoring across countries and environments, smaller-scale dynamics that affect plastic movement and accumulation, and trophic transfer dynamics of persistent organic pollutants via plastics through the marine food web.

Data from shorelines are more abundant, but lack consistency in monitoring approaches. Hence it is apparent that more regular and harmonized monitoring will be required in order to detect changes in relation to policy measures implemented for example in response to MSFD.

Also, it is apparent from reports in the media and from conversations with people from many walks of life, that there is widespread misunderstanding about the nature of the marine litter issue and the extent to which it is perceived as a 'problem' which someone should be doing something to prevent and reduce.

Moreover, the relevant strategies and instruments to divert the waste from landfills are not in place and there is no comprehensive and decisive enforcement action against illegal landfilling.

The implementation gap concerning the waste management is also reflected in infringement cases for the bad application of the Landfill Directive and the non-conform transposition of the Waste Framework Directive. It is therefore not surprising that the use of the dedicated EU funds to improve waste management has been extremely low, mainly due to the lack of capacity of the final beneficiaries to prepare and implement large investment projects, lack of ownership and due to the long times spent on tender procedures.

2. Policy making framework for environmental protection (especially waste management)

Marine litter is a huge problem and a large number of instruments at international, regional and national levels have been adopted in order to tackle this issue. These instruments comprise conventions, agreements, regulations, strategies, action plans, programs and guidelines. They contain specific management measures that are either compulsory or voluntary.

2.1. International instruments

- The International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978 (MARPOL) is one of the most important international marine environmental conventions. It was developed by the International Maritime Organization in an effort to minimize pollution of the oceans and seas, including dumping, oil and air pollution. MARPOL is divided into Annexes according to various categories of pollutants, each of which deals with the regulation of a particular group of ship emissions. Annex V of MARPOL 73/78 is the major international instrument addressing ocean-based litter pollution from ships. Annex V was recently revised in 2011 and came into force in 2013. The revised Annex V provides an updated framework for the control of garbage generated by ships. It imposes a general ban on discharges of all garbage from ships at sea, except for a few clearly defined circumstances. These circumstances are associated with the types of garbage that can be disposed of, specifications of the distances from the coast, discharge of garbage within or outside special areas, the manner in which they may be disposed of, and in route requirements for allowable discharge.
- The London Protocol (LP) is a major instrument dealing with dumping of wastes and other matter at sea. The discharge of garbage during normal operations as regulated in the Annex V of MARPOL 73/78 is not considered as dumping. In 1996, the protocol was adopted to further modernize the 1972 London Convention and eventually replace it. The protocol entered into force in 2006. While the goal of the 1972 convention is to regulate pollution by dumping, the goal of the Protocol is to stop waste dumping at sea. Namely, the protocol is more restrictive in regulating wastes dumping than the 1972 convention by introducing a reverse listing approach. This approach is, in essence, to prohibit the dumping of any wastes or other matter except for the materials listed in Annex I. In addition, the protocol prohibits incineration of wastes at sea and the export of wastes to countries for dumping or incineration at sea. The protocol is to supersede the convention for the state parties that ratified it and will eventually replace the convention as more and more parties ratify.

- The UNEP Regional Sea Programme embarked in 2003 on the development of a Global Initiative on Marine Litter. This initiative has succeeded in organizing and implementing regional activities on marine litter around the world. Activities focusing on managing marine litter were arranged through individual agreements in 12 Regional Seas, including Black Sea. The main activities include: a review and assessment of the status of marine litter in the region, organization of a regional meeting of national authorities and experts on marine litter, preparation of a regional action plan for the management of marine litter, and participation in a regional cleanup day within the framework of the International Coastal Cleanup Campaign. This regional initiative also provides a platform for the establishment of partnerships, cooperation and coordination of activities for the control and sustainable management of marine litter.
- UNEP/IOC Guidelines on Surveying and Monitoring of Marine Litter The UNEP developed, in cooperation with the intergovernmental Oceanographic Commission (IOC), guidelines on surveying and monitoring of marine litter in order to provide a long-term platform for scientific monitoring. Four sets of operational guidelines were developed: comprehensive assessments of beach, benthic and floating litter, and rapid assessments of beach litter. The first three sets target the collection of highly resolved data to support the development and/or evaluation of mitigation strategies, while the last aims to raise public awareness of and educate about marine litter issues.
- The most recent initiative was to establish a Global Partnership of Marine Litter (GPML) in June 2012 by the UNEP. The GPML builds on the Honolulu Strategy. It is a global partnership, acting as a "coordinating forum" for all stakeholders (international, regional, national and local organizations) working in the area of marine litter prevention and management. The forum assists stakeholders to complement each other's efforts, to avoid duplication and to optimize the efficiency and efficacy of their resources. Mare Nostrum NGO is part of this partnership.

2.2. European framework for environmental protection

There are numerous EU legal instruments already in operation that could have a role in tackling marine litter, addressing litter sources from a diversity of sectors. And these started to be developed since 1975 (figure 5). Among them, perhaps the most relevant is the **Marine Strategy Framework Directive (MSFD)**, the environmental pillar of the EU Integrated Maritime Policy. This directive is an integral policy instrument for the protection of the marine environment for the European Community, following an ecosystem-based, adaptive and integrated approach to the management of human activities, which have an impact on the marine environment. The directive establishes a framework, within which member states shall

take necessary measures to achieve or maintain good environmental status (GES) in the marine environment by 2020. Marine litter is listed as the tenth of 11 qualitative descriptors for determining GES, which states that the properties and quantities of marine litter do not cause harm to the coastal and marine environment.

Of the 11 descriptors listed in Annex I of the MSFD for determining GES, descriptor 10 has been defined as 'Marine litter does not cause harm to the coastal and marine environment'. Commission Decision 2010/477/EU identify the following criteria and four associated indicators for Descriptor 10:

- 4 Criteria 10.1. Characteristics of litter in the marine and coastal environment
- Trends in 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 amount of litter in water column (including floating on the surface) and deposited on sea floor, including analysis of its composition, spatial distribution and, where possible, source (10.1.2);
- Trends in amount, distribution and where possible, composition of micro-particles (in particular microplastics) (10.1.3).
- **4** Criteria 10.2. Impacts of litter on marine life
- Trends in amount and composition of litter ingested by marine animals (e.g. stomach analysis) (10.2.1).

In 2010, as a follow-up to Commission Decision 2010/477/EU, the European Marine Directors requested the Directorate-General for the Environment (DG ENV) of the European Commission to establish a technical subgroup under the Working Group on GES (WG GES) for the implementation of MSFD Descriptor 10. The group's mandate contained the following work items: (i) identify and review existing data and ongoing data collection on marine litter; (ii) describe data needs and methods for the future assessment of marine litter; (iii) consider standards for monitoring marine litter; (iv) develop proposals for the development of impact indicators for each of the regions; (v) address how to develop objectives (characteristics of GES), environmental targets and associated indicators in relation to marine litter; (vi) discuss the effectiveness of measures to reduce marine litter, and; (vii) recommend proposals for further research priorities.

The current lack of knowledge means that it is difficult to link any target to the desired condition of 'good environmental status', or to set a quantitative target given the lack of a baseline. Nevertheless, the precautionary principle requires that a lack of scientific certainty should not be used as a reason for postponing cost-effective measures to prevent environmental degradation. Targets play a key role in drawing the attention of policy makers to a problem and providing the political impetus needed to set the EU on course to meet the MSFD objective, as well as act as an important driver for the implementation of other existing legislation. Given that the preliminary results of the MSFD assessment show a lack of coherence and differing level

of ambition among Member States with respect to their target setting, including those sharing a common sea basin, it is doubtful that Member States will achieve the MSFD and Rio+20 targets without the stimulus of an EU wide quantitative target (Interwies et al, 2013).

The Waste Framework Directive (2008/98/EC) has already opened the way to a new thinking on waste management. It establishes an extensive liability of the manufacturer and describes powerful and innovative factors to stimulate sustainable production, taking into account the whole life cycle of products. Member States are encouraged to adopt legislative and non-legislative measures to reinforce reuse and prevention, recycling and other waste recovery operations. Manufacturers should be encouraged to engage in the creation of end-of-life acceptance points. They can engage in waste management and assume financial responsibility for the activity. They will also make available to the public, information on the possibilities of re-using or recycling a product. Appropriate action will be taken to encourage the design of products that have a lower environmental impact and generate less waste during production and subsequent use. These measures may encourage the development, production and the marketing of multiple-use products that are technically sustainable and allow for environmentally-friendly end-of-life management. The Waste Framework Directive requires Member States to carry out waste prevention programs. These programs include specific prevention objectives that need to be implemented at the appropriate level and which must be made public. In October 2012, the European Commission published a guidance document to support Member States in developing their waste prevention programmes. With regards to plastic waste specifically, the guidance suggests that plastic bags can be effectively targeted by waste prevention activities (BioIntelligence Service et al, 2012).

Some environmental effects produced by our levels and patterns of consumption are not visible at first. How many of us think that generating electricity to charge mobile phones and freezing our food leads to carbon dioxide emissions in the atmosphere, thus contributing to climate change? Or that means of transport we travel daily releases pollutants into atmosphere such as sulfur oxides and nitrogen, which harm human health. In everyday life, when choosing certain goods or services, we do not think of the "footprint" that they leave on the environment. Shelf prices almost never reflect their true cost from this point of view.

The EU approach to waste management is based on three main lines of action:

- Prevention of waste generation a factor considered to be of great importance in any waste management strategy, directly linked to both the improvement of production methods and the determination of consumers to change their habits consumption, thus generating smaller amounts of waste.
- Recycling and recovery encouraging a high level of recovery of component materials, preferably recycling materials. For this purpose, identifying several waste streams for each recycled material is a priority: packing waste, end-of-life vehicles, battery waste, electrical and electronic equipment waste.

• Final disposal of waste - where waste cannot be recovery, it must be disposed of safety for the environment and human health, with a strict monitoring program.

The Packaging and Packaging Waste Directive has the potential to have a high impact on marine litter, given that packaging comprises a large proportion of marine litter (more than half of the plastic fraction of marine litter is composed of plastic packaging waste such as bottles and bags (European Commission, 2013b). With regards to plastic in particular, full implementation of the Packaging Directive by the Member States is important to close loopholes in the plastic packaging cycle, and should have significant benefits for the quantities of marine litter generated. The addition of a specific mention of marine litter/the marine environment to the Directive could be considered to ensure that the importance of the issue is acknowledged. Another policy option would be to increase the recycling targets for packaging waste (in particular plastics). Softer policy options include encouraging greater efforts to prevent packaging at source and encouraging best-practice sharing between Member States on reducing packaging litter e.g. through litter-picking on coastlines, awareness raising, and the provision of adequate recycling and disposal bins in tourist areas.

Action on plastics was identified as a priority in the **Circular Economy Action Plan**, to help European businesses and consumers to use resources in a more sustainable way.

The first-ever **European Strategy for Plastics in a Circular Economy** adopted on January 2018 will transform the way plastic products are designed, used, produced and recycled in the EU. Better design of plastic products, higher plastic waste recycling rates and more and better quality recycles will help boosting the market for recycled plastics. It will deliver greater added value for a more competitive, resilient plastics industry. By 2030, all plastics packaging should be recyclable. To achieve its ambitious vision, the Strategy foresees actions as making plastic packaging reusable or recyclable in the European market; increasing the share of recycled plastic waste from 30% to 50%; growing the market for recycled or innovative plastic products; reducing CO2 emissions and dependence on fossil energy thanks to advances in recycling and reuse; combating the spread of microplastics in water and reducing plastic left in the environment; reducing the number of disposable plastic bags used annually to 90 per person in 2019 and 40 in 2026.

In March 2019, the European Parliament agreed on the rules on Single-Use Plastics items and fishing gear, addressing the ten most found items on EU beaches that place the EU at the forefront of the global fight against marine litter. They are part of the EU Plastics Strategy - the most comprehensive strategy in the world adopting a material-specific lifecycle approach with the vision and objectives to have all plastic packaging placed on the EU market as reusable or recyclable by 2030. The Single-Use Plastics Directive adopted by the European Parliament is an essential element of the Commission's Circular Economy Action Plan as it stimulates the production and use of sustainable alternatives that avoid marine litter. The main measures included are:

- ✓ A ban on selected single-use products made of plastic for which alternatives exist on the market: cotton bud sticks, cutlery, plates, straws, stirrers, sticks for balloons, as well as cups, food and beverage containers made of expanded polystyrene and on all products made of oxo-degradable plastic.
- Measures to reduce consumption of food containers and beverage cups made of plastic and specific marking and labelling of certain products.
- ✓ A 90% separate collection target for plastic bottles by 2029 (77% by 2025) and the introduction of design requirements to connect caps to bottles, as well as target to incorporate 25% of recycled plastic in PET bottles as from 2025 and 30% in all plastic bottles as from 2030.

The proposed Directive follows a similar approach to the successful 2015 Plastic Bags Directive, which brought about a rapid shift in consumer behaviour. When implemented the new measures will bring about both environmental and economic benefits, such as for example:

- avoid the emission of 3.4 million tons of CO₂ equivalent;

- avoid environmental damages which would cost the equivalent of €22 billion by 2030;

- save consumers a projected €6.5 billion.

Following this approval by the European Parliament, the Council of Ministers will finalize the formal adoption. This endorsement will be followed by the publication of the texts in the Official Journal of the Union. The Member States will then have two years to transpose the legislation into their national law.

The Landfill Directive potentially has a direct (although possibly limited) influence on marine litter, as it establishes technical requirements for the operation of landfills, to limit the final disposal of waste through landfill and to reduce the environmental impacts of landfill sites. The European Commission has however acknowledged that around 1,000 landfills in the EU are sub-standard (European Commission, 2012b) and the actual figure is likely to be much higher. Proper implementation of this Directive should therefore be a priority; indeed, the Commission is currently undertaking work to develop Roadmaps with country-specific recommendations to improve waste management in the worst performing Member States, including measures to move away from landfill.

The Water Framework Directive (WFD) requires all surface waters (including rivers, estuaries and coastal waters) to meet 'good ecological status'. However, although rivers are a source of marine litter, litter is not a criterion of good ecological status. As a result, Member States are not directly required to take measures under the WFD to reduce the amount of litter in suspension in their rivers. The exception would be if the litter causes a particular biological criterion not to be met (i.e. it disturbed the composition and abundance of phytoplankton taxa, or distorted the abundance of disturbance-sensitive fish species) in which case Member States would need to address the pressure.

he **Bathing Water Directive** aims to guarantee bathing water quality, which may be threatened by pollution. In particular, the Directive provides that bathing waters must be inspected visually for pollution such as tarry residues, glass, plastic, rubber or any other waste as part of the beach profile. In case such pollution is identified, adequate management measures must be taken. All bathing waters in the EU must be at least of sufficient quality by the end of the 2015 bathing season. If quality is poor and/or when waste is visually detected, Member States must adopt the necessary measures to manage and reduce pollution, and to protect and inform bathers.

At present the does not regulate cosmetics products on any marine litter or indeed environmental grounds, enabling the widespread use of plastic micro particles in cosmetics products. Several companies have already voluntarily committed to phasing microplastics out of their products. Unfortunately, this is a minority.

The Urban Waste Water Treatment Directive regulates the discharge of sewage, industrial waste water and rainwater run-off with the aim of reducing pollution to freshwater, estuarial and coastal waters. Urban waste water is a source of marine litter including items such as sanitary towels, tampons, condoms, plastic cotton wool bud sticks, microplastics from cosmetics and fibres from clothes washing. It is also one of the main sources of litter in all regional seas. Given these facts and the unpleasant and unsanitary nature of these items (making them particularly harmful socially and economically) at the very least the Directive should make mention of the marine litter problem in the recitals.

Article 48 of the Fisheries Control Regulation requires fishing operators to have the equipment on board to retrieve lost gear and for the master of the vessel to attempt to retrieve it as soon as possible. If for whatever reason the lost gear cannot be retrieved, the operator is required to inform the competent authority in its flag state. Information on rates of gear loss and the impacts of lost gear is scarce, and it is also unknown to what extent this type of marine litter is the result of accidental losses, and how much is due to intentional dumping. Consequently, it is difficult to determine how well the Control Regulation is being complied with. With respect to abandoned gear (as opposed to lost gear), the provisions in the Control Regulation are clear, thus mitigation and quantification of abandoned gear is primarily a control and enforcement issue (Graham et al, 2009).

The prime objective of the Integrated Maritime Policy (IMP) for the EU is to maximize the sustainable use of the oceans and seas while enabling growth of the maritime economy and coastal regions. Environment is a key component of the IMP. The European Commission commits, among other things, to take steps against discharges into the sea. A European network for maritime surveillance is one of the tools that can help to address such discharges and that the Commission will further develop jointly with the Member States. Other tools that the IMP refers to are Maritime Spatial Planning and Integrated Coastal Zone Management which can help through integrated planning to reduce the negative environmental impact of economic activities carried out in the marine and coastal areas. These activities include tourism, fishing and maritime transport, all sources of marine litter. The marine knowledge 2020 initiative aims to improve access to data on the sea, including the distribution and composition of marine litter.



Figure 5 - Evolution of the European marine litter framework

2.3. Romanian framework for environmental protection

Adopting and implementing new legislation for environmental protection has been a priority for Romania. This legislation is based on several legal principles, such as: (i) compliance with the acquis communitaire for environment; (ii) integration of environmental concerns into sectoral policies; (iii) monitoring and reduction of climate change risks; (iv) application of the "polluter pays" principle; (v) preservation of biodiversity and specific ecosystems; (vi) sustainable use of natural resources; (vii) disclosure of environmental information and public participation in decision-making; and (viii) international cooperation for environmental protection.

