Bu proje Avrupa Birliği ve Türkiye Cumhuriyeti tarafından finanse edilmektedir

Technical Assistance for Assessment of Türkiye's Potential On Transition to Circular Economy

EuropeAid/140562/IH/SER/TR

Marine Litter Monitoring Studies carried out under the DEN-İZ Programme in Türkiye

Activity 2.2.2. Workshop on Roadmap for Single Use Plastics and Marine Litter

Hacer SELAMOĞLU ÇAĞLAYAN-İbrahim Fatih ERKAL
General Directorate of EIA Permit and Inspection/MoEUCC

6-8 March 2024

İstanbul

TÜRKİYE CUMHURİYETİ ÇEVRE, ŞEHİRCİLİK VE İKLİM DEĞİŞİKLİĞİ BAKANLIĞI

Çevre ve İklim Eylemi Sektör Operasyonel Programı

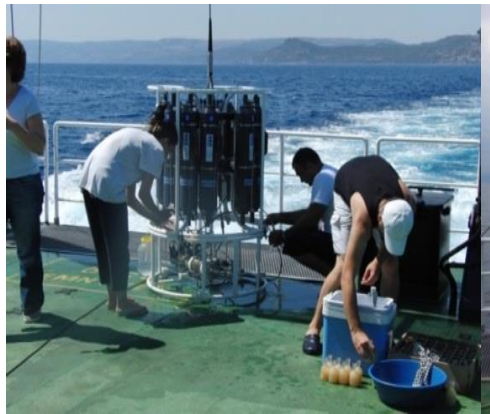
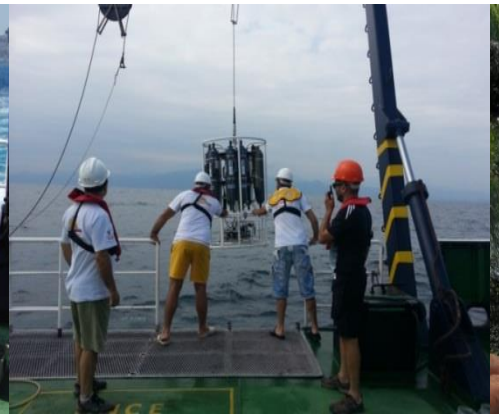
deep Türkiye Döngüsel Ekonomi Eylem Planı

DAI

T.C. ÇEVRE, ŞEHİRCİLİK VE
İKLİM DEĞİŞİKLİĞİ BAKANLIĞI

CONTENT

- Integrated Marine Pollution Monitoring Programme (2014-2025)
- Continuous Monitoring Centre
- Marine Litter Monitoring Studies

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DEN-İZ MONITORING STUDIES BASIS

The seas in our country are exposed to pollution due to various reasons and our seas should be monitored in terms of pollutants in order to determine the pollution status, pollution sources and to take necessary measures.

- **Decree No. 1 Article 104** Duties and powers of the General Directorate of EIA Permitting and Inspection
- **Regional Maritime Conventions to which Türkiye is a party** (Barcelona and Bucharest Conventions and monitoring programmes)
- **National Legislation** (RUWT, RSWQ, RWPC, ...)
- **EU Legislation** (SEA, MSFD)
- **Marmara Sea Protection Action Plan No. 2021/13**
- **Marmara Sea Integrated Strategic Plan 2021-2024**

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NATIONAL MARINE MONITORING PROGRAM (DEN-İZ)

DEN·İZ

Since 2014, the programme has been carried out by the Ministry under the coordination of TÜBİTAK-MAM. The 2023-2025 period started in May 2023.

Working Area

- **4 Seas,**
- **15 DDB**
- **85 coastal water bodies**
- **425 stations**

Period

- **3 annual monitoring period**
- Black Sea, Mediterranean and Aegean Sea **2 periods per year summer and winter,**
- Marmara Sea **3 periods a year spring, summer and winter**

Capacity

- **Cooperation** with many universities, institutes, public institutions and private sector under the coordination of TÜBİTAK-MAM
- **7** Research Vessels
- **>150** researchers and experts
- *** all national budget and national expertise!**

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NATIONAL MARINE MONITORING PROGRAM (DEN-İZ)

DEN·İZ

In The Program **7 research vessels/boats** carry out monitoring expeditions.

