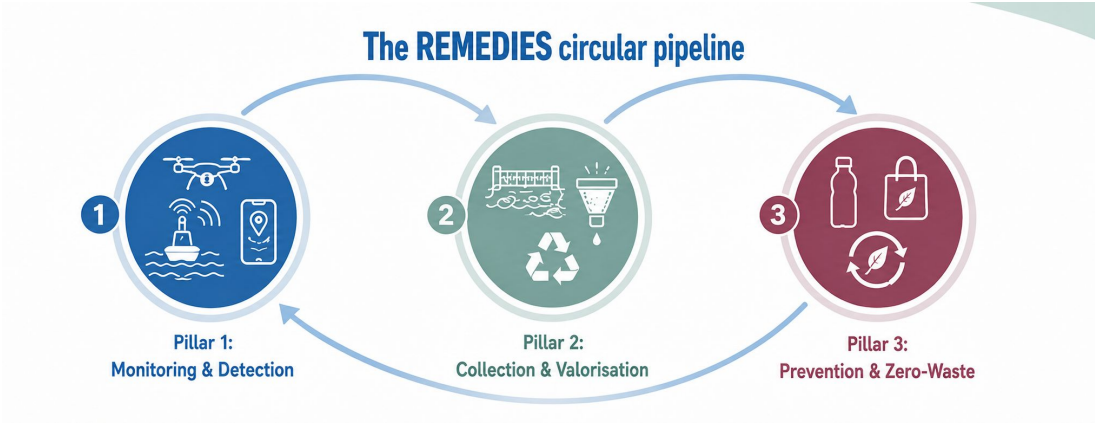
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MEDITERRANEAN SEA BASIN LIGHTHOUSE

Three Pillars for a Plastic Litter Free Mediterranean

To tackle the systemic crisis of marine plastic pollution across the Mediterranean basin, the REMEDIES project structured its technical and social interventions around three interconnected operational pillars.



Pillar 1 | Monitoring & Detection

We generate and share real-time data using drones, smart buoys, mobile apps and satellites to map plastic litter flows and identify pollution hotspots.

Pillar 2 | Collection & Valorisation

We intercept plastic before it reaches the sea through river barriers and wastewater filtration, then recover materials for circular uses.

Pillar 3 | Prevention & Zero-Waste

We reduce plastic at the source with reuse systems, zero-waste supply chains and behaviour change, eliminating single-use plastics from daily life.

Why was REMEDIES implemented this way?

To stop plastic pollution at every stage:

Cleaning up beaches isn't enough if plastic keeps flowing in, and preventing single-use plastic takes time. By combining Monitoring & Detection, Collection & Valorisation, and Prevention & Zero-Waste, REMEDIES tackles plastic before, while, and after it enters our waters.

To match the specific needs of every community:

Every region faces different challenges. REMEDIES 3-pillar setup allows local actors to pick and deploy the exact, field-tested technologies suited to their territory.

To turn emergency clean-ups into long-term local economies:

By combining smart monitoring, passive collection, and local zero-waste businesses, the REMEDIES 3-pillar structure allows regional leaders to turn marine waste into a complete, self-sustaining regional economy.

Co-creating a Plastic Litter Free Future

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Factsheet: Prevention & Zero-Waste

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Pillar 3

1. The challenge solved:

Addresses the root cause of marine pollution by stopping non-degradable, single-use plastics at the distribution stage before waste is ever generated, targeting high-impact coastal sectors like mass tourism, festivals, personal care, and commercial fisheries.

2. Bio-based & reusable innovations:

Replaces fossil-based plastics with bio-formulated compostable materials, atmospheric water generators, and dissolvable seaweed coatings as part of reusable Product-Service Systems (PSS).

3. Zero-waste supply networks:

Combines containerised green washing recirculation systems and digital tracking apps to establish circular, zero-waste supply chains across Mediterranean communities.

METHODOLOGY AT A GLANCE

Want to understand the data behind this pillar?

Every Life Cycle Assessment metric, environmental indicator, and cost benchmark on this factsheet is defined in our REMEDIES Master User Guide & Methodology Manual. Use the guide to navigate the evaluation criteria, interpret the underlying metrics, and gain full transparency into how these REMEDIES solutions were measured.