The long-term objective of EU policies is to reduce the amount of waste generated and, where waste generation cannot be avoided, to promote their use as a resource and to achieve higher levels of recycling and disposal under safety conditions.

While Romanian legislation accurately reflects the environmental requirements agreed at EU level (figure 6), their implementation on the ground is in general a challenge, prompted inter alia by a lack of planning, coordination and appropriate funding. The implementation gap is problematic in several areas, in particular waste management and waste-water treatment.

The main challenges Romania faces with regard to implementing EU environmental policy and law are:

- Improving compliance with EU waste and urban waste-water legislations in order to meet the EU targets, as the final deadlines set out in the Accession Treaty are drawing near;
- Improving coordination and enhancing the administrative capacity of the authorities and agencies involved in the implementation of EU legislation, in particular with regard to water and waste management and the protection and management of the Natura 2000 sites, as part of the broader strategy to strengthen public administration.

Romania is also part of and has ratified various bilateral, regional and international conventions and treaties on environmental matters, including the 1992 UN Framework Convention on Climate Change and its 1997 Kyoto Protocol, the 1982 UN Convention on the Law of the Sea, the 1973 International Convention for the Prevention of Pollution from Ships and its 1978 Protocol, etc.

Romania's marine waters are part of the Black Sea marine region and the country is party to the Black Sea Convention. The main threats to the Black Sea region are land-based sources of pollution (e.g. nutrients coming from the River Danube).

As Member State Romania has the obligation to implement the requirements of the Marine Strategy Framework Directive into its marine waters which are part of the Black Sea marine region. Romania has been diligent with the implementation of the MSFD.

Regarding the last deliverables under the MSFD (initial assessment, determination of GES and environmental targets), Romania made considerable efforts to set quantitative targets when data was available and to give a GES description consistent with EU legislation. However, weaknesses were identified in the definition of GES: for instance, Romania initially only defined GES for 5 out of the 11 MSFD descriptors. A number of EU-financed projects facilitate cooperation and support implementation of the MSFD in the Black Sea region. Romania should continue to pursue coordination at regional level to improve quality.

The Marine Strategy Framework Directive has been transposed into national legislation by Emergency Government Ordinance 71/2010 on establishment of Marine Strategy and approved by Law 6/2011 and then amended by the Law 205/2013.

According to the Emergency Government Ordinance 71/2010 on establishment of Marine Strategy (chapter I, Objective, article 1), which transposed the Marine Strategy Framework Directive (2008/56/CE), the Ministry of Waters and Forest is the central authority responsible for the implementation of the requirements of the Directive.

Law No. 107(1996) on Water remains the main legal instrument for water protection. Two important amendments to this Law are Government Emergency Ordinance (GEO) No. 64 (2011) regarding the geological storage of carbon dioxide, and GEO No. 3 (2010) amending Law No. 107 (1996) on Water. Also, was adopted Law nr. 243/2018 for the approval of Government Emergency Ordinance no. 78/2017 amending and supplementing the Water Law no. 107/1996. These amendments cover the public authority with environmental responsibilities; measures to be taken to prevent temporary deterioration of water bodies; protection and conservation of surface water resources; gradual reduction of water pollution; uniform, rational and integrated management of waters; and exploitation rights for minerals in waterbed courses and lakes, with a new detailed section on the management of flood risks.

Law No. 211 (2011) on Waste transposes the provisions of Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste. The most important provisions of this Law refer to:

- The waste hierarchy for the purpose of diminishing the negative effects of waste on the environment;
- Regulation of the extended liability of the producer for the purpose of strengthening reuse, reduction, recycling and other methods for the recovery of waste;
- Application of the self-sufficiency and proximity principles;
- The control and labelling of hazardous waste;
- The preparation and content of waste management plans and waste prevention programmes.

Emergency Ordinance no 74/2018 amending and supplementing Law no 211/2011 on treatment of waste has bought significant changes to waste management legislation. This aims to improve the overall waste management system, starting from separately collecting waste at the generating source, sorting recycling and further disposal. To this end, the most widely used economic tools at European and international level taken by the Emergency Ordinance no. 74/2018 are: (i)" pay for the entire generated waste" principle, (ii) the "extended liability of the producer" and (iii) the "circular economy" principle that replaces the "deposit fee". To implement these economic tools, this ordinance proposes the following: discouragement of waste disposal through storage, payment schemes based on the amount of waste generated, extended producer liability scheme and a guarantee scheme for refunds or for reusable packing.

Apart from bringing novelties to waste management procedures in Romania, Emergency Ordinance no. 74/2018 also seems to clarify various areas of old waste management legislation that has proven problematic in Romania's relationship with the European Union and EU institution.

The framework law that regulates waste management activities in Romania is Law no. 27/2007, approving Government Emergency Ordinance no. 61/2006, amending and supplementing Government Emergency Ordinance no. 78/2000 on waste regime. This legislation sets the responsibilities for waste management from generation to disposal, the priorities in waste management, the requirements concerning the development of waste management plans at the national, regional and county level and the required competence for the respective development.

Law no. 249/2015 regarding the management of packaging and packaging generated waste provides certain obligations for suppliers of packaging materials, manufacturers of packaging and packaged products, importers, retailers, distributors and public authorities, regarding the manufacturing, labeling, collecting and recycling of packaging. The law transposes the provisions of Directive no. 94/62/CE of the European Parliament and of the Council, from 20th December 1994, regarding packaging and packaging generated waste. The Law contains provisions regarding:

- Base criteria for designating an object as packaging;
- Annual objectives, at a national level, regarding the recovery, incineration or recycling of packaging generated waste and the responsibilities of economic operators which place packaged products on the market, for the packaging generated waste;
- The publishing of a list containing all the economic operators mentioned at point 2 above, on the Environment Fund Administration's official homepage;
- The obligation for economic operators that purchase packaging or packaged products directly from the economic operators mentioned at point 2 above, to ensure that the latter are registered on the list mentioned at point 3 above;
- The obligation for economic operators which sell products to final consumers through sale units with medium and large surface areas, according to Government Ordinance no. 99/2000, to ensure that the customers are able to dispose of the packaging from purchased products, without any additional costs;
- The maximum amount for concentration levels for lead, cadmium, mercury and hexavalent chromium present in packaging and its components;
- Prohibiting the conditioning, under any form, of the customer's legal rights regarding the purchased products, on keeping the packaging;
- Granting priority, when purchasing goods using public funds, to products made from recycled materials or with packaging made from recycled materials;
- The definition of "placing on the national market of a product" has been redefined as "the supply made by a legal person established in Romania for the first time, of a product for distribution, consumption or use on the national market during a commercial activity, for consideration or free of charge."

European Strategy for Plastics in a Circular Economy was adopted in Romania through Decision no. 27/2018 on the adoption of the opinion on the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, that supports the actions at EU levels.

In Romania, the efficient use of resources is low, and the circular economy remains poorly developed. Along with Bulgaria and Estonia, the resource productivity (the economy's efficiency in using material resources to produce wealth) was the lowest in the EU in 2015, standing at 0.31 EUR/ kg compared to the EU average of 2 EUR/ kg. Circular economy is not just a fancy trend or a hot subject in Europe, is another economic model, is a new engine using waste as a fuel. Waste, having seen by environmentalists as a threat, as a potential polluter is now becoming a more disputed resource for all industries. As a result, the consumer is becoming

not just a "waste generator" but a supplier for the recycling industry. Recycling industry is in the center of circular economy absorbing the municipal and industrial waste as a nutrient for its own growth and implicitly modifying the metabolism of the city towards "zero waste" horizon. Circular economy is an opportunity for Romania to stimulate its economic growth, by disconnecting itself from the use of natural resources. It also creates a snowball effect that can bring immense social benefits, such as the creation of new specialized types of jobs in the green economy and generation of job opportunities. The switch to a circular economy leads the way to a new perspective in the research and development field, so that the great creativity and ingenuity of Romanians can be put to work also here.

In Romania, the legal framework for carrying out the spatial and urban planning activities was completed in 2001 by the promulgation of Law 350/2001 on Spatial Planning and Urban Planning, which establishes:

- spatial planning objectives (balanced economic and social development of regions and areas, in observance of their specific nature, improving life quality for people and human collectivities, accountable management of natural resources and environmental protection, sound land management);
- the compulsory nature of carrying out spatial planning activities, so that spatial management be conducted on a continuous and long-term basis, in the interest of the collectivities that use the territory, in accordance with the values and aspirations of society and with the requirements related to integration within the European space;
- the institutional structure and the duties of the central, county and local public administration in the field;
- the categories of Spatial and Urban Planning documentations, responsibilities for endorsing and approving them.

In accordance with Law 350/2001, the spatial planning activity is carried out on the entire Romanian territory based on the principle of hierarchization, cohesion and spatial integration at national, regional, county, city and commune level, creating the appropriate framework for balanced development and sound use of territory and accountable management of natural resources and environmental protection.

Another important framework is **Government Decision no. 349/2005 on waste** (Official Gazette no. 394 of 10 May 2005), by GD no. 210 / 28.02.2007 amending and supplementing certain acts transposing the acquis communitairein the field of environmental protection. This aims to establish the legal framework for the carrying out of the waste storage activity, for realization, exploitation, monitoring, closure and post-closure monitoring of the new deposits, as well as for the exploitation, closure and post-closure of the existing deposits under environmental protection conditions and people's health.



Figure 6 - Evolution of the Romanian marine litter framework

3. Stakeholders analysis

Edward Freeman defines a stakeholder as "any group or individual who can affect or is affected by the achievement of the organization's objectives". Understanding societal perceptions and evaluating communication and engagement with different stakeholder groups is critical in order to develop better strategies to improve understanding about the problem and solutions surrounding marine litter and to influence behavioral change. When communicating about environmental issues, in this case, the global issue of marine litter, then the work of social and behavioral scientists is highly relevant. Many attempts to communicate with stakeholders regarding environmental issues rely on presenting the "facts" or increasing knowledge about the problem. They need to understand, feel concerned, responsible, motivated and able to take action and perceive that others are working toward a similar goal (figure 7).



Figure 7- Stakeholders and marine litter

According to Application Form the target groups involved comprise direct beneficiaries and also final beneficiaries of the project results. These can be information providers and/or information users, as they can also facilitate the exchange and integration of information and the extension of project results. In prospect they can be part of a common exchange system of information on litter for the Black Sea. **Business support organizations** need access to monitoring data and can be users of environmental monitoring data and ICT tools for decision support. They can provide information about pollution generation and good practices in marine litter prevention and reduction.

Education/training center and schools: the two types of educational establishments also include another sector of the target group: teachers and lecturers. They are often NGO members and volunteers and can be regarded also as part of the interest groups of concerned citizens. Environmental education is a potentially powerful tool for raising awareness and knowledge about pressing environmental issues, such as marine litter, and for facilitating greater understanding of the solutions to these problems in order to enable action. Teachers are a key driver of change in society and formal and non-formal educators play a vital role in helping to encourage students to be knowledgeable of the environment and problems, aware of the solutions to these problems and equipped to solve them. It is vital that teachers feel supported so they become and remain motivated to provide environmental education.

Children can be powerful agents of change in society, not only because they represent the next generation of consumers and decision-makers but often they can inspire and influence directly the behavior of their families and even their close community (Vaughan *et al.*, 2003).

Young people are aware of various environmental problems such as pollution and litter; they worry about environmental issues and tend to report behaving in an ecologically responsible manner. Children are also an important source of social influence, with the potential to shape the environmental values, knowledge, attitudes, and behaviors of peers and family. **Students** could investigate and take learning into their own hands, and educators acted as facilitators. This is consistent with constructivist pedagogy, where learners are active participants in their education. It is often difficult to evaluate how engaged young people have become in environmental issues, and whether communication has influenced attitudinal or behavioral change. Methods often simply demonstrate satisfaction and enjoyment in the environmental education activity, rather than measuring changes in outcomes.

Like all other environmental challenges, in order to effectively tackle the problem of marine litter, there is the need for a concerted approach to encourage co-responsibility through a joint dialogue between the many players.

Higher education and research are another important group of interest. Their interest is the new research infrastructure for their use in science and education, the link between policy and management which they research, study and consult on government level. Their needs are associated with wider access to data for public use for research and education. They miss information from outside their own sectors. This group's wider audience is also indirect and final beneficiary of the project.

Infrastructure and (public) service providers can provide information about waste and pollution with solid waste, to the extent that it is available, especially about plastic waste quantities and types, although national statistics are more reliable in most cases. They are important stakeholders in a sense that they can provide information about solid waste sources, generation, distribution, management process and good practices in reduction, especially of plastics. But these are that kind of stakeholders who feel they might be vilified in relation to the marine litter issue may be less inclined to take part in communications and engagement events. This is a particular challenge, because they may be fear of being criticized or singled-out, or are perceived as responsible. It is vital to have participation from these sectors, because without them, solutions are not possible. It is important to assure stakeholders that the aim is to provide joint dialogue between the many players and is intended to increase cooperation rather than be a debate or blaming exercise.

Interest groups, including NGOs need reliable and accessible information and data for the state of the environment for their activities related to provision of information, awareness raising, environmental education, campaigns, advocacy etc.

Local public authorities can provide some data and information about pollution generation and good practices in marine litter prevention and reduction. Sectoral agencies have information about their own sectors, often missing integrated information about the state of the environment. They need environmental monitoring data and decision support tools for marine litter reduction. They can provide information about pollution generation and good practices in marine litter prevention and reduction.

Communication within groups allows stakeholders with a range of knowledge; skills and experience to share their views and work on a problem together (figure 8). It provides an environment for discussion and acknowledgement of joint responsibility. When trying to communicate with a diverse group of stakeholders about environmental issues, such as marine litter, it is common to come up against some challenges along the way.



Figure 8 - All kind of stakeholders at the same table

4. Strategies, practices, measures - reality

Waste management remains a key challenge for Romania. The country's performance is characterized by very low recycling and composting, and high landfilling rates, contrary to the waste hierarchy and the recycling targets set at EU level. Romania is late in adopting waste management plans and waste prevention programmes (the national waste management plan was adopted in 2004 and was valid until 2013), which are the best tools to reflect on the existing policies and find realistic solutions to achieve the targets on waste management. Romania will have to put massive efforts to increase recycling and reduce landfilling.

Romania is in a deplorable situation regarding the waste management and recycling. The latest report issued by the European Commission at the beginning of 2017, based on the data from 2014, shows that Romania selectively collects and recycles only 5% of the produced waste, 11% goes to compost and a huge percentage of 82% reaches landfill. In 2016, Romania recorded the highest waste disposal rate in the EU, namely 72%, well above the EU average of 25.6%.

The current situation is not at all favorable to Romania when it comes to the selective collection of waste, because even if it is collected selectively, then the waste is grouped together and taken to a mixed ramp. Deposits in Romania, most of them, are non-compliant with EU regulations and represent a serious risk to human health and the environment. For this reason, at the beginning of 2017 the European Commission decided to act in justice Romania at the European Court of Justice because the authorities failed to close 68 non-compliant municipal landfills.

Also, on 27 April 2017, the European Commission (EC) sent Romania to the EU Court of Justice for failing to review and adopt the national waste management plan and the waste prevention program in line with the objectives The Waste Framework Directive (Directive 2008/98 / EC) and the circular economy.

The gaps in waste management implementation are also reflected in breach cases for incorrect application of the Landfill Directive and the non-compliance of transposition measures of the Waste Framework Directive.

4.1. Regional and national strategies and action plans

4.1.1. National Waste Management Strategy

National Waste Management Strategy was developed by the Ministry of Environment and Water Management, according to the responsibilities reverting to this institution following the transposition of European legislation in the field of waste management and according to the provisions of Emergency Government Ordinance no. 78/2000 on the regime of waste, approved with amendments and completions by Law no. 426/2001. The strategy was drafted for the

interval 2003 - 2013, and it is to be revised on a regular basis, according to technical progress and environment protection requirements.

It aims to create the necessary framework for the development and implementation of an environmentally and economically sound integrated waste management system. The National Strategy for Waste Management 2014 - 2020, proposing targets the following aspects (figure 9):

- Prioritize waste management efforts in line with waste hierarchy;
- Develop measures to encourage waste prevention and re-use, by promoting the sustainable use of resources;
- Increase the recycling rate and improve the quality of recycled materials, working close to business sector and the waste recycling units and enterprises;
- Promote packaging waste recycling;
- Reduce the impact of carbon impact;
- Encourage energy generation from waste for non-recyclable waste;
- 4 Organize the database at national level and streamlining the monitoring process;
- Implement the concept of "life cycle analysis" in the waste management policy/management.

Moreover, it wants to improve services to people and the business sector through:

- Encouraging green investments;
- Supporting initiatives that reward people that reduce, reuse and recycle household waste;
- Collaboration with local public administration authorities to increase efficiency and quality of collected waste, making it easier to recycle;
- Collaboration with local government authorities and the business sector to improve waste collection systems.



Figure 9 - Priorities in waste management Source - National Strategy for Waste Management
The NSWM provisions apply to all types of waste regulated by Law no. 211/2011 regarding waste management.