Research vessels carrying out oceanographic studies in our seas

TÜBİTAK Marmara Research Center

METU Institute of Marine Sciences

İstanbul University Institute of Marine Sciences and Management

Research vessels/boats carrying out Fish and Invertebrate Biodiversity and Seabed Litter Studies by Trawling

İstanbul University Faculty of Aquatic Sciences

TOB Trabzon Fisheries Central Research Institute

Karadeniz Technical University Sürmene Faculty of Marine Sciences

METU Institute of Marine Sciences

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TÜBİTAK MAM

INTEGRATED MARİNE POLLUTİON MONİTORİNG PROGRAMME (DEN-İZ)

DEN-İZ; a continuously developed monitoring programme based on R&D studies!

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NATIONAL MARINE MONITORING PROGRAM (DEN-İZ)

TÜBİTAK MAM

- Within the scope of DEN-İZ, quality control (QC) and quality assurance (QA) studies are carried out and **qualified and reliable data are produced**.
- Quality control is ensured by international **intercalibration studies, proficiency tests and certified reference materials** (MED-POL, Quasimeme intercalibration tests)
- **Sampling and measurement equipment and methods** specified in the monitoring guidelines are used.
- Equipment is **regularly calibrated**.

- Within the scope of the programme, sampling, measurement and analyses are carried out within the framework of national and international standards and **Marine Monitoring Guidelines** published as a result of the Ensuring Standardisation in Marine Monitoring Project (2015-2016). It is targeted to update the guidelines.

Macroalgae and Seagrass Monitoring Guide

Inorganic Pollutants Monitoring Guide

Eutrophication Monitoring Guide

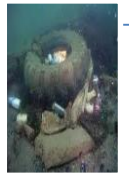
Trawling Method Usage Guide in Biological Diversity Marine Litter Studies

Organic Pollutants Monitoring Guidelines

Hydrographic conditions Monitoring Guide

Marine Mammal Monitoring Guide

Microbiological Pollutants Monitoring Guidelines



Marine Litter Monitoring Guide

Bentose Monitoring Guide

Plankton Monitoring Guide

Underwater Noise Monitoring Guide

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DEN-İZ OUTPUTS

DEN·İZ

Within the scope of the DEN-İZ program:

- Many components such as physicochemical and nutrient assessments, biodiversity studies, radioactivity monitoring and assessments, marine litter monitoring studies, pressure-impact analyses, river, basin and gulf pollution assessments are evaluated.

- The final reports and the summary reports will be distributed to the public institutions. Scientific data is provided on the following topics for the Public Institutions;

➢ **marine and coastal,**
➢ **water and soil management strategies,**
➢ **nature conservation works,**
➢ **waste management policies,**
➢ **coastal planning and climate change adaptation strategies**.

- With our "Biological Diversity" studies in our DEN-İZ Programme, new species found are transformed into publications and included in the international literature, contributing to the **biological diversity of our country**.

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DEN-İZ OUTPUTS

DEN·İZ

The data and metadata produced under the DEN-İZ programme are used in many projects and research areas: (MoAF, Provincial Environmental Directorates, Municipalities, Departments of MoEUCC)

- **Projects**

- Planning of Intervention in Marine Pollution Incidents Project
- Parliamentary Commission (fisheries and aquaculture)
- Project for Updating the National Action Plan for the Protection of Our Seas against Land-Based Pollutants
- Assessing the Threats of Invasive Alien Species in Important Marine Biodiversity Areas Project (MarIAS)
- Dirençli Ekosistemlerde Mavi Büyümeyi Birlikte Geliştirmek için Karadeniz Araştırma ve İnovasyonunun Geliştirilmesi Projesi (BRIDGE-BS)
- Establishment of Marine Environment Strategy of Türkiye Project
- Gediz Basin River Basin Management Plans Preparation Project
- The Effect of Mucilage Formation on Marmara Ecosystem
- Mediterranean Ecological Status Assessment
- "Quantification of Water Resources; Preparation of Monitoring Programmes by Performing Typology, Mass and Risk Studies Project
- Project on "Updating the National Action Plan for the Protection of Our Seas against Land-Based Pollutants"
- Preparation of River Basin Management Plans in 6 Basins European Union Technical Assistance Project
- National Water Information System Project
- TUCBS -Türkiye National Geographic Information System

- **During the mucilage period**

- Data and reports were submitted to
- The Committees of the Grand National Assembly of Türkiye (mucilage), General Directorate of Agricultural Research and Policies, General Directorate of Fisheries and Aquaculture, General Directorate of Water Management.
- Marmara Sea Integrated Strategy Plan

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DEN-İZ INTERNATİONAL STUDİES

- **MEDPOL IMAP reporting of Barcelona Convention to which our country is a party;**

- Bucharest Convention Advisory Group on Pollution Monitoring (**PMA**) and Land-Based Pollutants Advisory Group (**LBS**), Consultative Group on the Conservation of Biological Diversity **(CBD) reports are made using DEN-İZ data**.

