

Marine litter monitoring app & data portal

One place to collect, validate and share marine litter data from beaches, drones, buoys and clean-ups

REMEDIES innovation D4 • Monitoring & Detection pillar • Infordata Sistemi with CIBOS, Mohammed I University and Venice Lagoon Plastic Free

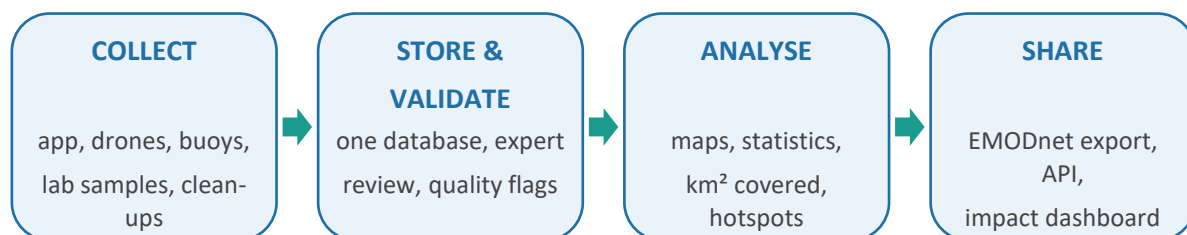
The problem

Marine litter data is collected by many actors with different methods, sheets and apps. Results end up scattered, hard to compare and rarely reused. Decision makers cannot see where litter accumulates, what it is made of, or whether clean-ups and new technologies make a difference.

What the innovation does

- Mobile app for beach surveys and clean-ups, following the EU MSFD / JRC beach litter protocol (J-codes) with the ICC card categories.
- Cloud portal that stores every survey, drone flight, underwater dive, GPS buoy track and clean-up in one validated database.
- Automatic import of aerial and underwater drone results, microplastic samples and GPS buoy telemetry from the REMEDIES technology partners.
- Expert validation workflow, role-based access and an open API for partners and researchers.
- One-click export to EMODnet Chemistry, so REMEDIES data becomes part of the European marine data infrastructure.
- Data feeds the public REMEDIES Impact Evaluation Dashboard built by CIBOS.

How it works



“Collect once, use many times”: every record is entered once and reused for monitoring, reporting, science and public information.

Who is it for

- Municipalities, port authorities and coastal managers who need reliable litter maps to plan clean-ups.
- NGOs and citizen scientists running beach surveys and clean-up events.
- Researchers and technology providers who need a validated, standardised dataset (EMODnet-ready).
- Projects and regions that want to replicate the REMEDIES approach: the platform is open access upon authorisation and can be white-labelled.

Where it has been used

REMEDIES demo sites across the Mediterranean: Koper (Slovenia), Venice lagoon (Italy), Sinis / Sardinia (Italy), Marseille (France), Mykonos and Porto Rafti (Greece), Hamallaj (Albania) and Saïdia (Morocco), plus partner projects reusing the same platform.

Key figures (Sept 2026)