The NSWM shall influence the behavior and actions of the following categories:

- Producers of goods: reuse products using more recycled materials and design products to generate less waste;
- \circ Merchants: reduce the quantity of waste generated by their activities;
- Generators of waste: separate waste for recycling and recovery purposes and modify consumer behavior towards purchasing products that generate less waste.
- Environmental authorities: provide adequate services to manage all types of waste streams.
- Waste management industry: invest in the best techniques available in the field of waste recovery / recycling and ensure proper waste management services are provided to facilitate recycling and recovery of waste generated by economic agents.

The ANNEXES 1 and 2 present the General Strategic Objectives for Waste Management and the Specific Strategic Objectives for Certain Waste Flows included in the National Waste Management Strategy.

4.1.2. National Waste Management Plan and National Program for the Prevention of Waste Generation

In 2017, the National Waste Management Plan and the National Program for the Prevention of Waste Generation were developed, documents aimed at developing a general framework for waste management at national level with a minimal negative environmental impact. The main objectives are the characterization of the current situation in field (quantities of generated and managed waste, existing facilities), the identification of problems that cause inefficient waste management, the setting of objectives and targets based on legal provisions and strategic objects established by National Strategy for Waste Management 2014 - 2020, as well as identifying investments needs. To characterize the existing situation on quantities of generated and managed waste were used date for the period 2010 - 2014, as well as data and information on 2016 waste management facilities. The waste volume projection was carried out for the period 2015 - 2025 and the measures plan covers 2018 - 2025.

4.1.3. Black Sea Marine Litter Regional Action Plan

The Commission on the Protection of the Black Sea against Pollution (BSC) elaborated the **Black Sea Marine Litter Regional Action Plan** that recognizes that marine litter issues are not properly addressed and managed so far on the regional and national scales, and even actual

levels of marine litter pollution are not adequately evaluated and monitored in the Black Sea riparian countries. The overall objective 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. Thus, the Contracting Parties of the Bucharest Convention will elaborate and implement, individually or jointly, as appropriate, national and regional action plans and programmes, containing measures and timetables for their implementation (ANNEX 3). This Black Sea Action plan also include a series of actions and measures that must be included in the national ones as: monitoring programme for assessment of the current status of marine environment with respect to marine litter, awareness raising campaigns and educational programmes, cooperation of relevant stakeholders, etc. All these aims to prevent and reduce to minimum marine litter pollution and its impacts, to remove to the extent possible already existent marine litter by using environmentally respectful methods and to enhance knowledge on marine litter.

4.1.4. Monitoring program

According to the Monitoring Program (2014), the current monitoring is poorly developed, focusing more on assessing waste on the beach and seabed. This address both quantitative aspects (number of items or kg), as well as qualitative (composition) for the purpose of providing data in order to describe the trends, a better understanding of sources and distribution of litter in marine environment. Also seeks the improvement of knowledge on socio-economic and environmental impact, supporting the development and assessment of the effectiveness of management and control strategies, in particular integration with solid waste management. Also are addressed human activities (by measuring space, time and intensity) as well as the pressures generated by them both at source and in the marine environment. Nothing is mentioned about the effects of marine litter on biota. Furthermore, in 2017 were proposed a series of new measures for tackling marine litter issues as coordinated and/or supporting regular (annual) awareness raising campaigns for business (commercial agents, beach operators, fishermen, etc.) and general public (tourists, students, children, etc.) about the marine environment and the need to recycle or developing a Marine Litter Bilateral Action Plan (Romania - Bulgaria) meaning a joint methodology to inventor the litter, identification of sources. Other measures were to improve waste management from ships, to facilitate and implement "Fishing for Litter" and to identify areas of litter accumulation in the marine environments and develop an action plan for their depollution.

4.1.5. Romania report - Programme of Measures (art.13, art. 14) under Marine Strategy Framework Directive

In 2017 was published the Romania report - Programme of Measures (art.13, art.14) under Marine Strategy Framework Directive where is mentioned the fact that proposed measures for D10 marine litter are sufficient to achieve GES, but they do not cover micro plastic. It should be emphasized that information is limited and because of transboundary impact of micro plastic, Romania put an exception according to art.14 of MSFD. In this context, Romania applies an exception under art. 14 (a) of MSFD regarding achieving GES for marine litter. In the following years, all efforts shall be made to improve data regarding all types of marine litter based on which this program of measures, including the exceptions, will be updated (especially after approval and implementation of *"Regional Action Plan on Marine Litter Management for the Black Sea"* and "Guidelines for Marine Litter Monitoring in the Black Sea"). These actions will be part of the monitoring program, but there will also be steps taken in research to generate data base for marine waste.

4.1.6. Local Action Plan for Environment

For Constanta was developed a Local Action Plan for Environment which is of particular importance in solving most urgent environmental problems in the county, representing the community's opinion on priority environmental issues. Waste management is one of the top priority problems identified, but is not too much addressed.

4.1.7. Strategy for Sustainable Development of Romania 2030

The end of 2018 came with the official launch of the **Strategy for Sustainable Development of Romania 2030** that provides main lines of action for the implementation of 2030 Agenda, assumed by 193 States at the UN General Assembly in 2015. Integrated waste management is part of **Objectives 12 Responsible consumption and production.** It is mentioned the fact that integrated waste management fits organically in the vision of sustainable development and represents the materialization of the concept of circular economy, based on recycling and conservation. Thus, any man-made product that becomes unusable is treated as raw material for the generation of other products or services. In the same article is said that, in 2016, the recycling rate reported by Eurostat (including compost) was 13%, while the storage rate was 69%. The 2030 targets are:

Recycling 55% of municipal waste by 2025 and 60% by 2030;

- Recycling 65% of packing waste by 2025 (50% plastics, 25% wood, 70% metals, 50% aluminum, 70% glass, 75% paper and cardboard) and 70% plastics, 55% wood, 80% metals, 60% aluminum, 75% glass and 85 % paper and cardboard by 2030;
- Separate collection of hazardous household waste by 2022, bio-waste up to 2023 and textiles by 2025;
- Establishing mandatory schemes of extended producer responsibility for all packing until 2024;

Within Objective 14 Marine life, Conservation and sustainable use of oceans, seas and marine resources for sustainable development is drawn another target for 2030: preventing and significantly reducing marine pollution of all kinds, especially from land-based activities, including marine litter and nutrient pollution.

4.2. Awareness campaigns

Romania is part of the international cleanup campaign "**Let's do it**" which aims to unite the global community, raise awareness and implement true change to achieve our final goal - a clean and healthy planet. Thus, 15 of September is declared the Romania Cleanup Day. In 2018, more than 365 000 volunteers gathered 3505 tons of waste, cleaning 1.502.455 m². In Constanta, 2600 volunteers took part at the action and have collected 3000 bags with waste.

Starting with 2017, Romania joined the challenge "Plastic free July", an international concept of awareness, change and mobilization of community to protect nature from the effects of plastic, where millions of people give up single use plastic during the month of July. Plastic is used daily, in the form of bags, bottles, packaging and many more. Sometimes people use plastic for only a brief moment to carry groceries home or to drink a cup of coffee, but it can take up to 1000 years to decompose. Plastic is destructive for the environment; it lowers the fertility of our soils and is harmful for wildlife. More plastic has been produced in the first ten years of this century than its predecessor.

Mare Nostrum NGO marks every year the **Black Sea International Action Day** by organizing public campaigns to inform local community, coastal communities, authorities and the general public about the importance of marine and coastal ecosystems for local and regional development and the problems that may arise there. Starting with 2016, Mare Nostrum started to organize a running which aim is to raise awareness of the impact of marine litter (picture 1). Thus, there are 3 routes: one for children and their parents, one of 4 km and one of 7 km. The number of participants increases from year to year and in 2018, 1500 runners accepted the proposal, to run for the Black Sea. Also, in 2018 was launched a new challenge for all participants: to prove civic sense by gathering cigarette butts from beach, during their run and bring them to "Mucometru" (picture 2), a new unit of measurement specially designed to record

the number of existing butts. They mobilized and collected 25 units, meaning about 2.500 cigarettes butts.



Picture 1 - Run for Black Sea Source - Mare Nostrum NGO



Picture 2 - "Mucometru" Source - Mare Nostrum NGO

Mare Nostrum has also a campaign dedicated to collection of **waste vegetable oil**. Being to be a toxic residue, waste oil is regulated at the legislative level by special rules, which oblige both oil and gas operators and individuals to collect separately the residual oil and deliver it to the economic agents in charge recycling this type of waste. More than 5 years after its implementation, the project continues to produce results: people bring used vegetable oil, collecting over 10.000 l annually. This is extending also at national level and new and new campaigns and events are available, one of this being "Uleiosul".

4.3. Blue Flag in Romania

Four Romanian beaches in the seaside resorts of Mamaia and Navodari received the quality Blue Flag award in 2018, one more than in 2017 (figure 10). The four beaches in Romania awarded the Blue Flag in 2018 are Musset Lounge & Beach and Vega Vintage Beach in Mamaia, and Phoenicia Beach and Marina Regina Beach in Navodari. The Blue Flag Programme for beaches and marinas is run by the International Foundation for Environmental Education NGO. It challenges local authorities and beach operators to achieve high standards in the four categories of: water quality, environmental management, environmental education and safety. Globally, there are 4,500 Blue Flag beaches and marinas. Most of these beaches are in Spain (590), Greece (519) and Turkey (459).



Figure 10 - Blue Flag in Romania Source - <u>https://www.blueflag.global/</u>

5. Monitoring status - what, how and who is measuring

The European Commission has developed the Marine Strategy Framework Directive (MSFD) for the protection and sustainable use of marine ecosystems. Of the 11 descriptors listed in Annex I of the MSFD for determining GES, descriptor 10 has been defined as 'Marine litter does not cause harm to the coastal and marine environment'.

Developing common approaches, pooling resources through experience-sharing, bringing together the best technical expertise and investing in joint research and crucial tools are necessary to ensure that marine strategies are coherent, consistent and built on the best advice of the political and scientific community. The Directive requires from Member States detailed and coordinated input and in order to facilitate this work, they have set up an informal programme of coordination, the **Common Implementation Strategy (CIS)**.

According to the Directive, each Member State must implement a marine strategy for its marine waters, in cooperation with other Member States sharing the same marine region, reviewed every 6 years (figure 11).



Figure 11 - MSFD implementation cycles

Source: <u>http://ec.europa.eu/environment/marine/eu-coast-and-marine-policy/implementation/index_en.htm</u>

In 2016 was published the assessment for the first phase where is stated the fact that Romania has not defined GES for Descriptor 10 (ANNEX 4). The justification provided for the gap is that there is not enough data and indicators are still under development. However, Romania does not refer to either UNEP or Black Sea Commission documents on the problem of marine litter in the Black Sea (UNEP 2009: Marine Litter: a global Challenge and (draft) Strategic Action Plan for Management and Abatement of marine litter in the Black Sea Region). In the reporting sheet, Romania has not carried out an initial assessment on the level of pressure of and impacts from marine litter due to lack of data. In the paper report, marine litter is regarded as one of the environmental issues caused by shipping, fishing and marine recreational activities (along with the release of nutrients and microbiological agents, physical damage and natural resource extraction). It is not assessed as a separate pressure on the ecosystem.

Romania has not defined any environmental targets to address D10 and it is impossible to assess the consistency between the definition of GES, the initial assessment and the environmental targets since they have not been reported by Romania.

By March 2016, Member States had to set up and implement programmes of measures to achieve good environmental status in their marine waters. This requirement is set in Article 13 of the Marine Strategy Framework Directive. The programme should address each of the MSFD descriptors, and the individual measures should as a whole aim to ensure that environmental targets are addressed and good environmental status (GES) is achieved or maintained by 2020.

On 31 July 2018, the Commission adopted its report assessing these programmes, identifying whether they constitute an appropriate framework within the requirements of the Marine Strategy Framework Directive and whether they address the pressures that the EU seas and oceans are facing. The Commission concluded that while considerable efforts have been made by Member States, not all pressures are covered properly by the measures. The Commission therefore provides recommendations to Member States to guide them in accordance with Article 16 of the Directive (ANNEX 5). Regarding marine litter is mentioned the fact that coherence of pressures addressed by the programmes for marine litter (D10) is assessed to be moderate to high across the EU, but for Romania is nothing stated (figure 12).

Black Sea	BG	Addressed	Fisheries, urban activities, and shipping are addressed. It is not clear if micro-litter is addressed (no data).
	RO		

Figure 12 - Assessment conclusions of coverage of pressures by Black Sea

In August 2017, Romania completed its Article 13 and Article 14 reporting under the Marine Strategy Framework Directive (MSFD), submitting a text-based report presenting its Programme of Measures (PoM) for its waters in the Black Sea. Romania's PoM is comprised of a brief introduction, followed by two short chapters. The first describes the status of implementation of the MSFD at national, regional, and European level, while the second gives an overview of the measures, broken down into existing measures, new measures, and exceptions, with a reasonably detailed outline of the methodology used to select measures. Chapter two also outlines the structure of the measures, which are set out in the Annexes to the document.

The measures have been clearly assigned to the descriptors they address, as presented in Figure 13 below.





Regarding Descriptor 10 Marine Litter, Romania reported three existing (1a) measures, two new (2a) measures and three completely new (2b) measures as relevant to marine litter (D10). The following table summarizes the reported measures for this descriptor.

Table 3 - List of measures for D10 Marine litter

Source - Article 16 Technical Assessment of the MSFD 2015 reporting Programme of Measures, November 2018, European Commission

Measure code	Measure name	ктм	Existing or new	Type of measure
RO-ME- 029	Exploitation of beaches in bathing areas is subject to specific requirements	Not specified	Existing (1a)	Not specified
RO-ME- 033	Development and implementation of the takeover and management plan for ship- generated waste and/or cargo residue	Not specified	Existing (1a)	Not specified

RO-ME- 034	Ensuring the permanent provision and availability of port reception facilities for ship-generated waste and cargo residue and establishing a charging system for port reception facilities	Not specified	Existing (1a)	Not specified
RO-MN- 021	Enhancing inspections of the use of ship cleaning areas in ports	MSFD29 Litter, MSFD31 Contamination	New (2a)	Technical, Legislative
RO-MN- 024	Improvement of waste management from ships	MSFD29 Litter, MSFD31 Contamination	New (2a)	Technical
RO-MN- 025	Coordinated and/or supporting regular (annual) awareness-raising campaigns for the business environment (commercial agents, beach operators, fishermen, etc.) and the public (tourists, students, children, etc.) on the consequences of waste for the environment and the need for waste recycling	WFD19 Recreation and angling, WFD21 Urban and transport pollution, MSFD29 Litter	Completely new (2b)	Awareness/ communication/ dissemination
RO-MN- 026	Facilitating and implementing 'Fishing for Litter' practices	WFD19 Recreation and angling, WFD20 Fishing and other exploitation, MSFD29 Litter	Completely new (2b)	Technical, Awareness/ communication/ dissemination, Economic
RO-MN- 027	Identification of accumulation zones of plastic litter in the marine environment and development of	WFD19 Recreation and angling, MSFD29 Litter	Completely new (2b)	Technical, Awareness/ communication/ dissemination

Romania reports three existing measures with direct effects on the pressure:

- RO-ME-029 refers to the Bathing Water Directive and requires the exploitation of sea bathing areas to be subject to specific requirements, such as the provision of waste collection containers, no petroleum product spills, no detergents and no solid residue, and availability of sanitary facilities. No information is provided on how or by whom this measure is implemented.
- RO-ME-033 links to Directive 2000/59/EC and the MARPOL Convention and concerns the

development and implementation of the takeover and management plan for shipgenerated waste and/or cargo residue. No further information is provided.

 RO-ME-034 links to Directive 2000/59/EC and the MARPOL Convention and concerns the provision of port reception facilities for ship-generated waste and cargo residue and the establishment of a charging system applicable to ships so as to encourage ships to bring back waste and/or cargo residue to port facilities.

According to Romania, the first measure above contributes 'highly' to achieving the objectives of D10 marine litter, while the two last ones have a potentially high contribution to achieving these objectives.

Romania reports two new measures with direct effects on marine litter:

- RO-MN-021 aims to ensure compliance with MARPOL 73/78, the Waste Directive, the Black Sea Convention and Directive 2000/59/EC by improving inspections (in terms of both personnel and logistics) of the use of ship cleaning areas in ports. The measure addresses the reduction of nutrient intake, organic matter and contaminants (chemical and microbiological) in territorial waters and in the EEZ. Romania specifies that the measure contributes 'moderately' to achieving the targets for D10.
- RO-MN-024 covers the collection and transport of ship-generated waste and waste water through improving existing facilities in ports, training staff, and hiring additional staff for overseeing operations. It has been linked to the Waste Directive 2008/98/EC, Directive 2000/59/EC on port reception facilities for ship-generated waste and cargo residue, MARPOL 73/78 and the Convention for the Protection of the Black Sea. According to Romania, the measure has the potential to contribute 'highly' to achieving D10 objectives.