Scan to access the methodology guide

INNOVATIONS / TECHNOLOGIES UNDER PILLAR 3









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Pillar 3 | Prevention & Zero-Waste

Plug and Play 2 Zero Waste System

Owner: alchemia-nova Greece

A circular ecosystem combining multi-use bio-based cups (engineered for 100+ wash cycles) with containerized washing lines. Features vertECO® vertical green walls for greywater treatment and reuse, managed via a smart QR/NFC tracking app.

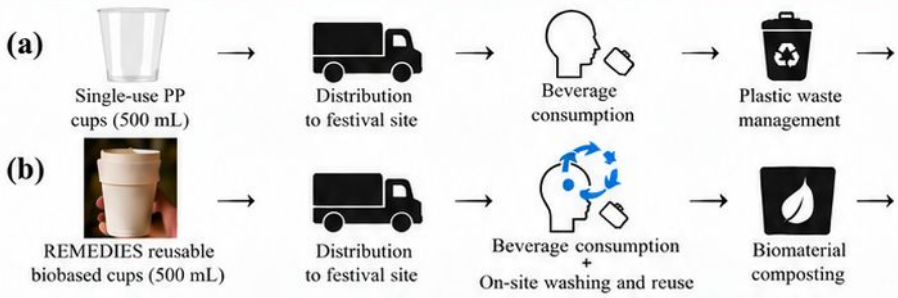


100+ wash cycles

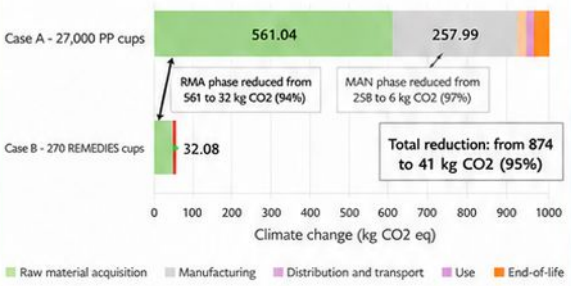
Bio-based cups

QR/NFC tracking app

Greywater treatment & reuse



Environmental impacts (comparative assessment)



What the graph shows

- Environmental comparison between single-use and reusable cup systems.
- Impact reductions achieved through reuse.
- Relative contribution of washing, manufacturing and end-of-life management.

Key Findings

- Replacing 27,000 single-use cups with 270 reusable cups achieves the same function.
- Each cup is designed for 100 reuse cycles.
- Environmental impacts are reduced by 95%.
- Raw material impacts decrease by 94% due to lower material demand.
- Washing impacts exist but do not offset the overall environmental benefits.

Quick Facts

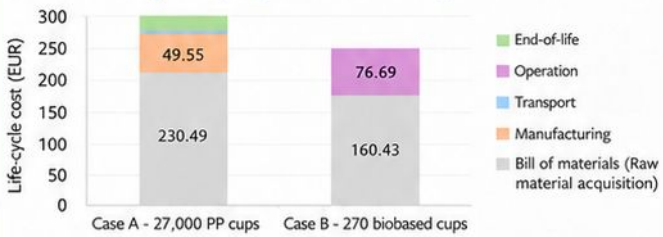
100 uses per cup

95% lower environmental impact

94% lower impacts in the raw material phase

27,000 disposable cups replaced by 270 reusable cups

Economic impacts (comparative assessment)



Key Findings

- Total life-cycle costs decrease from €230 to €160.
- Fewer cups are required due to reuse.
- Transport and end-of-life costs are substantially reduced.
- Washing introduces additional operational costs.
- Overall savings remain significant despite cleaning requirements.

Quick Facts

30% lower total costs

100 reuse cycles per cup

Lower transport and waste management costs

Operational Requirements for Success

Operational Parameter	Performance & Sustainability Requirements
High return & reuse rates	Maximum sustainability potential is unlocked in settings with high attendee compliance and return incentives, driving impact by reducing the total number of cups manufactured.
Efficient washing systems	Requires low-energy washing infrastructure on-site to minimize operational impacts.
Localised supply chains	Shorter transport distances and material efficiency gains further reductions to environmental, economic, and social impacts.

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Pillar 3 | Prevention & Zero-Waste

H2Oasis

Owner: Marine Conservation Greece

Description: A solar-compatible, zero-energy unit that extracts ambient air moisture to produce up to 50 liters/day of fresh drinking water. Eliminates single-use plastic water bottle consumption in water-scarce island communities.