330

registered users from
49 organisations

50,000+

litter items recorded at the
demo sites in 2024–2025

200

GPS buoys tracked,
>15,000 km of drift paths

140+

clean-up events
logged

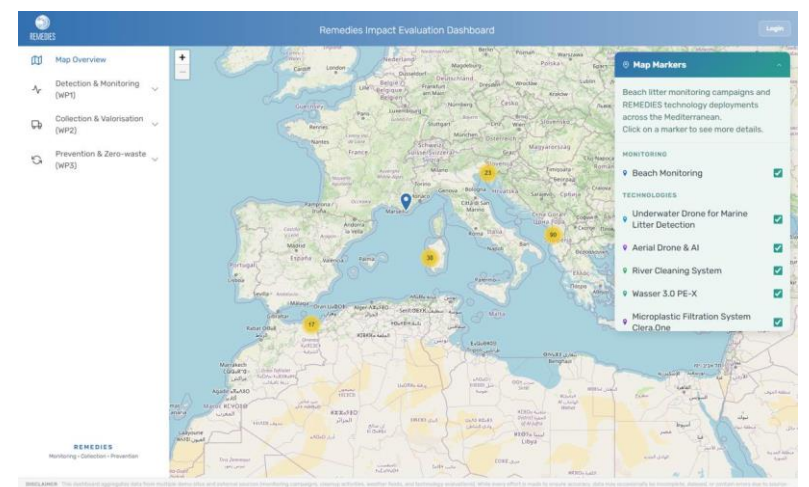
4,600+

historical EMODnet surveys
integrated for comparison

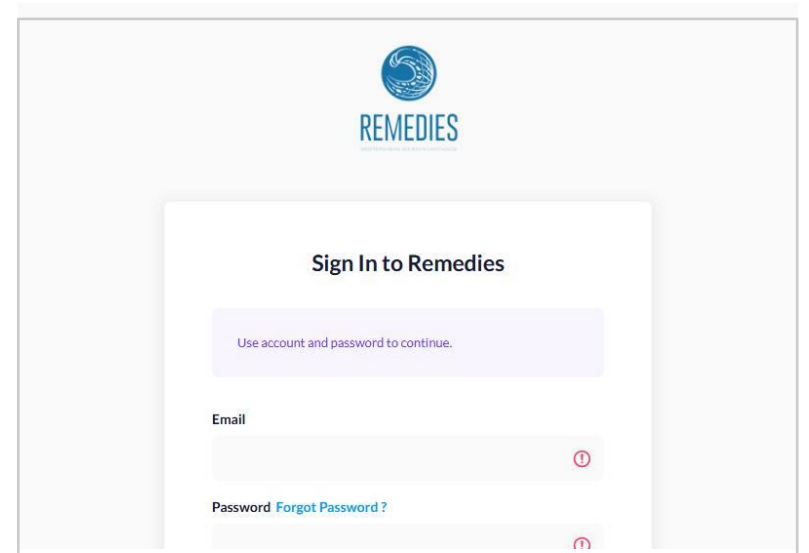
700+

users of the public
impact dashboard

In pictures



REMEDIES Impact Evaluation Dashboard (CIBOS), fed by the portal data



Data portal, remedies.infordata.eu



Data portal



Impact dashboard

Try it / contact us

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Portal access for partners and researchers on request. Public data: dashboard-remedies.mycibos.eu



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PLASTIQUE LITTER SURVEILLANCE: DRONES AND DEEP LEARNING FOR EFFICIENT DETECTION

CONTEXT AND OBJECTIVE

REMEDIES combines detection and monitoring, collection and valorisation, and prevention of plastic waste across Mediterranean demonstration sites. UMP develops the aerial drone and AI innovation within the monitoring pillar.

Objective: detect, locate, track and count visible plastic litter from drone imagery to support targeted beach cleanups and repeated coastal surveys.

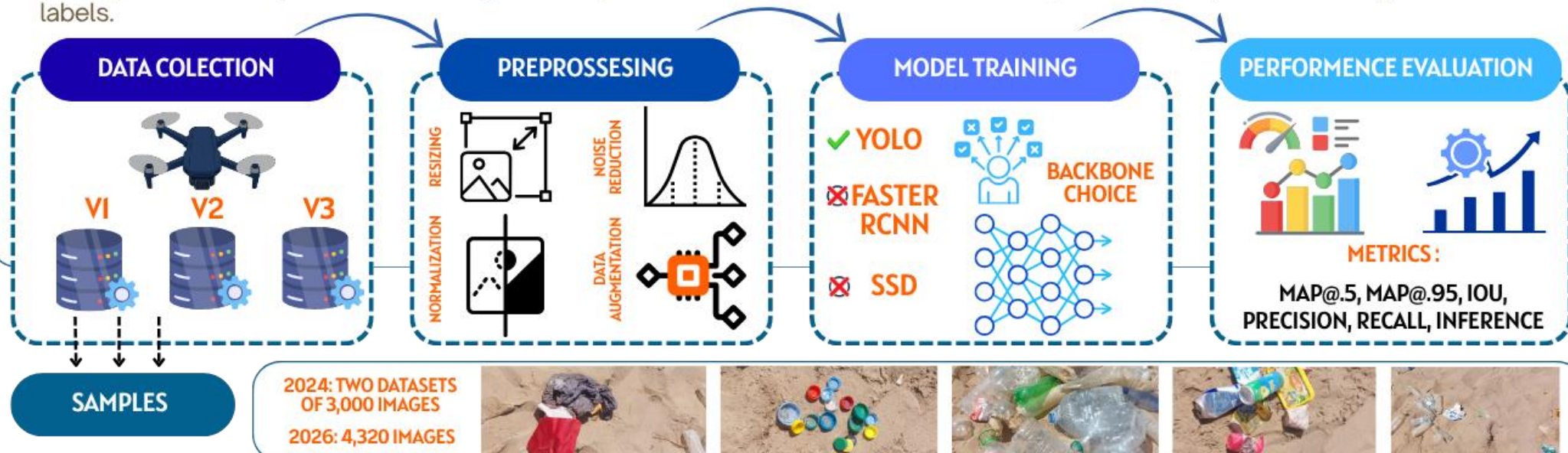
STUDY SITE AND DATA

The Moulouya River mouth near Saïdia, Morocco, provides the coastal test site. A DJI Mavic Air records beach imagery during repeated field visits.