Romania reports one completely new measure with direct effects on the pressure:

RO-MN-026 consists of encouraging fishermen to land all litter accidentally caught in fishing gear, by raising awareness and providing incentives, as well as ensuring adequate infrastructure for waste collection and reception. The measure is linked to the Habitats, Bathing Water and Waste Directives, and Directive 2000/59/EC on port reception facilities for ship-generated waste and cargo residue, amended by Directive 2007/71/EC. Romania reports that the measure will 'moderately' contribute to achieving D10 targets. Romania also reports one completely new measure with an indirect effect on marine

litter. This measure relates to public information and awareness-raising:

RO-MN-025 aims to raise awareness among economic operators (fishermen, tour operators, port operators, etc.) about the negative effects of introducing waste into the marine environment, thereby reducing the pressures at their source. The implementation of the measure involves the following actions: capacity-building events through campaigns and information seminars (for children, students and the general public); regular (annual) campaigns to encourage and promote beach cleaning and improve

voluntary monitoring and collection of marine waste; regular awareness campaigns for economic operators (fishermen, beach operators, commercial agents, etc.) on the negative impact of marine waste on their businesses and on the conservation of biodiversity; and strengthening controls (e.g. compliance with contractual provisions of beach operators, port operators, etc.). The measure is linked to the Waste, UWWT and Bathing Water Directives, the Bucharest Convention and its Protocols. Romania recognizes that the measure makes a small contribution to achieving the D10 targets.

Romania reports **one** completely new measure with both **direct** and **indirect** effects on marine litter:

RO-MN-027 seeks to identify areas where waste accumulation, especially plastic, has been identified and, depending on the area identified (beaches, sandspit, lagoons, harbors, bays, seashore, etc.), details specific actions to recover/collect and recycle such waste. This will (among other things) decrease the creation of micro-plastics through fragmentation of macro-litter. The implementation of the measure involves the following actions: promoting/encouraging the transmission of data/information/observations on the presence of waste (plastic) by the general public, authorities and commercial workers, who have the opportunity to observe and inform the competent authorities (awareness campaigns, media campaigns, dedicated software applications Marine Litter Watch, etc.); creating a working group (to process data/observations received and to develop models of distribution of storage areas on the basis of the data provided); and developing an action plan that includes specific actions for the types of areas identified. The measure is linked to the Habitats, Waste and Bathing Water Directives. Romania reports that the measure will contribute 'moderately' to achieving the targets for D10.

In its Article 8 reporting, Romania identified marine litter as a pressure on its marine water due to fisheries, tourism and recreational activities, and shipping. The following table summarizes the pressures and activities targeted by each of the reported measures.

Table 4 - Pressures addressed by the D10 measures

Source - Article 16 Technical Assessment of the MSFD 2015 reporting Programme of Measures, November 2018, European Commission

Pressure	Activity	Measures	Spatial scope
	Tourism and recreation including yachting	RO-ME-029 (1a)	Not specified
		RO-ME-033 (1a)	Not specified
	Shipping	RO-ME-034 (1a)	

		RO-MN-021 (2a)	Territorial waters, EEZ
		RO-MN-024 (2a)	Territorial waters
Marine litter	Fisheries including recreational fishing (fish and shellfish)	RO-MN-026 (2b)	T erritorial waters
		RO-ME-033 (1a)	Not specified
Port operations	Port operations	RO-ME-034 (1a)	
		RO-MN-021 (2a)	Territorial waters,
		RO-MN-024 (2a)	EEZ
	Various	RO-MN-027 (2b)	Territorial waters
Micro-litter	Various	RO-MN-027 (2b)	Territorial waters

GES for marine litter (D10) is achieved 'when impacts of marine wastes and their decomposition products are reduced and cease to produce harmful effects on the marine and coastal environment'.

The GES definition is very broad, and any measure which improves the situation will contribute to meeting this definition. However, this should not be confused with fully achieving GES.

Romania identified the following targets as relevant for D10:

- \circ The downward trend in the amount of marine waste brought and/or deposited on shore.
- The decreasing trend of the quantity of marine waste in the water column and deposited on the seabed.
- Reducing the number of recorded cases in the presence of marine litter in the digestive system of marine organisms.

Romania applies an exception for D10 under Article 14(1)(a) of MSFD 'action or inaction for which the Member State concerned is not responsible', due to the transboundary impact of marine micro-plastics. Romania reports that information on marine litter, especially micro-plastics, remains limited, which hinders the assessment of status and the identification of suitable measures. It states that efforts will be undertaken to increase the knowledge base, especially regarding the amount of litter originating from other countries. Based on this, the PoM (including the exceptions) will be updated after the approval and implementation of the Regional Action Plan on Marine Litter Management for the Black Sea (adopted on 24-25 October

2018) and the Guidelines for Marine Litter Monitoring in the Black Sea. Nevertheless, Romania does not report whether or not it has identified (or even quantified) the amount of litter coming from neighboring Member States through monitoring efforts, which would represent the basis of such exception. Romania also did not put in place research measures to start filling knowledge gaps about marine litter, and especially micro-litter. The justification is thus found to be partially grounded.

In terms of gaps, Romania states that the proposed measures for D10 marine litter are expected to be sufficient to achieve the targets but that micro-plastics are not covered. Romania emphasizes the limited information on micro-plastics and states its intention to improve data on marine litter. In view of the transboundary character of marine litter, Romania highlights the need for common/coordinated measures with Bulgaria. Romania also reports that these measures should be implemented at regional level.

Also, Romania does not specify when GES will be achieved, but the exception applied for D10 indicates that it will not be reached by 2020.

Commission Decision 2010/477/EU identify the following criteria and four associated indicators for **Descriptor 10**:

Criteria 10.1. Characteristics of litter in the marine and coastal environment

Trends in amount of litter washed ashore and/or deposited on coastlines, including analysis of its composition, spatial distribution and, where possible, source (10.1.1)

In this regard, Mare Nostrum NGO, National Institute for Marine Research and Development "Grigore Antipa" and National Institute for Research and Development on Marine Geology and Geo-ecology - GeoEcoMar developed actions.

Marine litter monitoring became o priority for Mare Nostrum NGO since 2005, when started to develop Coastwatch programme. This was a volunteer programme dedicated especially to students and teachers. The methodology used is the one developed by Coastwatch Europe which is an international network of environmental groups, universities and other educational institutions, who in turn work with local groups and individuals around the coast of Europe. The goal of CWE is the protection and sustainable use of coastal resources, and informed public participation in environmental planning and management. Coastwatch Europe is driven by public participation. Thus, Mare Nostrum made an overview of all Romanian beaches that are easily accessible and split them into sectors. These sectors were made public by sending invitations to schools to be part of this programme. Each school chose one sector that was close to their institution and in October - November took action together with students, parents and other children. They went to sector and inventor each items found on beach and added it on the special sheet. Some groups also removed the litter properly. After each session, the leader completed a report that was sent to Mare Nostrum NGO that prepared each year a joint report with the results of the monitoring. This report was made public and sent to national/local authorities and other relevant stakeholders. Coastwatch is a programme that is repeated each year and is a real success. In this way, is also marked the International Black Sea Action Day.

Moreover, since 2014 Mare Nostrum is applying the protocol for beach litter included in the "Guidance on Monitoring of Marine Litter in European Seas", a guidance document within the Common Implementation Strategy for the Marine Strategy Framework Directive, published in 2013. They are making the monitoring twice per year, in April and October, before and after Summer season. For this were selected 8 beach samples: Vama Veche, Saturn, Costinesti, Eforie, Constanta, Mamaia Nord, Navodari and Corbu. The criteria used in selection were a minimum length of 100 m, clear access to the sea such that marine litter is not screening by anthropogenic structures, accessible to survey teams year-round. The sampling unit covers the whole area between the water edges (where possible and safe) of from the strandline to the back of the beach. The unit in which litter is assessed on the coastline is number and weight and if some items are too big to be weight, their weight is estimated. All items found on the sampling unit are entered on the survey forms. On these, each item is given a unique identification number. Data is entered on the survey forms while picking up the litter (ANNEX 6). Unknown litter or items that are not on the survey form are noted in the appropriate "other item box". A short description of the item is included on the survey form. Digital photos are taken of unknown items so that they can be identified later and, if necessary, be added to the survey form. There are no upper size limits to litter recorded on beaches. A lower limit of 2.5 cm in the longest dimension is recommended for litter items monitored during beach surveys. This ensures the inclusion of caps & lids and cigarette butts in any counts.

Removal of litter should be carried out at the same time as monitoring the litter. Coupling removal with monitoring ensures better accuracy of reporting and enables comparison of litter accumulation over time; it also has the added advantage of leaving a clean beach. The litter collected is disposed of properly.

After each session, the data is also included on Marine Litter Watch developed by the European Environment Agency. Also, is prepared a report that is made public through media and sent to all interested stakeholders: local authorities, ministries, environment agencies, etc. It is prepared an English report that contains data from both sessions in a year and is sent to European stakeholders as Black Sea Commission. In this way, Romanian compulsoriness for descriptor 10 of MSFD is achieved.

Mare Nostrum NGO is also part of "Assessing the vulnerability of the Black Sea marine ecosystem to human pressures (ANEMONE)"; project started in 2017 and is ongoing. Within this, it will take place a marine litter monitoring in 4 riparian countries that are partners in the project: Romania, Bulgaria, Ukraine and Turkey. The project is coordinated by National Institute for Marine Research and Development "Grigore Antipa" from Romania. Mare Nostrum is the task leader and is the organization that prepared the methodology used by all partners. This will be the same as the one usually used in the recent years.

National Institute for Marine Research and Development "Grigore Antipa" made some research regarding marine litter on Romanian beaches, using the Marine Litter Watch app, as an educational tool. This monitoring was performed on three beaches Ammos and Flora, urban and 2 Mai - Vama Veche, rural. Surveys were implemented both off-season (January, April 2015), as well as during the high tourist season (summer 2015) (Golumbeanu, 2017). This research was made according to the methodology included in "Guidance on Monitoring of Marine Litter in European Seas - A guidance document within the Common Implementation Strategy for Marine Strategy Framework Directive". This methodology started to be applied since 2015 and data is recorded on Marine Litter Watch (https://www.eea.europa.eu/themes/water/europes-seas-and-coasts/assessments/marine-litterwatch/data-and-results/marine-litterwatch-data-

<u>viewer/marine-litterwatch-data-viewer</u>) and on online platform EMODNET (http://www.emodnet-chemistry.eu/data) (Figure 14).



Figure 14 - Marine Litter on EMODNET, Black Sea Source - EMODNET

http://ec.oceanbrowser.net/emodnet/?server=http://www.ifremer.fr/services/wms/emodnet_

chemistry2#0

National Institute for Research and Development on Marine Geology and Geo-ecology -GeoEcoMar established 9 sectors of beach situated in the southern part of the Romanian littoral in front of the following Marine Protected Areas (MPAs) - *The submerged sulphurous springs from Mangalia* (ROSC10094), *Aurora Cape* (ROSC10281), *The Marine Area from Tuzla Cape* (ROSC100273), *Underwater Beach Eforie Nord - Eforie Sud* (ROSC10197) and ROSPA00076 *Marea Neagra* and have been surveyed for beach litter identification and quantification. The work protocol followed the methodology described in the EU MSFD TG10 "Guidance on Monitoring of Marine Litter in European Seas" for the assessment of beach litter. All waste items (> 2.5 cm) provided by the mobile application categorized according to TSG - ML code given in the Annex 8.1. of the Guidance were gathered, sorted and quantified (Muresan, 2017). Trends in amount of litter in water column (including floating on the surface) and deposited on sea floor, including analysis of its composition, spatial distribution and, where possible, source (10.1.2)

National Institute for Marine Research and Development "Grigore Antipa" started in 2011 to perform monitoring for marine litter in water column and deposited on sea floor, according to the methodology included in "guidance on Monitoring of Marine Litter in European Seas. They used the bottom trawl and beam trawl. All data were uploaded on EMODNET platform (<u>http://www.emodnet-chemistry.eu/data</u>). For instance, in 2012, was also facilitated bottom trawl survey fishing, during fishing operations, the collection of litter on the seabed. They established 3 sectors from Sulina to Vama Veche at depths ranging between 15 - 90 m. In 28 of 69 hauls performed, in the retention area of the trawl sack, various wastes were also determined (Anton, 2013).

Trends in amount, distribution and where possible, composition of micro-particles (in particular microplastics) (10.1.3)

National Institute for Marine Research and Development "Grigore Antipa" analyzed the micro litter from sand, using square samples.

Criteria 10.2. Impacts of litter on marine life

Trends in amount and composition of litter ingested by marine animals (e.g. stomach analysis) (10.2.1)

Regarding this criterion, National Institute for Marine Research and Development "Grigore Antipa" is the one that performed some actions on some marine organisms, especially fish, but the used methodology or the results are not public.

The efforts made at national level regarding marine litter monitoring are just made by each institution, without any involvement or shared information. For instance, Mare Nostrum NGO is making the monitoring each year and makes public the data, informing also the competent authorities. Also, National Institute for Marine Research and Development "Grigore Antipa" and National Institute for Research and Development on Marine Geology and Geo-ecology - GeoEcoMar are developing different actions in this direction and report data.

Until now, no information is known regarding efforts made at regional level. In the last year were started two regional projects funded by Black Sea Basin Programme 2014 - 2020, "Assessing the vulnerability of the Black Sea marine ecosystem to human pressures (ANEMONE)" and "Improved online public access to environmental monitoring data and data tools for the

Black Sea Basin supporting cooperation in the reduction of marine litter (MARLITER)" that aim to improve the existent knowledge regarding marine litter and harmonize protocols, but also it will take place a first regional effort for marine litter monitoring on Black Sea shores.

Moreover, the Black Sea Marine Litter Regional Action Plan aims to strengthen, harmonize and implement necessary environmental policies, strategies and measures for sustainable integrated management of marine litter issues in the Black Sea region. Once it will be adopted by the Parties, this will be the base of all following actions and will make relevant stakeholders to adopt regional measures.

To have a harmonized regional marine litter monitoring it is important that all stakeholders that have interests in this issue to adopt the same methodology/protocol at national and regional level. The methodology should be based on The Black Sea Marine Litter Regional Action, but also other methodologies that were developed across Europe and that have followed the MSFD requirements. Then, the next step is to agree the resulted methodology and to use it in all kinds of marine debris monitoring. It is very important that the national authorities (ministries) and the regional ones to adopt the action plans and to allocate funds to sustain them. Then, stakeholders involved must share responsibilities, one institution is not enough for tackling this marine pollution and it will be excellent if they can adopt and implement different measures. For instance, one institution can make the monitoring on beaches for macro litter, one for micro litter; another one can be in charge with floating litter and in water column, and so on. In this way, it will be covered a larger area and it will be filled the knowledge gaps regarding Black Sea and we will have comparable data.

Furthermore, it is really important to involve citizen in collecting data, making use of citizen science. Data quality can be improved by volunteer training that shall consist of one-hour classroom preparation or a brief introduction in the field just before sampling activity. Also, shall incorporate a validation process in which the data gathered by the volunteers are compared to data obtained by professional scientists. It is strongly recommended that a professional scientist demonstrates the tasks that citizen scientists will be performing in the field beforehand. Whenever possible, scientific surveys themselves should be supervised by scientists in order to ensure proper sampling and data collection. Participants should also be involved in the data evaluation and communication results as a concluding activity, because this will enhance their commitment to the activity. And following these recommendations, we are sure that citizen scientists are capable to collect relevant data, even showing no significant difference with results gathered by experienced scientists (Thiel et al. 2014, Hidalgo-Ruz, 2015).

Then, different institutions from Romania started to use "Marine LitterWatch", which aim is 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 also includes a public central database hosted by European Environmental Agency. 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). Marine LitterWatch is developed in accordance with the Shared Environmental Information System (SEIS) principles (Galgani et al, 2013).

The Marine LitterWatch (MLW) data viewer provides a map of beach litter data collection events organized by MLW communities (figure 15). It also provides overview graphs and tables of both the data collected and community engagement.



Figure 15 - Beach cleanups and monitoring events in Romania (2013 - 2019) Source -Marine LitterWatch <u>https://www.eea.europa.eu/themes/water/europes-seas-and-</u> <u>coasts/assessments/marine-litterwatch/data-and-results/marine-litterwatch-data-</u> <u>viewer/marine-litterwatch-data-viewer</u>

According to the Marine LitterWatch, the most common material identified at Black Sea is plastic (figure 16), during 167 events. In total were recorded 143.856 items, the most common being the cigarette butt (figure 17).





Source - Marine LitterWatch https://www.eea.europa.eu/themes/water/europes-seas-and-

coasts/assessments/marine-litterwatch/data-and-results/marine-litterwatch-data-

viewer/marine-litterwatch-data-viewer

Top 10 items



Figure 17 - Top 10 items, Black Sea

Source - Marine LitterWatch https://www.eea.europa.eu/themes/water/europes-seas-and-

coasts/assessments/marine-litterwatch/data-and-results/marine-litterwatch-data-viewer/marine-litterwatch-

data-viewer

6. Recommendations: policy, mitigation and management actions (national and regional)

Both the implementation of the management schemes and improvement of knowledge on marine litter are long term processes (figure 18). Research and monitoring have become critical for the Black Sea where not much information is available.



Figure 18 - Types of measures

6.1. Preventing measures

Preventive measures focus on avoiding the generation of debris, or preventing debris from entering the sea. Measures of this type include source reduction, waste reuse and recycling, waste conversion to energy, port reception facilities, gear marking, debris contained at points of entry into receiving waters and various waste management initiatives on land. Product modification and improvement (e.g. through eco design) is an important method for source reduction. A variety of source reduction schemes are available, such as designing packaging such that the product can be refilled (e.g. shampoo bottles), maintaining and repairing durable products (e.g. bicycles), developing more concentrated products (e.g. laundry detergent) and electric messaging (Vaughn, 2009).