- An active role is taken in the work of the Correspondence Group on Monitoring (CORMON), which was established for the Ecosystem Approach (ECAP) for the protection of the Mediterranean Sea, with the opinions of marine monitoring experts in the **development of guidelines** on eutrophication, marine litter and pollutants and in the **determination of regional treshold**.

DEN·İZ

UNEP

MAP

Commission on the Protection of the Black Sea Against Pollution

14 SUDAKİ YAŞAM

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MONİTORİNG COMPONENTS 2023-2025 PERİOD

DEN·İZ

Descriptor 1. Biological Diversity (together with alien species)	Descriptor 3. Commercial seafood	Descriptor 4: Food network	Descriptor 5: Eutrophication (annually)	Descriptor 6: Seafloor Integrity	Descriptor 7: Hydrographic Properties (annually)	Descriptors 8&9: Pollutants (every three years)	Descriptor 10: Marine Litter (every three years)	Advanced Monitoring
Plankton (annually) (zoo and phyto)	Fish (every three years)	Biodiversity	Dissolved Oxygen	Coastal morphology	CTD	Heavy metals in the sediment	Microplastics (annually)	Real-time monitoring
Macro Flora (every three years)			Nutrients TP,PO4-P,DIN,NO3+NO2,NH4-N	Biodiversity	Dissolved Oxygen	Organic pollutants in the sediment (PCB, Pesticide, PAH)	Sea floor macro marine litter	Satellite Images
Macrozoobenthosis (every three years)			Chlorophyll-a		pH	TOC in sediment	**Digested litter**	Coastal Ecosystem and Landscape
Fish (every three years)			SDD		In Situ Fluorescence	TON in sediment	Beach litter	**Offshore Monitoring**
Seagrass Meadow (every three years)					SDD	TP in sediment		Climate change
Coral Reefs (every three years)					Dissolved Oxygen	Heavy metals in biota		**Underwater noise (T11)**
Coralligenous Habitats (every three years)					SiO2	Organic pollutants in biota (PCBs, pesticides, PAHs)		
Alien and invasive species in ports (every three years)						EOM in Biota		
Marine mammals (every three years)						Radioactivity (annually)		
Seabirds (every three years)						Organics with Passive Sampler		
Sponge disease (every three years)								

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TÜBİTAK MAM

DİSSEMİNATİON STUDİES

- I . National Maritime Monitoring and Evaluation Symposium December 21-23, 2016 / ANKARA
- II. National Maritime Monitoring and Evaluation Symposium 11-13 December 2019 / ANKARA
- III. National Maritime Monitoring and Evaluation Symposium 6 - 9 December 2022

Summary reports every 3 years (Turkish/English)

TÜİK Bulletins every 3 years (Turkish/English)

Abstracts Books

Annual Final Reports

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MARİNE LİTTER MONİTORİNG

IMAP- INDİCATORS, CRİTERİA

TÜBİTAK MAM

IMAP		
Ecological Target 10 Marine litter (EO 10 Marine litter)	Indicator	Status (2020-2022)
Marine and coastal litter does not adversely affect the coastal and marine environment	Common Indicator 22 Trends in the amount of litter that washes ashore and/or accumulates on the coastline (including composition, spatial distribution and, where possible, source analyses) (EO10)	Within the scope of DEN-İZ, litter studies are carried out on the beaches on a pilot scale.
	Common Indicator 23 Trends in the amount of litter in the water column and on the seabed, including microplastics	Pilot scale studies were carried out in 2014-2016 and 2017-2019 Programmes. In the 2020-2022 Programme, the station network is expanded and microplastic measurements are carried out in the water surface, water column and sediment.
	Candidate indicator 24 Trends in the amount of litter digested or circulated by marine organisms, focusing on selected marine mammals, seabirds and sea turtles	Not studied in 2020-2022 DEN-İZ. Literature assessment of the studies carried out in our country is added to the reports.