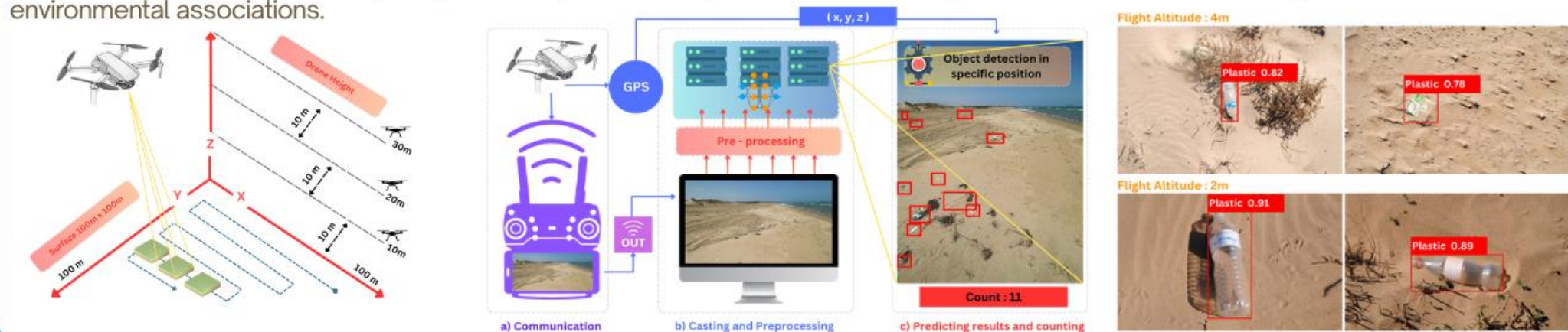
CONTEXT AND OBJECTIVE

1. Acquisition: survey along a planned route and record imagery with GPS and flight information. 2. Preparation: label visible plastic objects, normalise images and augment the training data. 3. Training (2026): split images into 70% training, 20% validation and 10% testing. Train for 70 epochs. 4. Counting: track objects across video frames to reduce duplicate counts, then check against manual labels.



ARCHITECTURE & ENVIRONMENTAL APPLICATION

Georeferenced counts can help target cleanups and compare repeated surveys. UMP works with university volunteers and local environmental associations.



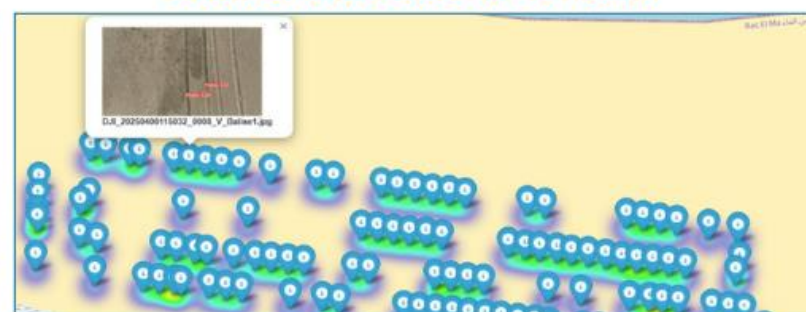
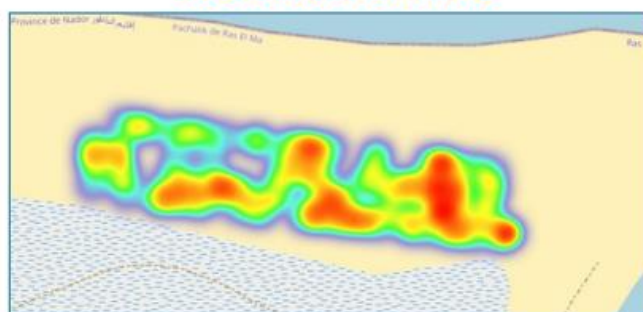
SPATIAL RESULTS FROM DRONE SURVEYS

Field demonstration: drone images become georeferenced plastic detections and hotspot maps, supporting targeted beach surveys.

SAÏDIA, MISSION 5: PLASTIC DETECTION WITH 54% MODEL CONFIDENCE (6 APRIL 2025).

HEATMAP HIGHLIGHTS SPATIAL CLUSTERS OF MAPPED PLASTIC DETECTIONS

MAP POINTS LINK DETECTION LOCATIONS TO ANNOTATED DRONE IMAGES FOR VERIFICATION



Nautiloc – GPS Buoys for Tracking Floating Plastic Litter

From early prototypes to a field-deployed marine litter monitoring system

Marine Conservation Greece | REMEDIES · Detection & Monitoring / Prevention & Zero-Waste

201

GPS buoys deployed
Target: 200

>15,000 km

of GPS drift paths
Target: >10,000 km

12 h

typical position interval
via online platform

Nautiloc uses floating GPS buoys that mimic common plastic litter. By following their movement through rivers and seas, the system reveals transport routes, accumulation zones and potential hotspots — turning plastic drift into actionable location data.