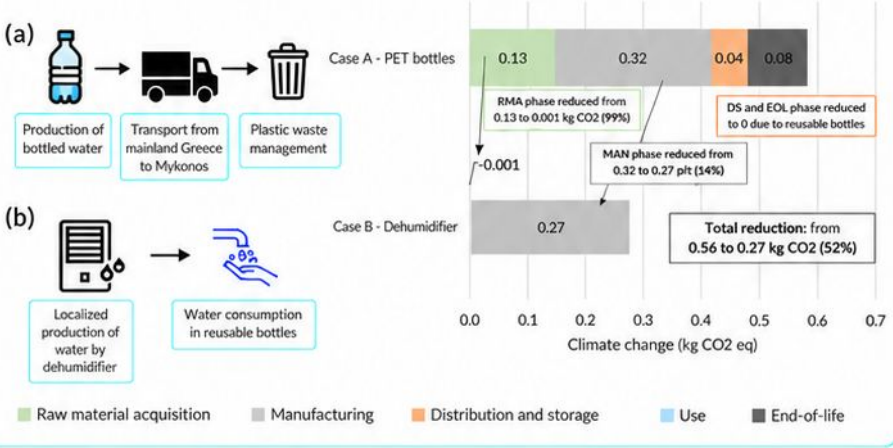


52% lower environmental impact

99% reduction in raw material impacts

Transport impacts virtually eliminated

No plastic bottle waste at the point of consumption



Key Findings

- Producing drinking water locally reduces environmental impacts by 52% compared to imported bottled water.
- Raw material impacts are reduced by 99% through the elimination of single-use plastic bottles.
- Transport impacts are virtually eliminated.
- No plastic bottle waste is generated at the point of consumption.
- Reusable bottles are the key driver of environmental improvement.

Economic Impacts (comparative assessment)



Quick Facts

52%
lower environmental impact

99%
reduction in raw material impacts

What the graph shows

- Comparison of total costs between bottled water and dehumidifier systems.
- Distribution of costs across materials, operation and transport.

Key Findings

- Local water generation reduces overall life-cycle costs.
- Savings mainly come from avoiding bottled water production and packaging.
- Lower material consumption reduces purchasing costs.
- Operating the dehumidifier is less expensive than producing, bottling and transporting mineral water.
- The solution combines environmental and economic benefits.

Operational Requirements for Success

Operational Parameter	Performance & Sustainability Requirements
Resource substitution	Functions as an effective plastic-prevention pathway specifically in coastal, island, or remote locations where drinking water is not available on-site and is thus routinely supplied via imported single-use PET bottles.
Environmental conditions	The greatest environmental and economic reductions could be achieved in humid environments where higher ambient moisture maximizes water production efficiency.
Renewable energy integration	Environmental performance could be further improved when connected to renewable energy sources or lower-carbon municipal electricity grids.

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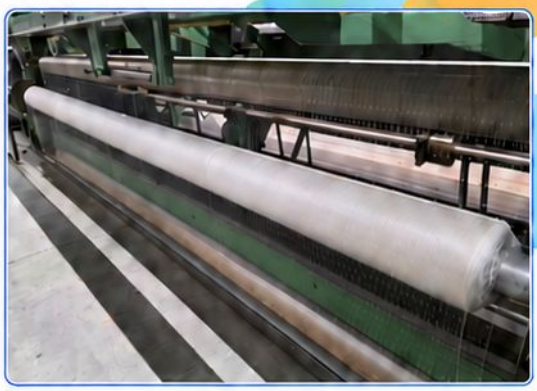
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Pillar 3 | Prevention & Zero-Waste

Fishing nets made with biodegradable polymers

Owner: CIT

Description: Developed as a bio-based alternative to non-degradable synthetic materials, these professional fishing nets provide high mechanical performance during maritime operations. By expanding end-of-life management options compared to conventional polymers, this technology ensures that retired gear does not persist as a long-term marine pollutant or microplastic source.