Restriction of the use of plastic bags is one of such measures, which is significant in the reduction of plastic waste. Based on the hierarchy of waste management, the strategies of preventing wastes from being formed in the first place is of paramount importance as are recycling, resource recovery and waste-to-energy approaches as less waste is generated and relatively low risks and costs are associated with waste management, compared to other strategies such as treatment and disposal (Cheremisinoff, 2003).Currently, consumers often do

not have a chance to select a more environmentally friendly packaged/produced good as they are all packaged/manufactured with plastics. The EU Waste Framework Directive establishes EPR and describes drivers for sustainable production taking into account the full life cycle of products (EU 2013). This directive encourages member states to take legislative or non-legislative measures in order to strengthen re-use and the prevention, recycling and other recovery operations of waste.

6.2. Mitigating measures

Mitigating measures concern the ways that litter is disposed of. Methods of debris disposal are employed to minimize its adverse impact on the marine environment. These measures are largely command and control regulations, and overlap with preventive ones if they also involve preventing certain types of debris from entering the sea. Examples of such measures include prohibition of certain types of litter (e.g. plastics) discharged into seas or to coastal landfills, dumping regulations if dumping is allowed, prohibition of certain types of wastes discharged into ecologically sensitive areas, specifications of the distances from the land and of waste status for disposal (e.g. waste discharged ≥ 12 miles from the land and wastes not containing substances harmful to the marine environment), and prohibition of certain activities at sea (e.g. incineration of wastes at sea).

6.3. Removing measures

Removing measures aim to remove debris already present in the marine environment. Beach cleanups are commonly employed for this but are time-consuming, costly (Newman et al. 2015) and only capture a fraction of the overall debris.

In Fishing for Litter initiatives fishers remove all litter items collected during normal fishing operations and deposit them safely on the quayside to then be collected for disposal. Gear retrieval programs encourage fishers to retrieve derelict fishing gear at sea during fishing operations (Noh et al. 2010; Watson 2012).

Removal of ALDFG, using environmentally sensitive techniques, can yield several benefits. It provides immediate benefits to marine animals, including cetaceans, by removing gear that is a threat to entanglement and ingestion and has saved thousands of animals (McElwee and Morishige, 2010). In addition to conservation concerns, there can be clear economic benefits to reducing ghost fishing, especially for higher value commercial species such as crustacea, where the cost-benefit ratio of removal costs versus increased fishing yields may exceed 1:10 (Gilardi et al. 2010). It has been argued that paying fishermen to remove derelict gear, in targeted programmes during non-fishing periods, can be cost-effective, as well as educational and hence potentially encouraging more responsible fisheries activity.

While monitoring marine debris is concerned with recording information on debris types, amounts and sources, it can be classified as removing measure since it often concomitantly involves the removal of debris. Monitoring is instrumental in devising effective management strategies to prevent specific types of litter from entering the sea. Importantly, long-term monitoring programmes enable us to assess the effectiveness of legislation and coastal management polices (Rees and Pond, 1995) and have the potential to help management at individual sites and to generate large scale pollution maps (from regional to global) to inform decision makers (Ribicet al. 2010).

6.4. Behaviour - changing measures

Behavior - changing measures seek to influence behavior such that people engage in activities that help to reduce marine debris. Behavior-changing schemes are crosscutting and aid the development and implementation of the above-mentioned three types of measures. Such schemes aim to encourage people to embrace the notion of waste as a resource and choose the products that generate lower quantities of litter (preventive), dispose of waste in a more environmentally sound way (mitigating) and participate in beach cleanups (removal).Education campaigns (Hartley et al. 2015), activities raising awareness such as Fishing for Litter initiatives and provision of incentives are examples of such measures. Behavior-changing schemes are fundamental in addressing marine debris at its root.

One of the largest scientifically-based assessments of public perceptions was conducted in Europe, in a survey of 10,000 citizens from ten European countries, where respondents were asked to identify the three most important environment matters regarding the coastline or sea (Buckley and Pinnegar 2011). The survey was conducted in the context of assessing perceptions about climate, but allowed the respondents to express their concerns freely. When stating levels of concern for a number of environmental issues, including overfishing, coastal flooding and ocean acidification, the term 'pollution', particularly water and oil pollution, was mentioned frequently. Marine debris-related terms, such as 'litter', 'rubbish' and 'beach cleanliness' were also reported, but much less frequently (figure 19).

The survey took place in January 2011, just months after the largest oil spill in history, the Deepwater Horizon, and took place in the Gulf of Mexico, between April and July 2010.



Figure 19 - Main responses from a multinational sample from 10 countries (*n* = 10,106) to a qualitative question that asked individuals to state the three main marine environmental matters. Frequency of responses is illustrated by the size of the text, with *pollution* noted most often (reproduced from Buckley and Pinnegar 2011).

Informing people about marine litter and the impact it can have is regarded generally as an important step in changing behaviors and instilling a more responsible attitude towards protecting the environment. This can involve both formal education and more informal initiatives. All ages can take part although efforts are often directed towards school-age students in the hope that any changed attitudes will persist and may influence their peers and elders.

Then, citizen science is a form of 'learning by doing'. Citizen science initiatives can be very effective at both raising awareness and collecting information and monitoring data about the state of the environment.

6.5. Recommendations based on best practices for policy and public awareness

In the current framework were identified a number of gaps that prevent the effective control of marine litter that can be improved. For instance, Gold et al. (2013) identified a number of limitations in existing instruments in addressing plastic marine litter, including their insufficient scope with respect to the main sources of plastic pollution, exemptions and lack of enforcement standards. MARPOL Annex V exempts accidental loss of disposal of plastic resulting from damage to the ship or its equipment, as well as ships <400 GT, a category to which most of the fishing vessels belong, from recoding garbage discharge operations in Garbage Record Books (GRBs).

The implementation and enforcement of regulations and management measures at national levels is a key component to combat marine litter. Policy makers, managers and scientists involved in implementing MSFD or other framework on marine litter are faced with complex and diverse issues, including questions relating to the harmonization of monitoring tools and strategies, the definition of 'harm' to the marine environment, the assessment of land and sea-based sources from which marine litter enters the sea and the development of a common understanding of the application of appropriate operational/environmental targets. Then, introducing a landfill tax and gradually increase it to divert recyclable waste from the landfills can be a solution and using the revenues to support the separate collection and alternative infrastructure in conjunction with a better allocation of the cohesion policy funds to the first steps of waste hierarchy.

Moreover, it is important to enhance participation and cooperation of state in international/regional initiatives. The transboundary nature of marine litter underlines that the problem is global in scale and international in impact. In this regards, national measures alone are insufficient to control marine debris, and international/regional cooperation is required. A wide range of international/regional initiatives on marine litter (such as UNEP or GPML and various regional sea instruments) have established a platform for concerned states to engage in cooperation; participation and cooperation should be enhanced and strengthened both in terms of the number of participating states and the substantiality of cooperation. This would promote a dialogue among states on good practices in marine litter management and allow for substantial coordination and cooperation in research and developing and implementing more effective and practical management measures, such as the standardization of litter monitoring methods, the technologies for solid waste management, the waste notification system and the fee system for ship-generated waste. Moreover, this would help fewer wealthy countries to advance solid waste and sewage management through technical and financial assistance and training provided by more experienced countries and international organizations (Liffmann et al. 1997).

6.6. Marine litter - stakeholder involvement in the prevention and reduction of marine litter - workshop results

In January 2017, Mare Nostrum NGO organized within "Marine Knowledge Sharing Platform for Federating Responsible Research and Innovation Communities - MARINA" project a Mobilisation and Mutual Learning Workshop "Pollution by human pressure with a special focus on marine litter". This was attended by 29 participants, representatives of different kind of stakeholders: citizens, researchers and scientists, NGO's and CSO's, local policy makers and journalists.

By the end of the workshop, the participants drafted a roadmap having in mind three challenges: priority, feasibility and economic.

PRIORITY

What actions should be taken by the community in order to reduce marine litter?	Level of priority	Stakeholder involvement
 Identifying and monitoring of polluting sources (land and marine), creating and maintaining a viable date base Providing the infrastructure and innovative technologies for selective waste collection (land, marine) Involving the local beaches administration, economic, volunteers and control bodies through testing actions, control and encouraging civic spirit, education in context of compliance and updating the legislation 	High Medium Medium	Citizens/consumers; NGOs; Public authorities; Researchers/scientists; Industry Authorities; Policy makers; Policy implementers; Government; Industry/Businesses; Citizens/consumers; NGOs; Public authorities; Policy makers; Policy implementers; Government; Industry/Businesses.

FEASIBILITY CHALLENGES

What actions should be taken by the community in order to reduce marine litter?	Level	Stakeholder involvement
 Volunteering actions Environmental education in schools Practical education for evaluators Encouraging civic spirit Updating legislation for economic traders Providing infrastructure for waste collection and collection points Intensifying verification/inspection Involving authorities, beaches representatives and administrators 	Short- term Short- term Short- term Medium - term Medium - term Medium - term Medium - term	Citizens/consumers; NGOs; Public authorities; Researchers/scientists; Industry/Businesses; Policy makers; Policy implementers Citizens/consumers; Public authorities; Researchers/scientists; NGOs NGOs; Researchers/scientists; Public authorities Public authorities; Policy makers; Policy implementers; Government; Industry/Businesses. Public authorities; Policy makers; Policy Implementers; Government; Public authorities; Policy makers; Policy Implementers; Government; NGOs; Public authorities; Policy makers; Policy implementers; Government; NGOs; Public authorities; Policy makers; Policy implementers; Government; NGOs; Public authorities; Policy makers; Policy implementers; Government; NGOs; Industry/Businesses.

What actions should be taken by the community in order to reduce marine litter?	Level	Stakeholder involvement
 9. Scientific monitoring and official; development of date base 10. Development of new technologies (recycling; environmentally friendly packages) 11. Monitoring of polluting sources (e.g. ships), over-monitoring 12. Applying concrete methods for waste selective collection 13. Identifying and treating pollution sources 	Long - term Long - term Long - term Long - term Long - term	Researchers/scientists; NGOs; Public authorities; Policy makers; Policy implementers Researchers/scientists; Citizens/consumers; NGOs; Public authorities; Policy makers; Policy implementers; Government; Industry/Businesses. Researchers/scientists; Citizens/consumers;; NGOs; Public authorities; Policy makers; Policy implementers; Government; Industry/Businesses. Public authorities; Policy makers; Policy implementers; Government; Industry/Businesses; Citizens/consumers Public authorities; Policy makers; Policy implementers; Government; Industry/Businesses; Citizens/consumers

ECONOMIC CHALLENGES

What actions should be taken by the community in order to reduce marine litter?	Level	Stakeholder involvement
 Practical education for evaluators Volunteering actions Environmental education by age Encouraging civic spirit Updating legislation for economic traders Applying concrete methods for waste selective collection Intensifying verification/inspection 	Low Low Low Medium Medium Medium	Researchers/scientists; NGOs; Citizens/consumers; NGOs; Public authorities; Researchers/scientists; Industry/Businesses; Policy makers; Policy implementers Citizens/consumers; public authorities; Researchers/scientists; NGOs NGOs; Researchers/scientists; Public authorities Public authorities; Policy makers; Policy implementers; Government; Industry/Businesses. Public authorities; Policy makers; Policy implementers; Government; Industry/Businesses; Citizens/consumers Public authorities; Policy makers; Policy implementers; Government; Industry/Businesses; Citizens/consumers Public authorities; Policy makers; Policy implementers; Government; NGOs;
What actions should be taken by the community in order to reduce marine litter?	Level	Stakeholder involvement

8. Monitoring of polluting sources (e.g. ships), over-monitoring	High	Researchers/scientists; Citizens/consumers; public authorities; NGOs; Public authorities; Policy makers; Policy implementers;
9. Scientific monitoring and official;	High	Government; Industry/Businesses.
development of date base		Researchers/scientists; NGOs; Public authorities;
10. Providing infrastructure for waste	High	Policy makers; Policy implementers
collection and collection points	5	Public authorities; Policy makers; Policy Implementers: Government:
11. Development of new technologies (recycling; environmentally friendly packages)	High	Researchers/scientists; Citizens/consumers;; NGOs; Public authorities; Policy makers; Policy implementers; Government; Industry/Businesses.
12. Identifying and treating pollution sources	High	Public authorities; Policy makers; Policy implementers; Government; Industry/Businesses;
13. Replaying legislative actions,		Citizens/consumers
technical solutions and implementing sanctions	High	Public authorities; Policy makers; Policy implementers; Government; Industry/Businesses.

In March 2019, took place a workshop dedicated to "Marine litter - Stakeholder involvement in the prevention and reduction of marine litter" under the project MARLITER - Improved online public access to environmental monitoring data and data tools for the Black Sea Basin supporting cooperation in the reduction of marine litter, BSB-138.

The first day of the workshop was dedicated to discussion related to the availability of marine litter data, as well as waste management measures and marine litter reduction measures that can be implemented at the Romanian seaside. These discussions were attended by representatives of local and national public institutions, research institutes, universities, etc.

The main measures proposed were:

- Cleaning the coastal areas not contracted for rent;
- Financial allocation for surveys;
- Education and awareness;
- Penalties from competent institutions, selective collection, alert systems for population regarding waste;
- Selective collection and waste recovery;
- Developing sanitation services;
- Technical development of the production of biodegradable packaging;
- Financing local authorities for cleaning and preservation the natural of coastal areas;
- Involving custodians/citizens in data collection;
- Volunteering;
- Updating legislation for economic operators;

References

Allen, R., Jarvis, D., Sayer, S., & Mills, C. (2012): Entanglement of grey seals Halichoerus grypus at a haul out site in Cornwall, UK. Marine Pollution Bulletin, 64, 2815-2819.

ARCADIS, 2013. Final proposal policy mix "4 seas project". Black Sea Region - Constanta case study.

Arthur, C., Sutton-Grier, A. E., Murphy, P., & Bamford, H. (2014): Out of sight but not out of mind: Harmful effects of derelict traps in selected US coastal waters. Marine Pollution Bulletin, 86, 19-28.

Article 12 Technical Assessment of MSFD 2012 obligations, Romania, 2016, pp 31.

Ballance, A., Ryan, P. G., & Turpie, J. K. (2000): How much is a clean beach worth? The impact of litter on beach users in the Cape Peninsula, South Africa. South African Journal of Science, 96, 5210-5213.

Barnes, D. K. A. (2002): Biodiversity: Invasions by marine life on plastics debris. Nature, 416, 808-809.

Barnes, D. K. A., Galgani, F., Thompson, R. C., & Barlaz, M. (2009): Accumulation and fragmentation of plastic debris in global environments. Philosophical Transactions of the Royal Society B, 364, 1985-1998.

Baulch, S., & Perry, C. (2014): Evaluating the impacts of marine debris on cetaceans. Marine Pollution Bulletin, 80, 210-221.

Berkun, M., Aras, E. and Nemlioglu, S. 2005. Disposal of solid waste in Istanbul and along the Black Sea coast of Turkey. Waste Management 25: 847-855.

BioIntelligence Service, Copenhagen Resource Institute and Regional Environmental Center (2012) Preparing a Waste Prevention Programme: Guidance document.

Birkun, A., Jr. 2002 Cetacean direct killing and live capture in the Black Sea. In: G. Notarbartolo di Sciara, ed. Cetaceans of the Mediterranean and Black Seas: State of Knowledge and Conservation Strategies. A Report to the ACCOBAMS Secretariat, Section 6, Monaco, 19 pp.

Bond, A. L., Provencher, J. F., Elliot, R. D., Ryan, P. C., Rowe, S., Jones, I. L., et al. (2013): Ingestion of plastic marine debris by Common and Thick-billed Murres in the northwestern Atlantic from 1985 to 2012. Marine Pollution Bulletin, 77, 192-295.

Browne, M. A. (2015): Sources and pathways of microplastic to habitats. In M. Bergmann, L. Gutow & M. Klages (Eds.), Marine anthropogenic litter (pp. 229-244). Berlin: Springer.

BSC, 2007 Marine litter in the Black Sea Region: A review of the problem. Istanbul, Turkey: Black Sea Commission Publications 2007-1.

Buckley, P., Pinnegar, J. K., Dudek, A., Arquati, A. (2011). Report on European public awareness and perception of marine climate change risks and impacts. CLAMER deliverable 2.2. ENV.2009.1.1.6.3. FP7-2009-1-244132

Bugoni, L., Krause, L., & Petry, M. V. (2001): Marine debris and human impacts on sea turtles in Southern Brazil. Marine Pollution Bulletin, 42, 1330-1334.

CBD [Convention of Biological Diversity]. (2012): Impacts of marine debris on biodiversity: Current status and potential solutions. CBD Technical Series No. 67. Montreal: Secretariat of the CBD/the Scientific and Technical Advisory Panel—GEF.

Celik, F. 2002 A case study: Interstate highway in the Black Sea coast. Proc. 4th Conf. on Turkish Coast and Coastal Areas (Izmir, Turkey, 5-8 November 2002), Vol. II: 847-856. (In Turkish)

Chanprateep, S. (2010). Current trends in biodegradable polyhydroxyalkanoate. Journal of Bioscience and Bioengineering 110(6): 621-632.

Cheremisinoff, N. P. (2003): Handbook of solid waste management and waste minimization technologies. Amsterdam: Butterworth-Heinemann

Cheshire, A. C., Adler, E., Barbière, J., Cohen, Y., Evans, S., Jarayabhand, S., et al. (2009). UNEP/IOC guidelines on survey and monitoring of marine litter. UNEP Regional Seas Reports and Studies, No. 186; IOC Technical Series No. 83.