Field deployment: GPS buoys prepared for river monitoring

From prototype to field-ready design



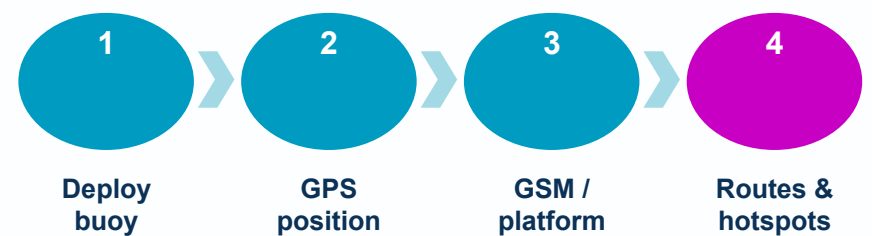
1. Early wood / cork concepts

2. Buoyancy & GPS field tests

3. Refined shapes and tracker fit

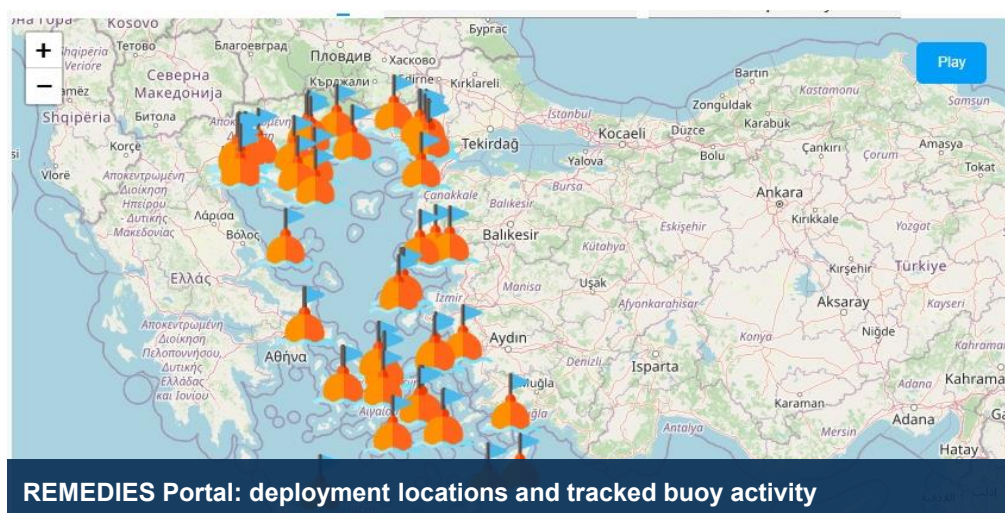
Field experience led away from moisture-sensitive and heavier wooden designs toward durable LDPE/HDPE-type casings that better reproduce floating plastic behaviour and protect the tracker.

How it works



Each buoy transmits its position to the online platform. Trajectories can then be visualised and compared with currents, wind, geography and river discharge to understand where floating litter travels or becomes trapped.

Deployment across rivers & the Aegean



REMEDIES Portal: deployment locations and tracked buoy activity

Deployments covered the Aegean and northern Greek rivers, including open-sea corridors, straits and coastal retention zones. Data feeds the REMEDIES Portal for maps, statistics, travelled distance and trapped-device alerts.

What the data revealed



Key observations

- Drift is strongly controlled by ocean currents.
- Buoys can reverse direction or remain trapped in local retention zones.
- The Cyclades can act as a “net” for floating pollution crossing the Aegean.
- Long-distance tracks show that marine litter is a transboundary problem.

What Nautiloc has achieved so far

REMEDIES T1.4 · field validation and KPI results

201 / 200

buoy deployment KPI
target exceeded

>15,000 km

GPS paths tracked
vs. >10,000 km target

100+

citizens engaged
deployment, recovery & outreach

Field-ready
monitoring system

from prototypes to long-duration deployment

Underwater monitoring and microplastic filtration

CLERA technologies

Underwater drone



Underwater drone with the CLERA sampling module

CLERA adapted an underwater remotely operated vehicle for camera surveys and seawater sampling. The camera records visible litter on the seabed. A custom pump and filtration module collect particles for laboratory analysis.

The sampling unit combines 300, 100 and 50 μm meshes with a flow meter to record the volume filtered.

Field demonstrations

CLERA supported camera surveys in Slovenia.

Clera.One filtration system



Silicon carbide membrane module inside Clera.One

Clera.One combines silicon carbide membrane filtration with ozonation to treat boat-washing wastewater. The SiC membrane retains suspended particles (microplastics).

CLERA installed the demonstrator at MarinaUp Izola, Slovenia, in February 2025. Field sampling campaigns followed in October 2025 and July 2026.

A separate laundry demonstrator combines sand and activated carbon filtration with ultrafiltration and reverse osmosis. Trials in Fiume Veneto, Italy, demonstrated operation with washing machines and water recirculation.

Project result: >95% microplastic removal from wastewater

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Mapping macro- and microplastics in the Mediterranean Sea

REMEDIES Green Paper: Connecting monitoring evidence with policy and action

Samuel Zidarič¹, Marko Petelin¹, Annamaria Vujanovic², Jan Puhar², Andrea Camedda³, Mariacristina Cocca³, Sylvain Petit⁴, Lelekis Ioannis⁵, Antonios Eleftheriou⁵, Alae-eddine Barkaoui⁶, Meivis Struga⁷, Kledisa Cela⁷, Alicia Macan Schönleben⁸, Milica Velimirovic⁸, Katrin Schuhen⁹, Tamara Bizjak¹⁰, Andreja Palatinus¹⁰, Davide Poletto¹¹, Gherardo Toso¹¹

¹ Infordata, IT; ² University of Maribor, SI; ³ CNR, IT; ⁴ SMILO, FR; ⁵ MCG, GR; ⁶ Université Mohammed Premier, MA; ⁷ ETMI, AL; ⁸ VITO, BE; ⁹ W3.0, DE; ¹⁰ NIC, SI; ¹¹ Venice Lagoon Plastic Free, IT.