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MSFD-INDİCATORS, CRİTERİA

TÜBİTAK MAM

MSFD (Commission Decision (EU) 2017/848 of 17 May 2017)*		
The characteristics and quantities of marine litter do not harm the coastal and marine environment.**		
D10C1	Primary: The composition, quantity and spatial distribution of litter on the shoreline, in the surface layer of the water column and on the seabed is such that it is not harmful to the coastal and marine environment.	compartments: Coastline (coast), surface water, sea floor
D10C2	Primary: The composition, quantity and spatial distribution of micro-litter on the shoreline, in the surface layer of the water column and on the seabed are such that they do not harm the coastal and marine environment.	micro-litter (<5mm) compartments: Coastline (coast), surface water, sea floor
D10C3	Secondary: The amount of litter and micro-litter ingested by marine animals is at a level that does not adversely affect the health of the species concerned.	ingested litter and micro-litter: birds, mammals, reptiles, fish or invertebrates
D10C4	Secondary: The number of individuals of each species adversely affected by litter, such as entanglement, other types of injury or death, or health effects.	bird, mammal, reptile, fish or invertebrate species at risk from litter will be assessed under DC104.

*Deniz sularının iyi çevresel durumuna ilişkin kriterleri ve metodolojik standartları belirleyen 17 Mayıs 2017 tarih ve 2017/848 sayılı KOMİSYON KARARI (AB) ve İzleme ve değerlendirme için spesifikasyonlar ve standart yöntemler ve 2010/477/EU sayılı Kararın yürürlükten kaldırılması

**Member States shall set thresholds for these levels through co-operation at Union level, taking into account regional or subregional specificities.

MARİNE LİTTER MONİTORİNG

	2013			2014			2015			2016			2017			2018			2019			2020			2021			2022		
Microplastics																														
	SW	S	SED	SW	S	SED	SW	S	SED	SW	S	SED	SW	S	SED	SW	S	SED	SW	S	SED	SW	S	SED	SW	S	SED	SW	S	SED
Mediterranean	12		12	3			3			3			3			3			3			3			3			3		
Black sea	2		2	3			3			3			X			X			X			9			winter 11 summer 9			winter 10 summer 10		
Aegean sea	7		7	2			2			2			X			X			X			10			winter 9 summer 11			winter 11 summer 11		
Marmara	2		2	3			3			3			X			X			X			12			winter 10 summer 12			winter 12 summer 12		
Microplastics in Biota																														
Mediterranean										175 (in stomach or in intestines)																				
Black sea										263 fishes																				
Aegean sea										269 fishes																				
Marmara										fish																				
Macro Litter (trawl/algarna)																														
Mediterranean										7+1									20						23					
Black sea										20 (WEST) 26 (MIDDLE EAST 6 TRAWL 21 ALGARNA)									west 14 middle-east 30						west 20 middle-east 30					
Aegean sea										18									22						24					
Marmara										18									18						18					
	LITTER MONITORING ON THE BEACH																													
Mediterranean													1 beach (3 stations)									1 beach								
Black sea																						1 beach								
Aegean sea													1 beach									1 beach								
Marmara																						1 beach								
Floating Litter																														
Black sea																									Together w/ Marine mammal					

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2023-2025 MARİNE LİTTER MONİTORİNG PLAN

TÜBİTAK MAM

new period planned	2023			2024			2025		
Microplastics									
	SW	S	SED	SW	S	SED	SW	S	SED
Mediterranean	3			3			3		
Black sea	10			10			10		
Aegean sea	10			10			10		
Marmara Sea	10			10			10		
Microplastic in biota (Mullus barbatus or other commercial species)									
Mediterranean				10					
Black sea				10					
Aegean sea				10					
Marmara				10					
Macro Litter (Trawl/Algarna)									
Mediterranean				20					
Black sea				30					
Aegean sea				20					
MARMARA				18					

new period planned	2023	2024	2025
Litter Monitoring on the Beach			
Mediterranean	1	1	1
Black sea	1	1	1
Aegean sea	1	1	1
Marmara Sea	1	1	1
Floating Litter			
Black sea		with marine mammal monitoring	
Marmara Sea		with marine mammal monitoring	
WWT Microplastics			
Marmara Sea			
Mediterranean Sea (Mersin Bay)			

new studies:

- Microplastic studies will be carried out in selected WWTPs in Marmara Sea and Mersin Gulf
- determination of monitoring frequency and methodology

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LİTTER MONİTORİNG STUDİES - CALİBRATİON

TÜBİTAK MAM

Monitoring of microplastics calibration studies

- In 2014, although the sampling method was the same, it was determined that there were differences in the assessments of the implementers.
- In 2015, a calibration study was conducted with the participating institutions in a selected pilot site (Mersin-Limonlu and METU campus).