Donohue, M. J., & Foley, D. G. (2007): Remote sensing reveals links among the endangered Hawaiian monk seal, marine debris, and El Niño. Marine Mammal Science, 23, 468-473.

Donohue, M. J., Boland, R. C., Sramek, C. M., & Antonelis, G. A. (2001): Derelict fishing gear in the Northwestern Hawaiian Islands: Diving surveys and debris removal in 1999 confirm threat to coral reef ecosystems. Marine Pollution Bulletin, 42, 1301-1312.

European Commission (2012b) COMMISSION STAFF WORKING DOCUMENT: Overview of EU policies, legislation and initiatives related to marine litter. SWD (2012) 365 final, 31.10.2012b,

European Commission (2013b) Integration of results from three Marine Litter Studies.

EU. (2013): Green paper on a European strategy on plastic waste in the environment. COM (2013) 123 final. Retrieved August 15, 2014, from http://ec.europa.eu/environment/ waste/pdf/green_paper/green_paper_en.pdf.

Galgani, F., Hanke, G., & Maes, T. (2015): Global distribution, composition and abundance of marine litter. In M. Bergmann, L. Gutow, & M. Klages (Eds.), Marine anthropogenic litter (pp. 29-56). Berlin: Springer.

Gilardi, K., Carlson-Bremer, D., June, J., Antonelis, K., Broadhurst, G. & Cowan, T. 2010. Marine species mortality in derelict fishing nets in Puget Sound, WA and the cost/ benefits of derelict net removal. Marine Pollution Bulletin

Gold, M., Mika, K., Horowitz, C., Herzog, M., & Leitner, L. (2013): Stemming the tide of plastic marine litter: A global action agenda. Pritzker Policy Brief 5.

Graham, N, Hareide, N, Large, P A, MacMullen, P, Mulligan, M, Randall, P J, Rihan, D and Peach, D (2009) Recuperation of fishing nets lost or abandoned at sea. For the European Commission Directorate - General for Fisheries and Maritime Affairs.

Hartley, B. L., Thompson, R. C., & Pahl, S. (2015): Marine litter education boosts children's understanding and self-reported actions. Marine Pollution Bulletin, 90, 209-217.

Interwies, E., Görlitz, S., Stöfen A., Cools, J., van Breusegem, W., Werner, S., et al. (2013). Issue Paper to the International Conference on Prevention and Management of Marine Litter in European Seas (final version). Retrieved August 15, 2014, from http://www.marinelitterconference- berlin.info/userfiles/file/Issue%20Paper_Final%20Version.pdf.

Jambeck, J. R., Geyer, R., Wilcox, C., Siegler, T. R., Perryman, M., Andrady, A., et al. (2015): Plastic waste inputs from land into the ocean. Science, 347, 768-771.

Jang, Y. C., Hong, S., Lee, J., Lee, M. J., & Shim, W. J. (2014): Estimation of lost tourism revenue in Geoje Island from the 2011 marine debris pollution event in South Korea. Marine Pollution Bulletin, 81, 49-54.

Jones, M. M. (1995): Fishing debris in the Australian marine environment. Marine Pollution Bulletin, 30, 25-33.

Kiessling, T., Gutow, L., & Thiel, M. (2015): Marine litter as a habitat and dispersal vector. In M. Bergmann, L. Gutow, & M. Klages (Eds.), Marine anthropogenic litter (pp. 141-181). Berlin: Springer.

Kühn, S., Bravo Rebolledo, E. L., & van Franeker, J. A. (2015): Deleterious effects of litter on marine life. In M. Bergmann, L. Gutow, & M. Klages (Eds.), Marine anthropogenic litter (pp. 75-116).Berlin: Springer.a

Liffmann, M., Howard, B., O'Hara, K., & Coe, J. M. (1997). Strategies to reduce, control, and minimize land-source marine debris. In J. M. Coe & D. B. Rogers (Eds.), Marine debris: Sources, impacts, and solutions (pp. 381-390). Berlin: Springer.

Mare Nostrum reports (2014, 2015, 2016, 2017, 2018)

MARine Litter in Europe Seas: Social AwarenesS and CO-Responsibility - D1.1. Review of the current state of understanding of the distribution, quantities and types of marine litter

McElwee, K. & Morishige, C., eds. 2010. Proceedings of the Workshop on At-sea Detection and Removal of Derelict Fishing Gear. Honolulu, HI, December 9-10, 2008. Technical Memorandum NOS-OR&R-34. Silver Spring, USA, National Oceanic and Atmospheric Administration.

Mouat, J., Lozano, R., & Bateson, H. (2010): Economic impacts of marine litter. Shetland, Scotland, UK: KIMO.

Newman, S., Watkins, E., Farmer, A., ten Brink, P., & Schweitzer, J.-P. (2015): The economics of marine litter. In M. Bergmann, L. Gutow, & M. Klages (Eds.), Marine anthropogenic litter (pp. 371-398). Berlin: Springer.

Noh, H.-J., Kim, H.-K., Kim, S.-D., & Han, S.-G. (2010): Buyback program for fishing gear and marine litter from fishery activities. In C. Morishige (Ed.), Marine debris prevention projects and activities in the Republic of Korea and United States: A compilation of project summary reports (pp. 3-8). NOAA Technical Memorandum NOS-OR&R-36.

Radu, G., Nicolaev, S., Anton, E., Maximov, V. and Radu, E. 2003. Preliminary data about the impact of fishing gears on the dolphins from the Black Sea Romanian waters. In: B. Ozturk and

F.S. Karakulak (Eds.), Proc. Workshop on Demersal Resources in the Black Sea and Azov Sea (Sile, Turkey, 15-17 April, 2003): 115-129.

Rees, G., & Pond, K. (1995): Marine litter monitoring programs—A review of methods with special reference to national surveys. Marine Pollution Bulletin, 30, 103-108.

Report from the Commission to the European Parliament and the Council assessing Member States' programmes of measures under the Marine Strategy Framework Directive, July 2018

Ribic, C. A., Sheavly, S. B., Rugg, D. J., & Erdmann, E. S. (2010): Trends and drivers of marine debris on the Atlantic coast of the United States 1997-2007. Marine Pollution Bulletin, 60, 1231-1242.

Ryan, P. G. (2015): A brief history of marine litter research. In M. Bergmann, L. Gutow, & M. Klages (Eds.), Marine anthropogenic litter (pp. 1-25). Berlin: Springer.

NRC (National Research Council) Committee on the Effectiveness of International and National Measures to Prevent and Reduce Marine Debris and Its Impacts (2008). Tackling Marine Debris in the 21st Century. The National Academies Press, Washington, D.C. 224 p.

Taylor, J. R., DeVogelaere, A. P., Burton, E. J., Frey, O., Lundsten, L., Kuhnz, L. A., et al. (2014): Deep-sea faunal communities associated with a lost intermodal shipping container in the Monterey Bay National Marine Sanctuary, CA. Marine Pollution Bulletin, 83, 92-106.

Thompson, R. C. (2015): Microplastics in the marine environment: Sources, consequences and solutions. In M. Bergmann, L. Gutow, & M. Klages (Eds.), Marine anthropogenic litter (pp.185-200). Berlin: Springer.

Topcu, E.N., Tonay, A.M., Dede, A., Ozturk, A.A. and Ozturk, B. 2012. Origin and abundance of marine litter along sandy beaches of the Turkish Western Black Sea Coast. Marine Environmental Research 86: 21-28.

UNEP. (2005). Marine litter: An analytical overview. Nairobi: UNEP.

UNEP. (2009). Marine litter: A global challenge. Nairobi: UNEP.

Vaughn, J. (2009). Waste management: A reference handbook. Santa Barbara, CA: ABC-CLIO.

Vaughan, C., Gack, J., Solorazano, H., and Ray, R., 2003. The effect of environmental education on schoolchildren, their Parents, and community members: a study of intergenerational and intercommunity learning. The Journal of Environmental Education, 34: 12-21.

Watson, M. (2012): Marine debris along the florida keys reef tract-mapping, analysis and perception study. Open access theses. Paper 330. (http://scholarlyrepository.miami.edu/cgi/viewco ntent.cgi?article=1330&context=oa_theses).







ANNEX 1 - General Strategic Objectives for Waste Management

Source - National Waste Management Strategy

Domain / Activity	Main objectives	Subsidiary objectives
1.Policies and legislative framework	1.1. Harmonizing national policies and legislation in the field of waste management with European policies and legislation, as well as with the provisions of the international agreements and conventions Romania is a party to.	1.1.1. Setting up an appropriate legislative framework for the entire waste management system, with a clear specification of all the "parties involved (professional associations, employers' associations, NGOs, trade unions, the civil society, etc.)", their responsibilities and obligations.
	1.2. Integrating waste management related issues in sectoral and company policies.	1.2.1. Correlating domestic policies and normative acts with European and international legislative provisions in the field of waste management.
-	1.3. Improving efficiency in the implementation of waste management	1.3.1. Granting more importance to the implementation of legislation and monitoring implementation.
	legislation.	1.3.2.Strengthening institutional capacity
		1.3.3.Encouraging private initiative in the field of waste management
2. Institutional and Organizational Matters	2.1 Adapting and developing the institutional and organizational framework in order to meet national	2.1.1.Creating the conditions for improving the efficiency of institutional structures and the systems related to waste management activities.
	requirements and make them compatible with European structures.	2.1.2.Strengthening the administrative capacity of government institutions at all levels (national, regional, county, local) by developing skills and assigning responsibilities in the implementation of the legislation

Common borders. Common solutions.



3.Human Resources	3.1. Securing a sufficient number of human resources, with adequate professional training	3.1.1. Securing sufficient numbers of well-trained staff, equipped with adequate facilities at all levels, both in the public and private sectors.

Domain / Activity	Main objectives	Subsidiary objectives
4.Financing of the waste management system	4.1. Setting up and using economic- financial systems and mechanisms for waste management while observing all general principles, in particular the "polluter pays" principle	4.1.1.Stimulating the setting up and development of a viable market for recyclable waste
		4.1.2. Making best use of all the funding available (environment fund, private funds, structural funds, etc.) for capital expenditures in the field of waste management
		4.1.3. Supporting a system for the management of municipal waste (calculating taxes, special programs using budget money)
		4.1.4. Supporting a system for the management of hazardous production waste.
		4.1.5. Supporting a system for the management of special waste flows: accumulators and batteries, waste oils, used tires, packaging, waste electrical and electronic equipment, end-of-life vehicles, etc. (deposit systems, raising awareness among producers, eco- financing mechanisms)
		4.1.6.Using national and international funds (ISPA, etc.)4.1.7.Financing a national monitoring system in the field of waste management
		4.1.8.Financing the intermediary securing and final rehabilitation of orphan contaminated sites

5. Raising awareness among all parties involved	5.1 Promoting an information, awareness-raising and incentive system for all parties involved	5.1.1.Intensifying communication among all parties involved
		5.1.2. Organising and implementing public education and awareness-raising programmes
Domain / Activity	Main objectives	Subsidiary objectives
6. Information and data system on waste management	6.1. Obtaining complete and accurate data and information corresponding to the national and European reporting requirements	6.1.1.Improving the national system for data and information collection, processing and analysis on waste management
7. Preventing waste generation	7.1. Maximising the prevention of waste generation	7.1.1.Promoting and applying the principle of prevention in industry
		7.1.2.Promoting and applying the principle of prevention among consumers
8. Valorising the useful potential in wastes	8.1. Exploiting all the technical and economic possibilities for waste recovery	8.1.1.Developing a market for secondary raw materials and encouraging the use of products made of recycled materials
		8.1.2.Decoupling waste generation from economic growth and achieving a global reduction of waste quantities
	8.2. Developing materials and energy recovery activities	8.2.1.Giving priority to materials recovery to the extent that technical and economic constraints allow it in such a way as to safeguard human health and the environment
		8.2.2.Promoting energy recovery in highly energy-efficient installations, in case the recovery of materials is not feasible from a technical and economic perspective, there is a positive energy balance resulting from incineration and a possibility to make efficient use of the energy obtained

Domain / Activity	Main objectives	Subsidiary objectives
9. Waste collection and transport	9.1. Providing collection and transport services to as many waste generators as possible-setting up systems covering the entire area of waste generators	9.1.1. Expanding waste collection systems in the urban and rural areas9.1.2. Optimizing transport schemes

	9.2. Selecting the best options available for waste collection and transport, in order to allow effective recovery	9.2.1. Formulating unitary principles and requirements for the operation of all sanitation operators
		9.2.2. Separating hazardous waste streams from non- hazardous waste streams
		9.2.3. Introducing and expanding selective waste collection at the source
		9.2.4. Ensuring more efficient control for domestic and transboundary waste transport activities
10. Waste treatment	10.1. Promoting waste treatment in order to ensure rational environmental management	 10.1.1. Encouraging waste treatment with a view to: enhancing recovery facilitating handling reducing the hazardous nature of waste reducing the final disposal of waste in such a way as to safeguard human health and the environment
11. Disposal	11.1. Disposing of waste according to the requirements of the waste management legislation in order to protect human health and the environment	11.1.1. Securing the necessary waste disposal capacities by giving priority to waste disposal installations at area level.
		11.1.2. Closing down waste disposal sites failing to meet EU requirements.

Domain / Activity	Main objectives	Subsidiary objectives
12. Research and development	12.1 Encouraging and supporting Romanian research in the field of integrated waste management	12.1.1. Adapting clean production technologies to local conditions.
		12.1.2. Developing new technologies for the neutralisation and disposal of hazardous waste.
		12.1.3. Improving availability for developing new solutions in waste prevention, minimisation, recycling and disposal.
		12.1.4. Disseminating information on new solutions and new technologies.
ANNEX 2 - Specific Strategic Objectives for Certain Waste Flows

Source - National Waste Management Strategy

Waste category	Sub-category	Main objective	Subsidiary objective
1. Waste from agriculture, animal breeding, forestry	1.1. Vegetable waste, faeces, sawmill waste, wood waste	nhancing the efficiency of controls concerning the disposal of untreated wastes	
and wood processing, food industry		ncouraging recycling by means of aerobic and anaerobic treatment	
inclustry		upporting energy recovery in case materials recovery is not feasible technically and economically, in such a way as to safeguard human health and the environment	
2. Waste from the generation of heat and power, incineration and co-incineration	2.1. Slag, bottom ash, fly ash, waste gypsum from thermal power stations	upporting materials and energy recovery	
	2.2. Slag, bottom ash, fly ash, waste gypsum from incineration and co-incineration installations	reatment before disposal in case recovery is not possible	

Waste category	Sub-category	Main objective	Subsidiary objective
3. Construction and	3.1. Construction and	3.1.1. Supporting the reuse and recycling of uncontaminated construction and demolition waste	3.1.1.1. Materials and/or energy
demolition	demolition waste		recovery and recycling of
waste	(whether contaminated		demolition waste

or uncontaminated)	3.1.2. Treating contaminated construction and demolition waste with a view to recovery or disposal	
	3.1.3. Developing a facility system allowing adequate disposal	
3.2. Soil excavation waste (contaminated and uncontaminated)	leuse and recycling, to the extent the excavation waste is not contaminated	
	eveloping facilities for the treatment of contaminated soil excavation waste with a view to recovery or disposal, and adequate disposal	
3.3. Road construction waste	3.3.1. Reuse and recycling, to the extent it is not contaminated	
	reatment of contaminated road construction waste for recovery or disposal, and adequate disposal	

Waste category	Sub-category	Main objective	Subsidiary objective
4. Sludges from water purification	4.1. Sludges from water purification plants	4.1.1. Pressing or pre-treatment for energy recovery by co-incineration in cement kilns	
plans		4.1.2. Preventing uncontrolled use on soils	
		4.1.3. Preventing sludge discharge in surface waters	
		Insuring, to the extent it is possible, the recovery of sludge and using it in agriculture for the purposes of fertilization or improvement	

5. Biodegradable waste	5.1. Biodegradable waste: household waste, as well as similar waste from commercial, industrial, service, and institutional sources, street waste, urban sewage sludge)	educing the quantity of biodegradable waste by recycling and processing (minimizing the amount of organic matter in the waste in order to reduce the quantity of leachate and landfill gas)	
---------------------------	--	---	--

Waste category	Sub-category	Main objective	Subsidiary objective
6. Packaging waste	6.1. Packing	mproving the level of packaging reuse and recyclability	
		6.1.2. Optimizing the quantity of packaging per packaged product	
	6.2. Packaging waste	educing the quantity of packaging waste generated by product unit	
		ncreasing the quantity of packaging waste collected, as well as the efficiency of selective waste collection	
		6.2.3. Optimizing the materials recovery schemes	
		etting up and optimizing energy recovery schemes for packaging waste (where materials recovery would not be "feasible")	
7. Tires	7.1. Tires	nhancing the materials and energy recovery of used tires	

Waste category	Sub-category	Main objective	Subsidiary objective
8. End-of-life vehicles	8.1. End-of-life vehicles	etting up a collection network for end-of-life vehicles, adequately represented across the country's territory	
		roviding owners of end-of-life vehicles with the possibility to deliver their vehicles free of charge to collection / recovery facilities	
		estricting the use of heavy metals in the manufacturing of vehicles	
		ncouraging the setting up of recovery facilities for end-of-life vehicles	