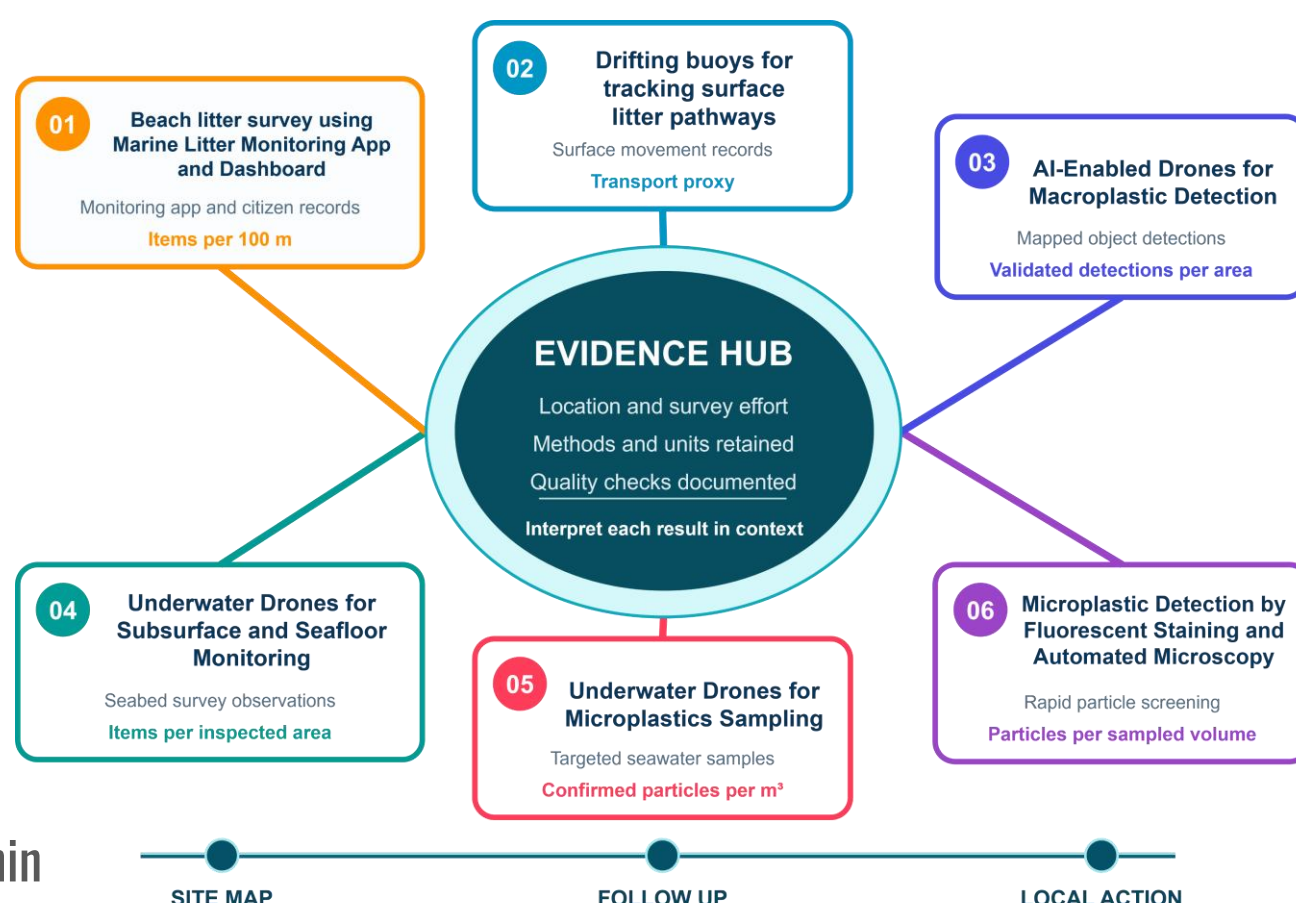
THE CHALLENGE

Plastic pollution extends across beaches, surface waters and the seabed.

Fragmented datasets, inconsistent methods and gaps in spatial coverage limit comparisons and the evaluation of interventions.

OUR APPROACH

The Green Paper combines scientific knowledge obtained within REMEDIES project to identify gaps and guide monitoring priorities.