Pilot Zone

- Limonlu Mersin
- METU campus Mersin

Matrices

- water surface, water column and sediment sampling;

Participants

- TUBITAK MAM (Black Sea and Aegean
- UI-MSc, (Sea of Marmara)
- METU-MScI (Mediterranean)

Criteria for comparison

- comparison of size and particle diversity

Conclusions and Recommendations

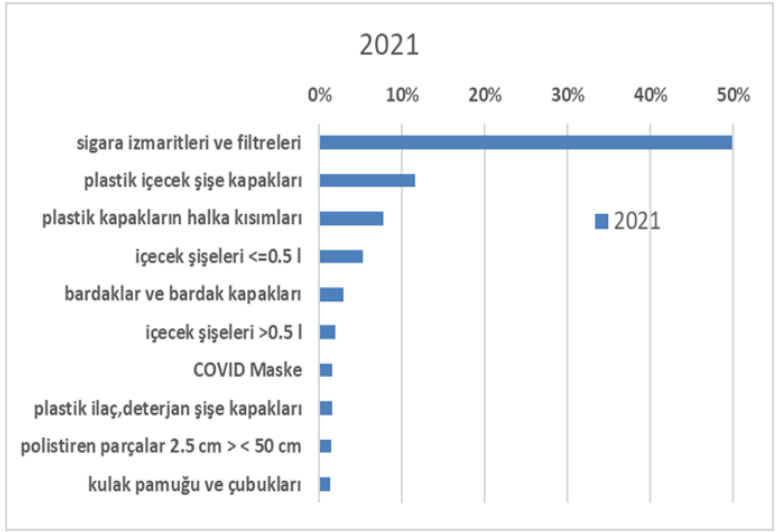
- Problems in sampling (organic material) and vacuum filtration (clogging ethyl alcohol and H2O2), suggestions for problems in evaluations

MARİNE LİTTER MONİTORİNG AND ASSESSMENT TOOLS

Litter monitoring on the beach

- In the sampling area, rubbish is collected and evaluated along a 100-metre coastline.
- Classified according to the waste classification system (JRC Master List) established by the "MSFD Marine Waste Assessment Working Group (TSG-ML)" (Plastic, Rubber, Wood, Metal, Glass, Ceramic, Other).
- Within the scope of the study, organic wastes were left outside the evaluation. The number and weight of each litter type were recorded.
- Litter abundance is expressed in number of pieces/m2, pieces/100 m and weight in g/m2, g/100 m.
- Clean Coast Index (CCI)
- A list of the 10 most frequently encountered items list was developed.

Mersin Limonlu, 2021



Mediterranean, 2021

MARİNE LİTTER MONİTORİNG AND ASSESSMENT TOOLS

Microplastic Monitoring

Plastic particles found in the marine environment that are smaller than 5 mm in size are called microplastics.

- *Surface water:*

Manta net (0.5 m x 0.2 m)

- *Water column:*

WP2 plankton net (diameter 0.57m)

- *Sediment*

Van Veen Grap

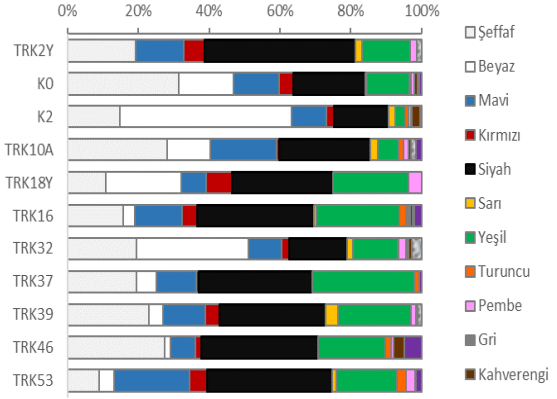
- Biota

Species identification (2 commercial species), trawl gear, examination of stomach contents