Waste category	Sub-category	Main objective	Subsidiary objective
9. Electrical and electronic equipment	9.1. Electrical and electronic equipment (EEE)	euse of EEEs and recycling of WEEEs	9.1.1.1. Encouraging the designing and production of EEEs that facilitate their repair, improvement, reuse, dismantling and recycling
		educing dangerous components in EEEs	9.1.2.1. Encouraging research for replacing dangerous materials with materials having a low impact on human health and the environment
	9.2. Waste electrical and electronic equipment (WEEE)	elective and separate collection of WEEE	9.2.1.1. Collecting a quantity of at least 4 kg/inhabitant/year of waste electrical and electronic equipment starting with 2007

		9.2.1.2. Encouraging consumers to return WEEEs
	Setting up the necessary facilities for the dismantling, recycling, treatment and disposal of WEEE	

ANNEX 3 - Work Programme for the Implementation of the Black Sea Marine Litter Regional Action Plan (BS ML

RAP)

Source - Black Sea Marine Litter Regional Action Plan

	Articles	Activities/Measures	Timetable (deadlines)	Responsible Body	Indicator	Cost
1.	Rationale for the BS ML RAP	Implementation of the MoU between the UNEP/MAP Secretariat and the BSC PS (signed in 2016)	Ongoing	BSC PS UNEP/MAP Secretariat	Implementation reports	
2.						
3.		Preparation, adoption and implementation of the Joint Work Plan on marine litter between BSC PS and UNEP/MAP	2018	BSC PS UNEP/MAP Secretariat	Signed Joint Work Plan	
4.		Establishment of the Joint Working Group (incl. Terms of Reference) supporting the work on the Joint Work Plan on ML	2018	BSC PS UNEP/MAP	Established Joint Working Group	

		between UNEP/MAP and the BSC PS to deal with issues relevant to the Joint Work Plan			Secretariat		
5.		Submission of National Biennial Reports on the implementation of the BS ML RAP	2022		Contracting Parties	Reports issued	
6.		Submission of Regional Biennial Report on the implementation of the BS ML RAP	2023		BSC PS	Report issued	
7.		Submission of the Report on the implementation of the Joint Work Plan on Marine litter between BSC PS and UNEP/MAP	2019		BSC PS	Report issued	
8.	Integration of marine litter measures into National Action Plans (NAPs)	Contracting Parties develop or update Marine Litter National Action Plans (ML NAPs) which may include:	2020		BSC PS Contracting Parties	ML NAPs developed	
		(a) Development and implementation of appropriate policy, legal instruments and institutional arrangements, including adequate management plans for solid waste, also including those originating from sewer systems, which shall incorporate marine litter prevention and reduction measures;	2020		Contracting Parties	Policy, legal instruments and institutional arrangements developed	
		(b) Monitoring programmes for assessment of the current status of marine environment with respect to marine litter;	2018	(revised	Contracting Parties	Monitoring programmes on marine litter	

		2020)	Contracting	developed/revised
		,	Parties	and implemented
	(c) Measures to prevent and reduce marine litter;	2020 (revised 2022)	Contracting Parties	Measures addressing marine litter developed/revised
	(d) Programmes of removal and environmentally sound disposal of existing marine litter according to the national legislation about the management of this kind of waste; and	2020	Contracting Parties	Programme developed
	(e) Awareness raising and education programmes and campaigns	Continually		Awareness raising and education programmes and campaigns conducted
9.	Preparation and adoption of the	2018	BSC PS	Developed and
	structure for National Biennial Reports (basic elements of reporting format)		Contracting Parties	adopted structure of National Biennial Reports
10.	Preparation of National Biennial Reports on National Action Plans (NAPs) by the	2022	BSC PS Contracting	Reports issued

		Contracting Parties. Preparation of Regional Biennial Report by the BSC PC on the basis of National Biennial Reports on NAPs.		Parties		
11.	Legal and institutional aspects	Ensure institutional coordination, where necessary, among the relevant national policy bodies and relevant regional organisations and programmes, in order to promote integration	2019	BSC PS Contracting Parties	Report issued	
12.		Give due consideration to the implementation of the relevant related provisions of the Protocols adopted in the frame of the Bucharest Convention, affecting marine litter management to enhance efficiency, synergies and maximize the results	2018	Contracting Parties	Report issued	
13.		Ensure close coordination between national, regional and local authorities in the field of marine litter management	2019	Contracting Parties	Report issued	
14.		Review and revise the existing national legislation related to marine litter in order to implement the relevant legislation at the national level	2020	Contracting Parties	Report issued	
15.		Integrate marine litter issues into existing legal and administrative instruments relevant to the implementation of waste and water management policies	2020	Contracting Parties	Integrated	
16.		Base urban solid waste management on	2025	Contracting	Implemented	

	Prevention of marine litter pollution	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		Parties BSC PS		
17.		Implement adequate waste reducing/reusing/recycling measures in order to reduce the fraction of plastic/microplastics packaging waste that goes to landfill or incineration without energy recovery	2019	Contracting Parties	Implemented	
18.		Implement Extended Producer Responsibility strategy by making the producers, manufacturer brand owners and first importers responsible for the entire life-cycle of the product with measures prioritizing the hierarchy of waste management in order to encourage companies to design products with long durability for reuse, recycling and materials reduction in weight and toxicity	2019	Contracting Parties BSC PS	Implemented	
19.		Implement Sustainable Procurement Policies contributing to the promotion of the consumption of recycled plastic- made products	2019	Contracting Parties BSC PS	Implemented	
20.		Establish voluntary agreements with	2019	Contracting	Implemented	

	retailers and supermarkets to set ar objective of reduction of plastic bag consumption as well as selling dry food or cleaning products in bulk and refil special and reusable containers		Parties BSC PS		
21.	Implement fiscal and economic instruments to promote the reduction of plastic bag consumption	2019	Contracting Parties BSC PS	Implemented	
22.	Establish Deposits, Return and Restoration Systems for beverage packaging prioritizing when possible their recycling	2019	Contracting Parties BSC PS	Implemented	
23.	Establish procedures and manufacturing methodologies together with the plastic industry, in order to minimize the decomposition characteristics of plastic to reduce micro-plastic	2019	Contracting Parties BSC PS	Implemented	
24.	Improve solid waste infrastructure in order to reduce entry of litter into the marine environment	2019	Contracting Parties BSC PS	Implemented	
25.	Improve or develop permanent services for marine litter collection and remova along the entire coastline of the BS MI RAP area including the populated and unpopulated sections of the shore, where applicable	2020	Contracting Parties BSC PS	Implemented	
26.	Take necessary measures to establish as appropriate adequate urban sewer	2020	Contracting Parties	Implemented	

	wastewater treatment plants, and waste management systems to prevent run-off and riverine inputs of litter		BSC PS		
27.	Take the necessary measures to close to the extent possible the existing illegal dump sites on land in the area of the application of the BS ML RAP	2020	Contracting Parties BSC PS	Implemented	
28.	Take enforcement measures to combat illegal dumping in accordance with national and regional legislation including littering on the beach, illegal sewage disposal in the sea, the coastal zone and rivers in the area of the application of the BS ML RAP	2020	Contracting Parties BSC PS	Implemented	
29.	Develop and implement measures aimed to prevent litter carried by rivers from deposition at sea	2020	Contracting Parties BSC PS	Implemented	
30.	Implement "Gear marking to indicate ownership" concept and 'reduced ghost catches through the use of environmental neutral upon degradation of nets, pots and traps concept', in consultation with the competent international and regional organizations in the fishing sector	2019	Contracting Parties BSC PS	Implemented	
31.	Contact the Permanent Secretariat of the Black Sea Memorandum of Understanding on Port State Control and carry out a Concentrated Inspection Campaign (CIC) focussing on how requirements for	2019	Contracting Parties BSC PS	Implemented	

		preventing marine pollution from ships (MARPOL Annex V) have been implemented. Such campaign is to be conducted in connection with the new amendments to Annex V of MARPOL convention related to products which are hazardous to marine environment (HME) and Form of Garbage Record Book adopted by resolution MEPC.277 (70) and which will be effective from 1st March 2018				
32.		Apply the cost effective measures to prevent any marine littering from dredging activities	2020	Contracting Parties BSC PS	Implemented	
33.		Take enforcement measures to combat dumping in accordance with national and regional legislation including littering on the beach, illegal sewage disposal in the sea, the coastal zone and rivers in the area of the application of the BS ML RAP	2020	Contracting Parties BSC PS	Implemented	
34.		Organise training courses on ghost fishing	2019	Contracting Parties	Training course held	
35.	Removing existing marine litter and its environmentally sound disposal	Implementation of the "Fishing for Litter" environmentally sound practices, in consultation with the competent international and regional organizations, to facilitate clean up of the floating litter and the seabed from marine litter caught incidentally and/or generated by fishing vessels in their regular activities	2020	Contracting Parties BSC PS	Implemented	

	including derelict fishing gears.				
36.	Improvement of Port reception facilitie in order to fully implement obligation arising from Annex V of the MARPO Convention. The Contracting Parties sha also take necessary steps to provide ship using their ports with update information on Annex V of the MARPO Convention	s 2019 s L II s d L	Contracting Parties BSC PS	Implemented	
37.	Charge reasonable costs for the use of port reception facilities or, whe applicable apply No-Special-Fee system in consultation with competer international and regional organization when using port reception facilities	of 2019 n , t	Contracting Parties BSC PS	Implemented	
38.	Identification, in collaboration with relevant stakeholders, accumulation hotspots of marine litter ar implementation of national actions for their regular removal and sound disposa	h 2020 s d r	Contracting Parties BSC PS	Implemented	
39.	Where it is environmentally sound ar cost effective, remove existir accumulated litter	d 2020 g	Contracting Parties BSC PS	Implemented	
40.	Apply as appropriate Adopt-a-Beach of similar practices and enhance publ participation role with regard to marin litter management	or 2019 c	Contracting Parties BSC PS	Implemented	
41.	Participation in the International Coast	al Annual	Contracting	Report o	on

		Cleanup events		Parties Organisations	participation
42.		Implement National Marine Litter Cleanup Campaigns on a regular basis	Annual	Contracting Parties Organisations	Report on campaigns
43.		Participate in a Blue Flag certification by the Foundation for Environmental Education (FEE)	Annual	Contracting Parties Organisations	Report on Blue Flag
44.	Other activities	Direct cooperation of Contracting Parties, with assistance of competent international and regional organizations, to address trans-boundary ML cases	2019	Contracting Parties BSC PS	Implemented
45.		Implementation of the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic area (ACCOBAMS), where applicable	2018	Contracting Parties BSC PS	Implemented
46.		Establish marine litter baseline values, using available data in the Black Sea and in coordination with existing global and regional processes, where applicable	2018	Contracting Parties BSC PS	Implemented
47.		Establish basin-wide marine litter reduction targets, based on available data from the Black Sea region and harmonized with regionally and globally defined targets. Establishment of indicators and thresholds on ML for the Black Sea region, taking into account the specifics of the Black Sea environment,	2018-2019	BSC PS	Implemented

		where applicable				
48.		Identify international, regional and national potential financial sources and propose projects in order to raise funds.	2018-2019	Contracting Parties BSC PS	Implemented	
49.		Identify financial sources and allocation of essential funds for the implementation of national and regional marine litter projects and ensure that relevant programmes and projects are properly incorporated into national budgets	2019	BSC PS Contracting Parties	Identified	
50.		Develop and use common basin scale models of circulation in connection with marine litter movement	2019	BSC PS	Published	
51.		Enhance usage of circular economy in marine litter management	Continuous	Contracting Parties	Reported	
52.		Establish institutional cooperation with various relevant regional and global institutions and initiatives	Continuous	BSC PS	Established	
53.	Marine litter monitoring and assessment	Contracting Parties will assess in the framework of ecosystem approach, the impact of marine litter on the marine and coastal environment and human health, the state of marine and coastal environment due to marine litter as well as the socio-economic aspects of marine litter management based on coordinated and, if possible, common agreed monitoring methodologies and programmes, environmental targets and indicators for assessment of the status of	2020	Contracting parties	Report	

	marine environment, cost - benefit and cost - efficiency assessment methodologies (CBA and CEA), national surveys and projects carried out				
54.	Prepare Guidelines on Monitoring of Marine Litter in the Black Sea Environment. In the process of preparation of the Guidelines the Integrated Monitoring and Assessment Guidance of the MAP and EU ML Monitoring Guidance (2013) may be consulted	2018	BSC PS	Guidelines prepared	
55.	Submission of Guidelines on Monitoring of Marine Litter in the Black Sea Environment for adoption	2018	BSC PS	Adopted	
56.	Implementation of Regional Marine Litter Monitoring Programme as a part of the Black Sea Integrated Monitoring and Assessment Program (BSIMAP) based on National Marine Litter Monitoring Programmes of the Contracting Parties	2019	BSC PS	Implemented	
57.	The Contracting Parties may consider to develop and implement National Monitoring Programmes on Marine Litter (ML NMPs) in compliance with the monitoring obligations under Article 2 of the Bucharest Convention and Article 8 of the LBS Protocol, based on an ecosystem approach and consistent with other regional seas. The ML NMPs should take	2019	BSC PS	Implemented	

	into account the need for harmonization and consistency with the BSIMAP				
58.	Secretariat will work with relevant partner organizations, in order to strengthen technical support that countries might need to implement their National Monitoring Programmes or Marine Litter (ML NMPs) and to integrate environmental targets addressing marine litter in BSIMAP that are not yet included in its initial phase	Continuous	BSC PS	Report	
59.	Take into account the different monitoring capacities of the Contracting Parties and the need for capacity building and technical assistance for implementation	2019	BSC PS	Implemented	
60.	Encourage the Contracting Parties to undertake, when appropriate, join monitoring initiatives on a pilot basis with the aim to exchange best practices use harmonized methodologies, and ensure cost efficiency	2019	BSC PS	Implemented	
61.	Encourage the Contracting Parties to support and take part in regiona initiatives and projects lead by competent partner organizations in order to strengthen strategic and operationa regional synergies	2018	BSC PS	Implemented	

62.		BSC PS will work further with relevant partner organizations, in order to strengthen technical support that countries might need to implement BSIMAP	Continuous	BSC PS	Implemented
63.		The BSC PS will prepare and publish Marine Litter Assessment in the Black Sea every five years using results of the national monitoring programmes and applied measures with the view to address priority issues and major information and data gaps, using all other available relevant regional and international data and where appropriate responses by the Contracting Parties to specific marine litter related questionnaires prepared by the Secretariat	2019	BSC PS	Published
64.		Implementation of marine litter projects at local, national and regional levels on marine litter monitoring and management is incorporated within the national budgets and with international financial support	Continuously	Contracting parties BSC PS	Implemented
65.		Establishment of the Black Sea National and Regional Data Bases on ML compatible with other regional or overarching data bases, where applicable	2019	Contracting parties BSC PS	Data Bases established
66.	Research topics	Consider Potential research topics relevant to marine litter	2018	BSC PS	Identified research topics

	and scientific cooperation					
67.	Enhancement of public awareness and education	Enhancement of public awareness and education by holding a set of national and regional awareness seminars/workshops, including higher and secondary education institutions involvement	Continuous	MAP Secretariat BSC PS	Report on enhancement	
68.		Participation in UNEP Open online course on ML	When scheduled	Individuals	Participation	
69.	Major groups	Cooperation of administrative stakeholders	Continuous	Contracting parties	Reported	
70.	and stakeholder participation	Ensure appropriate involvement of various stakeholders including local authorities, civil society, private sector and other stakeholders, as appropriate, to implement the measures provided for in the BS ML RAP and other measures	Continuous	BSC PS Contracting parties	Reported	
71.		Organise national and regional meetings/workshops of different stakeholders for the initiation of multilateral partnerships campaigning for clean beaches and water	Continuous	BSC PS	Meetings held	
72.		Enhancement of public-private partnership including local authorities, civil society and private sector	Continuous	Contracting parties	Reported	
73.		Enhance cooperation with national, regional and international NGOs on the issues related to marine litter pollution	Continuous	Contracting Parties	Enhanced cooperation	

		BSC PS	

ANNEX 4 - Summary of the MSFD assessment

Source - Article 12 Technical Assessment of MSFD 2012 obligations, Romania, 2016

The	table	presents	a sumn	nary of	the	assessment,	using	the	following	keys:

Keys	Meaning
+++	Good practice (can be attributed to one individual criteria)
++	Adequate
+	Partially adequate
-	Inadequate
0	Not reported

	GE S		Initial assessment	Targ ets		
Assessme nt	Crit eria	Assessme nt	Crit eri a	Assessme nt	Crit eria	
	 GES defined only for small number of specific habitats and species Only one species of mammals and a few species 	-	 Pressures: Physical loss is not assessed Physical damage is assessed only in a very general way or through the description of certain human activities Very little information on impacts is provided 		 Focus on specific habitats and species assessed in Romanian waters 	