EVIDENCE TO ACTION

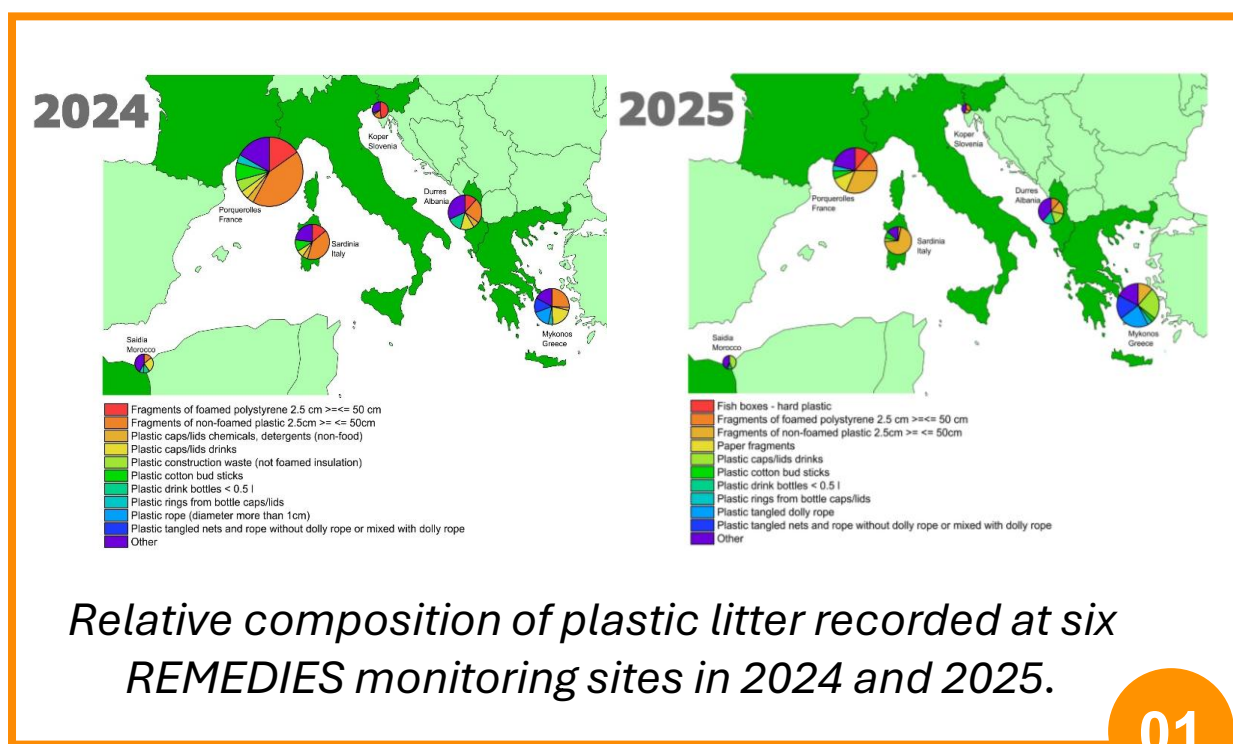
Harmonize monitoring: Align protocols, reporting units and quality requirements.

Data sharing: Retain location, sampling effort and method information.

Monitoring gaps: Prioritize poorly covered areas, marine compartments and particle sizes.

Coordinated action: Guide prevention, targeted interventions and cooperation across borders.

Beach litter survey using Marine Litter Monitoring App and Dashboard



01

Reliable mapping requires complementary methods, comparable data and coordinated action.

River Cleaning System

The **River Cleaning System** is an innovative, semi-permanent technology designed to intercept floating plastic and other riverine litter before it reaches the sea.

The system consists of a modular floating barrier positioned diagonally across the watercourse. Its rotating modules are driven by the **natural river current, requiring no external power**, and gently guide floating waste towards a single collection point, where it can be removed, sorted and directed to recycling or waste-management pathways.

INNOVATION IN ACTION

Within the **REMEDIES project**, the system was originally custom-designed for the Lana River in Tirana, Albania. Following an interruption in the permitting process, it was relocated and demonstrated at **Roggia Dolfina, Italy**, confirming the technology's adaptability to different river environments.

During REMEDIES, the River Cleaning System reached **TRL 8**, advancing its technical development, customization, operation and replication potential.

KEY BENEFIT

The River Cleaning System operates **autonomously 24/7**, powered by the natural water current. Its **modular, adaptable and low-impact design** enables waste collection while preserving aquatic life and supporting recycling and valorization. Field tests demonstrated **up to 97.4% average litter retention**.



H2Oasis Water Generation System

Producing drinking water from air - tested at Lia Beach, Mykonos

Marine Conservation Greece | REMEDIES - Prevention & Zero-Waste Solutions

50 L/day

nominal potable water production

150 L

stainless-steel storage tank

0.39 kWh/L

average specific energy use

H2Oasis tackles two island challenges at once: access to local drinking water and prevention of single-use plastic bottle waste. Air is condensed, treated, stored, cooled and dispensed to support refill and reuse models.



Field demonstrator: compact AWG unit installed in a real beach setting

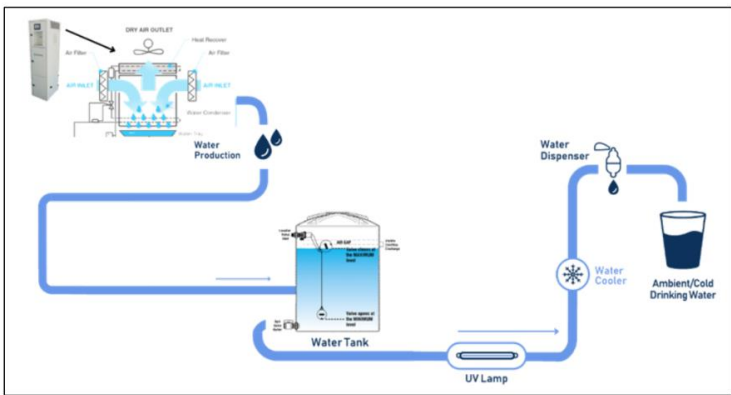
From prototype to real-use pilot



1. Build & integration
From dehumidifier and tank to a protected, branded unit.

2. Field-ready cabinet
User-facing dispenser, inlet, control panel and clear graphics.

How it works



Air capture → condensation → mineral enrichment & filtration → UV disinfection → storage → cooling → refill.

Deployment & reuse behaviour



Mykonos pilot

The unit was deployed at Lia Beach to provide cool drinking water to visitors and demonstrate a practical refill pathway with reusable 0.5 L glass bottles.