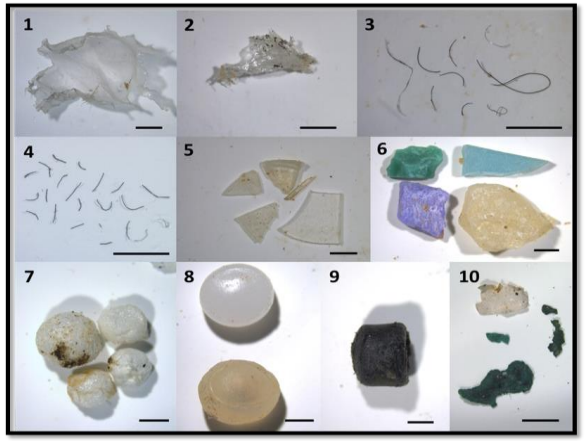
preprocessing → counting with a microscope

Assessment tools:

type, colour, abundance, size distribution, comparison with limit values



color distribution



2021 Black Sea SW types

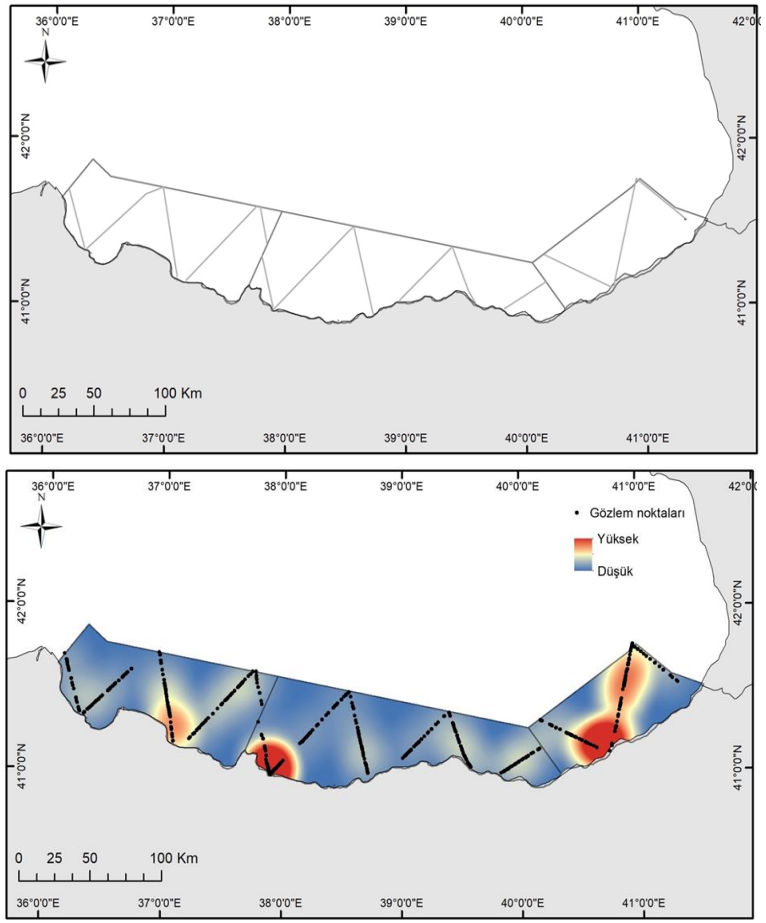
MARİNE LİTTER MONİTORİNG AND ASSESSMENT TOOLS

Floating Litter

- Monitoring and Assessment of Marine Litter: Recommendations for Monitoring the Litter Trend in the Marine Environment*, a data collection template was used
- All litter larger than 2.5 cm was recorded

type of material, colour, all identifiable details of the litter, distance from the ship were recorded.

- The abundance, density, type and distribution were evaluated.
- The abundance and density values of floating litter were estimated using the Distance package** in the R environment (R Core Team, 2021).



*Lippiatt et al., 2013-NOAA
**Miller et al., 2019

2021 Integrated into the Black Sea Marine Mammal Observation Survey (eastern Black Sea)

Seabed Macro Litter

- Simultaneously with biodiversity monitoring; sampling with bottom trawl net/algarna is carried out in accordance with MEDITS protocol.