D 1	-	 of shellfish Fish, seabirds and cephalopods are not covered Habitats and species covered are already protected by other mechanisms Non-committal definitions Lack of thresholds for certain definitions 	-	 Features: Information on habitats is relatively detailed but focuses mostly on habitats covered under the Habitats Directive Information on functional groups and species is particularly poor and focuses only on a number of fish stocks and a few species of dolphins, as well as a number of lower trophic species 	+	 Aim to maintain favourable conservation status SMART targets which would ensure that GES is achieved
D 2	-	 GES does not reflect minimum requirements Lack of thresholds and baselines GES definitions at criteria level are generally worded Missing data not identified and no plan to address these gaps 	+	 Inventory of NIS Limited assessment of level of and impacts from the pressure. Judgement on current status made but in contradiction with previous assessments concluding to increasing trends 	0	
D 3	-	 GES defined only for a single stock GES not defined in terms of MSY or PA reference points No coverage of the Commission Decision criteria 	+	 Assessment focused on by-catch of dolphins Information provided on status of several stocks in reference to Fmsy and proportion of sexually mature individuals No description of fleets 	-	 Targets are not SMART No clear relation between the targets and MSY or PA reference points no clear timeline for achievement of targets
D 4	0			See D1.	0	
D 5	-	- The definition of GES reported is rather a series of potential criteria-based sub- definitions and is most of the time non-	+	- Covers loads and concentrations of the relevant nutrients and organic matter but the data presented is incomplete	-	 Environmental targets reported in the reporting sheet are rather indicators and thresholds for the achievement of GES

		GE S		Initial assessment	Targ ets		
	Assessme nt	Crit eria	Assessme nt	Cri ter ia	Assessme nt	Crit eria	
		 committal Chlorophyll concentrations are not covered Coverage of macrophytobenthos status and changes in floristic composition Link between WFD and MSFD GES normatives for nutrients (albeit poorly explained). 		 Information on impacts is very limited Judgements and trends on the level of pressure are provided but it is not clear on what threshold they are based on 		 Targets are all impact-specific but not SMART Not clear how they will contribute to the achievement of GES Targets in the paper report are ambitious but not at all operational. 	
D6	0	· · ·		See D1.	0		
D7	0	Romania has not defined GES for D7	-	 The data presented is very limited The level of pressure from human activities or the impacts on ecosystem components is not discussed 	0	Romania has not reported environmental targets for D7	
D8	-	 Not real GES definition, only reference to relevant regulations Reference to EQSD, OSPAR, and other relevant mechanisms List of contaminants to measure and matrices provided Only 8.1 covered, no coverage of 8.2 	+	 Adequate reporting on sources of contamination and input loads Assessment of current concentration levels for relevant substances against EQS No assessment of biological effects on species and functional groups No assessment of radioactive contamination or acute pollution events 	+	 SMART targets focusing on relevant substances and requiring them to be below regulatory levels No real pressure targets focusing on reducing input loads from specific pressures Targets are more expressions of GES 	
D9	0		0		0		
D1 0	0		0		0		
D1 1	0		0		0		

ANNEX 5 - Conclusions MSFD, D10

Source - Report from the Commission to the European Parliament and the Council assesing Member States' programmes of measures under the Marine Strategy Framework Directive, 2018

D10	— Marine litter
	Measures cover both the reduction of marine litter input in coastal areas and in the open sea, as well as the removal of existing litter. Efforts are mostly directed towards macro-litter, through measures such as the introduction of tracking devices on fishing nets to avoid having them lost in the sea, banning the use of plastic bags, the organisation of beach clean-up days and fishing for litter initiatives targeting fisherman.
trengths	Most Member States report measures that are linked with regional actions and coordinated by contracting parties of relevant Regional Sea Conventions. These mostly link to regional action plans for litter, such as under OSPAR, HELCOM and UNEP/MAP.
0	Most Member States also report awareness raising efforts targeting not just the public, but also professional sectors that can be a source of litter (e.g. fishermen)
	Transboundary impacts of marine litter are acknowledged by most Member States.
	All Member States are aware of the problem of marine litter, including micro-litter, and most Member States have a good understanding of the main sources contributing to this problem.

D10 – Marine litter

Micro-litter is not yet fully covered by all Member States. Some report indirect measures to address knowledge gaps for this type of litter, which while not yet fully addressing the problem, will positively contribute to better characterising the pressure and its potential impact on fauna. Very few Member States report direct measures on micro-litter.

Although many Member States refer to 'degradation products' in their GES and target definitions (in a general way), no direct measures are in place to tackle these degradation products.

Due to the lack of knowledge and reporting on the effects of marine litter on biota, it is often unclear how Member States will interpret the issue of 'not cause damage on the marine environment' or 'significant impacts on the marine ecosystem', even though these aspects have been included in many of the GES definitions or in specific targets.

Even though transboundary impacts of marine litter are acknowledged by most Member States, no specific actions (e.g. governance efforts) are reported.

One Member State applied for an exception under Article 14(1)(a) but did not provide a fully grounded justification for doing so (transboundary nature of marine litter not sufficiently explained).

Member States should address micro-litter better, through direct measures, in addition to indirect measures, in line with recommendations of TG Litter¹⁴, to ensure coherence of approaches at the EU level.

Recommendations Member States should establish additional research efforts to address data gaps, increase knowledge and pave the way for direct action to address this litter segment as soon as possible.

Member States should develop efforts to prevent, identify and tackle pollution hot spots (e.g. from plastic pellets, lost fishing gear, single-use plastics, aquaculture, etc.).

Member States should develop targeted measures for products responsible for beach litter coming from both sea-based and land-based sources (such as single-use plastic items).

ANNEX 6 - Observation sheet

Observation sheet

1. Beach area - as is named in the methodology

2. Landmarks for the area

North -

South -

3. Survey date:_____

4. Observations

5. Weight

Туре	Weight in KG
Plastic	
Rubber	
Textile	
Paper/Cardboard	
Wood	
Metal	
Glass	
Other	

6. Recorded items

TSG_ML	OSPAR	UNEP	General Name	Level 1 Materials	Number	of
General	Code	Code			items	
code						
G1	1	PL05	4/6-pack yokes, six-pack	Artificial polymer		
			rings	materials		
G3	2	PL07	Shopping Bags incl. pieces	Artificial polymer		
				materials		
G4	3	PL07	Small plastic bags, e.g.	Artificial polymer		
			freezer bags incl. pieces	materials		
G5	112		Plastic bag collective role;	Artificial polymer		
			what remains from rip-off			

			plastic bags	materials	
G7	4	PL02	Drink bottles <=0.5l	Artificial polymer materials	
G8	4	PL02	Drink bottles >0.5l	Artificial polymer materials	
G9	5	PL02	Cleaner bottles & containers	Artificial polymer materials	
G10	6	PL06	Food containers incl. fast food containers	Artificial polymer materials	
G11	7	PL02	Beach use related cosmetic bottles and containers, e.g. Sunblocks	Artificial polymer materials	
G12	7	PL02	Other cosmetics bottles & containers	Artificial polymer materials	
G13	12	PL02	Other bottles & containers (drums)	Artificial polymer materials	
G14	8		Engine oil bottles & containers <50 cm	Artificial polymer materials	
G15	9	PL03	Engine oil bottles & containers >50 cm	Artificial polymer materials	
G16	10	PL03	Jerry cans (square plastic containers with handle)	Artificial polymer materials	
G17	11		Injection gun containers	Artificial polymer materials	

G18	13	PL13	Crates and containers / baskets	Artificial polymer materials	
G19	14		Car parts	Artificial polymer materials	
G21	15	PL01	Plastic caps/lids drinks	Artificial polymer materials	
G22	15	PL01	Plastic caps/lids chemicals, detergents (non-food)	Artificial polymer materials	
G23	15	PL01	Plastic caps/lids unidentified	Artificial polymer materials	
G24	15	PL01	Plastic rings from bottle caps/lids	Artificial polymer materials	
G25			Tobacco pouches / plastic cigarette box packaging	Artificial polymer materials	
G26	16	PL10	Cigarette lighters	Artificial polymer materials	
G27	64	PL11	Cigarette butts and filters	Artificial polymer materials	
G28	17		Pens and pen lids	Artificial polymer materials	
G29	18		Combs/hair brushes/sunglasses	Artificial polymer materials	
G30	19		Crisps packets/sweets wrappers	Artificial polymer materials	

G31	19		Lolly sticks	Artificial polymer materials	
G32	20	PL08	Toys and party poppers	Artificial polymer materials	
G33	21	PL06	Cups and cup lids	Artificial polymer materials	
G34	22	PL04	Cutlery and trays	Artificial polymer materials	
G35	22	PL04	Straws and stirrers	Artificial polymer materials	
G36	23		Fertiliser/animal feed bags	Artificial polymer materials	
G37	24	PL15	Mesh vegetable bags	Artificial polymer materials	
G40	25	PL09	Gloves (washing up)	Artificial polymer materials	
G41	113	RB03	Gloves (industrial/professional rubber gloves)	Artificial polymer materials	
G42	26	PL17	Crab/lobster pots and tops	Artificial polymer materials	
G43	114		Tags (fishing and industry)	Artificial polymer materials	
G44	27	PL17	Octopus pots	Artificial polymer materials	

G45	28	PL15	Mussels nets, Oyster nets	Artificial polymer materials	
G46	29		Oyster trays (round from oyster cultures)	Artificial polymer materials	
G47	30		Plastic sheeting from mussel culture (Tahitians)	Artificial polymer materials	
G49	31	PL19	Rope (diameter more than 1cm)	Artificial polymer materials	
G50	32	PL19	String and cord (diameterlessthan1cm)	Artificial polymer materials	
G52		PL20	Nets and pieces of net	Artificial polymer materials	
G53	115	PL20	Nets and pieces of net < 50 cm	Artificial polymer materials	
G54	116	PL20	Nets and pieces of net > 50 cm	Artificial polymer materials	
G56	33	PL20	Tangled nets/cord	Artificial polymer materials	
G57	34	PL17	Fish boxes - plastic	Artificial polymer materials	
G58	34	PL17	Fish boxes - expanded polystyrene	Artificial polymer materials	
G59	35	PL18	Fishing line/monofilament	Artificial polymer	

			(angling)	materials	
G60	36	PL17	Light sticks (tubes with fluid) incl. packaging	Artificial polymer materials	
G62	37	PL14	Floats for fishing nets	Artificial polymer materials	
G63	37	PL14	Buoys	Artificial polymer materials	
G64			Fenders	Artificial polymer materials	
G65	38	PL03	Buckets	Artificial polymer materials	
G66	39	PL21	Strapping bands	Artificial polymer materials	
G67	40	PL16	Sheets, industrial packaging, plastic sheeting	Artificial polymer materials	
G68	41	PL22	Fibre glass/fragments	Artificial polymer materials	
G69	42		Hard hats/Helmets	Artificial polymer materials	
G70	43		Shotgun cartridges	Artificial polymer materials	
G71	44	CL01	Shoes/sandals	Artificial polymer materials	

G72			Traffic cones	Artificial polymer materials	
G73	45	FP01	Foam sponge	Artificial polymer materials	
G75	117		Plastic/polystyrene pieces 0 - 2.5 cm	Artificial polymer materials	
G76	46		Plastic/polystyrene pieces 2.5 cm > < 50cm	Artificial polymer materials	
G77	47		Plastic/polystyrene pieces > 50 cm	Artificial polymer materials	
G78			Plastic pieces 0 - 2.5 cm	Artificial polymer materials	
G79			Plastic pieces 2.5 cm > < 50cm	Artificial polymer materials	
G80			Plastic pieces > 50 cm	Artificial polymer materials	
G81			Polystyrene pieces 0 - 2.5 cm	Artificial polymer materials	
G82			Polystyrene pieces 2.5 cm > < 50cm	Artificial polymer materials	
G83			Polystyrene pieces > 50 cm	Artificial polymer materials	
G84			CD, CD-box	Artificial polymer materials	

G85			Salt packaging	Artificial polymer materials	
G86			Fin trees (from fins for scuba diving)	Artificial polymer materials	
G87			Masking tape	Artificial polymer materials	
G88			Telephone (incl. parts)	Artificial polymer materials	
G89			Plastic construction waste	Artificial polymer materials	
G90			Plastic flower pots	Artificial polymer materials	
G91			Biomass holder from sewage treatment plants	Artificial polymer materials	
G92			Bait containers/packaging	Artificial polymer materials	
G93			Cable ties	Artificial polymer materials	
G95	98	OT02	Cotton bud sticks	Artificial polymer materials	
G96	99	OT02	Sanitary towels/panty liners/backing strips	Artificial polymer materials	
G97	101	OT02	Toilet fresheners	Artificial polymer materials	

G98		OT02	Diapers/nappies	Artificial polymer materials	
G99	104	PL12	Syringes/needles	Artificial polymer materials	
G100	103		Medical/Pharmaceuticals containers/tubes	Artificial polymer materials	
G101	121		Dog faeces bag	Artificial polymer materials	
G102		RB02	Flip-flops	Artificial polymer materials	
G124	48	PL24	Other plastic/polystyrene items (identifiable)	Artificial polymer materials	
G125	49	RB01	Balloons and balloon sticks	Rubber	
G126		RB01	Balls	Rubber	
G127	50		Rubber boots	Rubber	
G128	52	RB04	Tyres and belts	Rubber	
G129		RB05	Inner-tubes and rubber sheet	Rubber	
G130			Wheels	Rubber	
G131		RB06	Rubber bands (small, forkitchen/household/post use)	Rubber	
G132			Bobbins (fishing)	Rubber	

G133	97	RB07	Condoms (incl. packaging)	Rubber	
G134	53	RB08	Other rubber pieces	Rubber	
G137	54	CL01	Clothing / rags (clothing, hats, towels)	Cloth/textile	
G138	57	CL01	Shoes and sandals (e.g. Leather, cloth)	Cloth/textile	
G139		CL02	Backpacks & bags	Cloth/textile	
G140	56	CL03	Sacking (hessian)	Cloth/textile	
G141	55	CL05	Carpet & Furnishing	Cloth/textile	
G142		CL04	Rope, string and nets	Cloth/textile	
G143		CL03	Sails, canvas	Cloth/textile	
G144	100	OT02	Tampons and tampon applicators	Cloth/textile	
G145	59	CL06	Other textiles (incl. rags)	Cloth/textile	
G147	60		Paper bags	Paper/Cardboard	
G148	61	PC02	Cardboard (boxes & fragments)	Paper/Cardboard	
G150	118	PC03	Cartons/Tetrapack Milk	Paper/Cardboard	
G151	62	PC03	Cartons/Tetrapack (others)	Paper/Cardboard	
G152	63	PC03	Cigarette packets	Paper/Cardboard	
G153	65	PC03	Cups, food trays, food wrappers, drink containers	Paper/Cardboard	

G154	66	PC01	Newspapers & magazines	Paper/Cardboard	
G155		PC04	Tubes for fireworks	Paper/Cardboard	
G156			Paper fragments	Paper/Cardboard	
G158	67	PC05	Other paper items	Paper/Cardboard	
G159	68	WD01	Corks	Processed/worked wood	
G160	69	WD04	Pallets	Processed/worked wood	
G161	69	WD04	Processed timber	Processed/worked wood	
G162	70	WD04	Crates	Processed/worked wood	
G163	71	WD02	Crab/lobster pots	Processed/worked wood	
G164	119		Fish boxes	Processed/worked wood	
G165	72	WD03	Ice-cream sticks, chip forks, chopsticks, toothpicks	Processed/worked wood	
G166	73		Paint brushes	Processed/worked wood	
G167		WD05	Matches & fireworks	Processed/worked wood	
G171	74	WD06	Other wood < 50 cm	Processed/worked	
				wood	
------	-----	------	--	--------------------------	--
G172	75	WD06	Other wood > 50 cm	Processed/worked wood	
G174	76		Aerosol/Spray cans industry	Metal	
G175	78	ME03	Cans (beverage)	Metal	
G176	82	ME04	Cans (food)	Metal	
G177	81	ME06	Foil wrappers, aluminium foil	Metal	
G178	77	ME02	Bottle caps, lids & pull tabs	Metal	
G179	120		Disposable BBQ's	Metal	
G180	79	ME10	Appliances (refrigerators, washers, etc.)	Metal	
G181		ME01	Tableware (plates, cups & cutlery)	Metal	
G182	80	ME07	Fishing related (weights, sinkers, lures, hooks)	Metal	
G184	87	ME07	Lobster/crab pots	Metal	
G186	83	ME10	Industrial scrap	Metal	
G187	84	ME05	Drums, e.g. oil	Metal	
G188		ME04	Other cans (< 4 L)	Metal	
G189		ME05	Gas bottles, drums &	Metal	

			buckets (> 4 L)		
G190	86	ME05	Paint tins	Metal	
G191	88	ME09	Wire, wire mesh, barbed wire	Metal	
G193			Car parts / batteries	Metal	
G194			Cables	Metal	
G195		OT04	Household Batteries	Metal	
G198	89	ME10	Other metal pieces < 50 cm	Metal	
G199	90	ME10	Other metal pieces > 50 cm	Metal	
G200	91	GC02	Bottles incl. pieces	Glass/ceramics	
G201		GC02	Jars incl. pieces	Glass/ceramics	
G202	92	GC04	Light bulbs	Glass/ceramics	
G203		GC03	Tableware (plates & cups)	Glass/ceramics	
G204	94	GC01	Construction material (brick, cement, pipes)	Glass/ceramics	
G205	92	GC05	Fluorescent light tubes	Glass/ceramics	
G206		GC06	Glass buoys	Glass/ceramics	
G207	95		Octopus pots	Glass/ceramics	
G208		GC07	Glass or ceramic fragments >2.5cm	Glass/ceramics	

G210	96	GC08	Other glass items	Glass/ceramics	
G211	105	ОТ05	Other medical items (swabs, bandaging, adhesive plaster etc.)	unidentified	
G213	181, 109, 110	OT01	Paraffin/Wax	Chemicals	

Joint Operational Programme Black Sea Basin 2014-2020 The publication is edited by the Mare Nostrum NGO. Constanta, 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 Mare Nostrum NGO and can in no way be taken to reflect the views of the European Union.