Performance depends on climate

		Generation (liters per day)								Consumption (kWh per liter)							
		45	40	35	30	25	20	15	10	45	40	35	30	25	20	15	10
Relative Humidity (%)	100	61	60	57	55	46	35	22	19	0.49	0.47	0.46	0.42	0.47	0.57	0.76	0.80
	90	59	56	55	55	46	35	22	17	0.47	0.45	0.42	0.39	0.46	0.52	0.69	0.80
	80	56	54	52	52	43	33	21	13	0.45	0.42	0.41	0.39	0.44	0.50	0.67	0.84
	70	54	54	52	47	38	26	17	9	0.42	0.40	0.39	0.41	0.45	0.57	0.73	1.25
	60	50	51	47	40	29	21	13		0.42	0.40	0.41	0.44	0.53	0.65	0.87	
	50	43	43	37	29	22	15	7		0.46	0.44	0.47	0.55	0.64	0.82	1.49	
	40	31	30	25	20	14	7			0.62	0.59	0.64	0.72	0.89	1.53		
	30	20	19	15	11	6				0.86	0.84	0.96	1.16				
	20	14	13	12	11					1.10	1.10	1.15	1.20				

Higher humidity and temperature increase daily water output. The Mykonos demonstrator combines local climate data with measured operation to estimate energy use and emissions.

What it has achieved so far

2,439.5 L

drinking water produced

local production from ambient air

4,879

500 mL bottles avoided

single-use bottle equivalent

421 kg CO2e

net emissions avoided

estimated operational benefit

65-127 kg

PET plastic avoided

depending on bottle weight

FISHING GEARS made by BIODEGRADABLE MATERIAL

REMEDIES | From polymer formulation to industrial demonstrators and sea trials

THE CHALLENGE

Lost or abandoned conventional fishing nets can remain in the marine environment for decades, causing ghost fishing and progressively breaking down into microplastics.

REMEDIES SOLUTION

From biodegradable polymers to sustainable fishing gear: develop and scale up yarns, manufacture fishing gear, and validate its performance under real marine operating conditions.

DEVELOPMENT PATHWAY

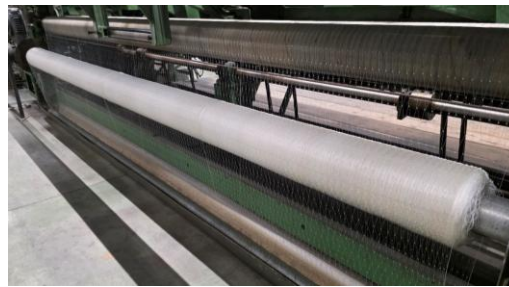
DEVELOPMENT PATHWAY

- Screened bio-based and biodegradable polymers to produce blends based on PBS, PBAT, PLA, PCL, PHA and starch.
- Optimised rheology, spinnability, drawing conditions and mechanical performance.
- Selected PBS/PBAT compound (C 2.2) for industrial monofilament scale-up.
- Converted the yarn into two full-scale fishing gear demonstrators.



INDUSTRIAL RESULTS

- 300 kg of C 2.2 compound prepared for scale-up; about 50 kg of usable yarn obtained.
- Stable yarn process condition: yarns resulted to show 0.34 mm diameter, 2.42 cN/dtex tenacity and 87.2% elongation.
- Knotted net: 0.33 mm monofilament, 41.6 mm half-mesh, double-knot construction.
- Braided rope: 7 mm diameter, 12-carrier construction, 29 g/m.



VALIDATION & IMPACT

- 510 m of rope produced, exceeding the 300 m project target.
1,216 m of net produced, exceeding the 700 m project target.
- Net mesh breaking load: 4.73 kgf; elongation at break: 36.88%.
- Rope average breaking load: 327.46 kgf (3,211 N).
- Demonstrators prepared for real-life trials in Sardinia and the Cyclades.



TRL 7

Demonstrator

0.33 mm

Net monofilament

1,216 m

Fishing net

510 m

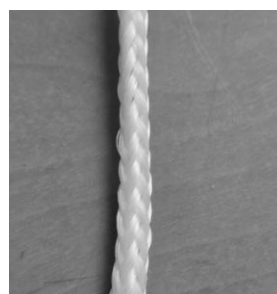
Braided rope

Demo sites

Sardinia + Cyclades

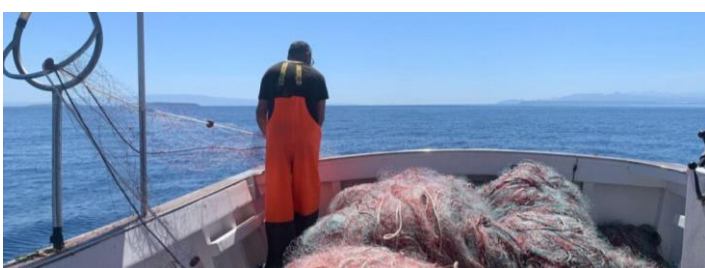
KEY RESULTS

Technical highlights



- **Compound:** PBS/PBAT (C 2.2)
- **Scale-up:** stable yarn production, >4 total draw ratio, yarn diameter $340 \pm 3 \mu\text{m}$
- **Net:** 41.6 mm half mesh, double knot, 50 meshes deep
- **Rope:** 7 mm, 12-carrier construction, no core
- **Industrial outcome:** demonstrators completed with minimal manufacturing waste

FIELD TESTING & NEXT STEPS



Professional fishermen are testing the gear in the Sinis Peninsula and Cyclades area to assess handling, durability, ageing and catch efficiency. Further work includes UV ageing and post-use material analysis.