- Classification, percentage distribution, quantity (pcs/km2), weight (kg/km2)

Çöpün Türü		Ağırlık (g)	Sayı
L1 Plastik	a.Plastik Poşet		
	b.Şişe		
	c.Paket Kağıdı		
	d.Örtü (Masa Örtüsü vb.)		
	e.Sert plastik nesneler		
	f.Balık ağları		
	g.Misinalar		
	h.Balıkçılıkla ilgili diğer şeyler (Tuzaklar, şamandıralar vb. (Belirtiniz))		
	i.Halat / Sarma Bantları		
L2 Lastik / Kauçuk	a.Araba Lastiği		
	b.Diğer (Eldiven, ayakkabı vb. (Belirtiniz))		
L3 Metal	a.İçecek kutuları		
	b.Diğer metal kutular		
	c.Orta büyüklükte metal kaplar (Boya, yağ, kimyasal vb.)		
	d.Büyük metal nesneler (Varil, makine parçası, elektrikli aletler (Belirtiniz))		
	e.Kablo		
	f.Balıkçılıkla ilgili malzemeler (Kanca, zıpkın şişi vb. (Belirtiniz))		
L4 Cam / Seramik	a.Şişeler		
	b.Cam Parçaları		
	c.Seramik kavanoz/küp		
	d.Büyük Nesneler (Belirtiniz)		
L5 Kumaş(Tekstil) Doğal İpler	a.Giysi (Elbise, ayakkabı)		
	b.Büyük Nesneler (Halı, minder vb. (Belirtiniz))		
	c.Doğal Halatlar		
	d.Hijyen Malzemeleri (Bebek bezi, pamuklu çubuk)		
L6 İşlenmiş ağaç (Yük paleti, kasa vb)			
L7 Kağıt ve karton			
L8 Diğer (Belirtiniz)			
L9 Belirtilmemiş			

Sefer	
Çekim No	
Tarih	...../...../20....
Çekimdeki çöpün toplam ağırlığı (g)	

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THEMATİC REPORTS

Thematic reports

2024

- Thematic Report on Eutrophication,
- **Thematic Report on Marine Litter**,

2025

- Thematic Report on Biodiversity (including phyto, zoo, benthic, fish, mammals, birds etc. & alien species),
- Thematic Report on Pollutants
- Thematic Report on Climate Change

Working Plan

- Thematic Meetings
- Online thematic study groups

Content

- Review of all data, monitoring network
- Review of sampling assessment tools
- Use of component-based integrated assessment tools
- Joint evaluation of all relevant component-based parameters

Thematic Report Objectives:

- To bring a national and holistic view specific to the component
- Setting out the situation on a component-specific marine basis
- Connection with national and international policies
- Influencing decision support processes

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CONTİNUOUS MONİTORİNG CENTRE (SIM) OF GREEN AND DİGİTAL TRANSİTİONS

SİM SÜREKLİ İZLEME MERKEZİ

«Data and data analysis,

It is aimed to ensure effective management of all environmental monitoring data from a single centre.

SİM platform currently

- ✓ **13,000 Sensors**, analyzer and device management
- ✓ Big Database with **50 billion data** management **(Big Data)**
- ✓ On average, **3,000 people access SIM** per month.

- ✓ Instantaneous data collection from **1535** points and seasonal data collection from **526** points
- ✓ More than **700** reporting screens
- ✓ Mobile Applications
- ✓ Management of all environmental data from a single center
- ✓ Decision Support Systems, Early Warning System

T.C. ÇEVRE, ŞEHİRCİLİK VE İKLİM DEĞİŞİKLİĞİ BAKANLIĞI

CHALLENGES AND EVALUATION

- Budget- national budget and national expertise
- Long coasts of Türkiye - studies in pilot areas
- Marine litter monitoring is time consuming, labour intensive and requires a wide range of expertise
- Lack of widespread use of low-budget, fast monitoring systems/modelling
- Lack of general acceptance of monitoring and assessment methodologies
- Lack of calibration and intercalibration tests for comparison of methodologies
- Both national and international limit (treshold/baseline values) values for monitoring parameters are at the stage of formation
- Lack of data and information - literature on some components (candidate indicator: marine litter)
- Data management challenges

Evaluation

- Implementation of tools/mechanisms/legislation for the reduction of plastic production/use in national/international areas as soon as possible

Bu proje Avrupa Birliği ve Türkiye Cumhuriyeti tarafından finanse edilmektedir

Thank You.

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