Partners: Cittadini | Next Technology Tecnotessile | CNR | Bio-Mi | ATIIP | IHA | SMILO

#RemediesForOceans

#MissionOcean

#FinalConference

#EUHorizon

PLUG-N-PLAY 2 ZERO-WASTE



A Circular Product-Service System (CPSS) targeting a >70% reduction of plastic litter across tourist hotspots, festivals, and high-traffic venues.

PLUG-N-PLAY 2 ZERO-WASTE is designed to support a more sustainable, low-impact food and beverage service model for the hospitality, events, and tourism sectors. The solution addresses key market needs by reducing persistent plastic litter and marine leakage, lowering recurring packaging costs, simplifying compliance with evolving environmental regulations, and replacing inefficient linear waste management practices with circular resource flows.

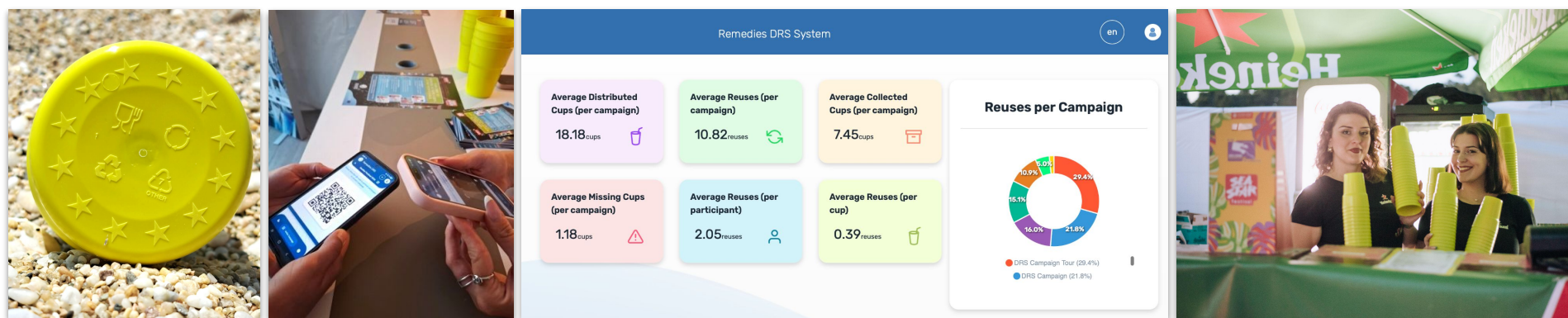


The challenge

Critical industries across the Mediterranean Sea basin, rely heavily on single-use (SUP) packaging to serve cold beverages on the beach. This dependence contributes significantly to marine plastic pollution, increases waste handling efforts and disposal costs for businesses, while undermines the environmental quality, economic sustainability and long-term resilience of coastal and island communities of the region.

The solution

PLUG-N-PLAY 2 ZERO WASTE is a circular reuse model that completes the full cycle onsite: cups are collected, cleaned and redistributed at the point of service, while nature-based technology treats the wash water. The system introduces 500 mL biobased reusable cups manufactured from a proprietary mixture of biobased polymers and natural additives, developed as a sustainable alternative to conventional fossil-based plastic cups. The cups are dishwasher-safe, food-contact compliant (EU 10/2011) for repeated use (100+ cycles), and industrially compostable (EN 13432). Adaptable to different event sizes and sector-specific needs, the system offers a Deposit Return System (DRS) app to connect inventory, service points and cleaning infrastructure into a single, trackable loop, providing real-time, measurable, and verifiable environmental performance data to both consumers and businesses.



Validation and Results

The technology was validated through two demonstrations and confirmed through a commercial replication, reaching TRL 7–8. Across the three monitored sectors, over just 116 days of operation, a total of 884 kg of fossil-based plastic was avoided at source, representing an approximately 60% reduction in plastic litter generation. At a beach bar in Mykonos, Greece, the solution avoided approximately 4,000 cups in 45 days. At the Sea Star Festival in Umag, Croatia, the solution supported more than 8,000 servings in four days of intensive, large-scale operation. The commercial replication at a summer camp in Kavala, Greece, prevented the use of more than 98,000 single-use cups over just 67 days, while generating approximately €5,000 in packaging-cost savings through the introduction of only 2,000 reusable bio-based cups. The technology exceeds the EU Zero Pollution Action Plan 2030 target of reducing plastic litter at sea by 50%, providing a tangible contribution to the EU's ambition to prevent plastic pollution at its source and protect marine ecosystems.

Related REMEDIES pillars: Prevention and Zero-Waste Solutions

Partner(s)/Owner(s): Alchemia-nova Greece, office.greece@alchemia-nova.gr

Other partners involved: Bio-Mi, AITIIP, CIBOS, NTUA



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