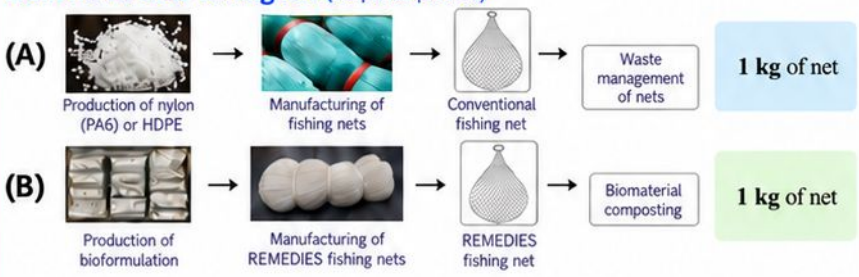
39% lower climate impact vs PA6

Bio-based alternative

Expanded end-of-life options

High mechanical performance

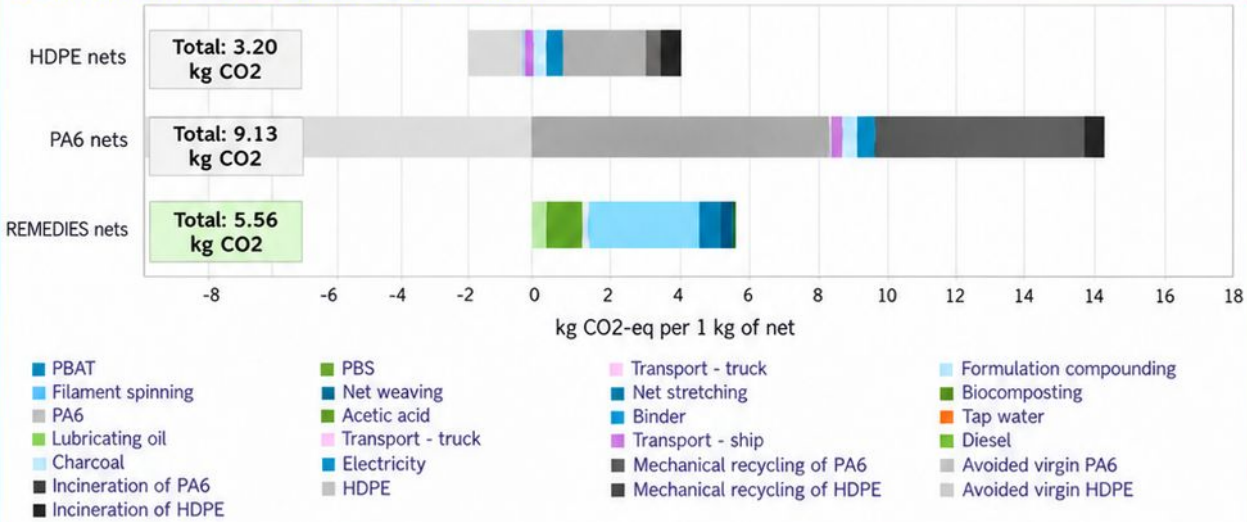
From material to fishing net (simplified process)



Key Findings

- The REMEDIES net has a 39% lower climate impact than a conventional PA6 net on a 1 kg basis.
- The main environmental benefit comes from the lower impact of the biopolymers compared with PA6.
- For the REMEDIES net, manufacturing is the main environmental hotspot.
- HDPE shows the lowest climate impact under the assessed scenario.
- Further improvements in manufacturing efficiency could reduce the impact of the REMEDIES net even further.

Environmental impacts (comparative assessment)



Operational Requirements for Success

Operational Parameter	Performance & Sustainability Requirements
Target application & context	Recommended for fishing zones where fishing gear loss cannot be fully prevented and conventional plastic nets risk long-term marine persistence and subsequent pollution.
Complementary port collection infrastructure	Recommended to be paired with port reception facilities and established recycling pathways as part of a comprehensive plastic-pollution reduction strategy.
Performance & industrial scaling	Industrial scaling and manufacturing optimisation are required to enhance cost-competitiveness relative to standard polyamide (PA6) and high-density polyethylene (HDPE) nets.

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Pillar 3 | Prevention & Zero-Waste

Zero-Waste Seaweed Coatings for Cosmetics

Owner: NIC

Description: A 100% natural, water-soluble, and carbon-negative seaweed biopolymer coating that encapsulates liquid cosmetics into single-use marbles. Designed for localized production at resort areas, eliminating plastic bottle waste in hospitality.



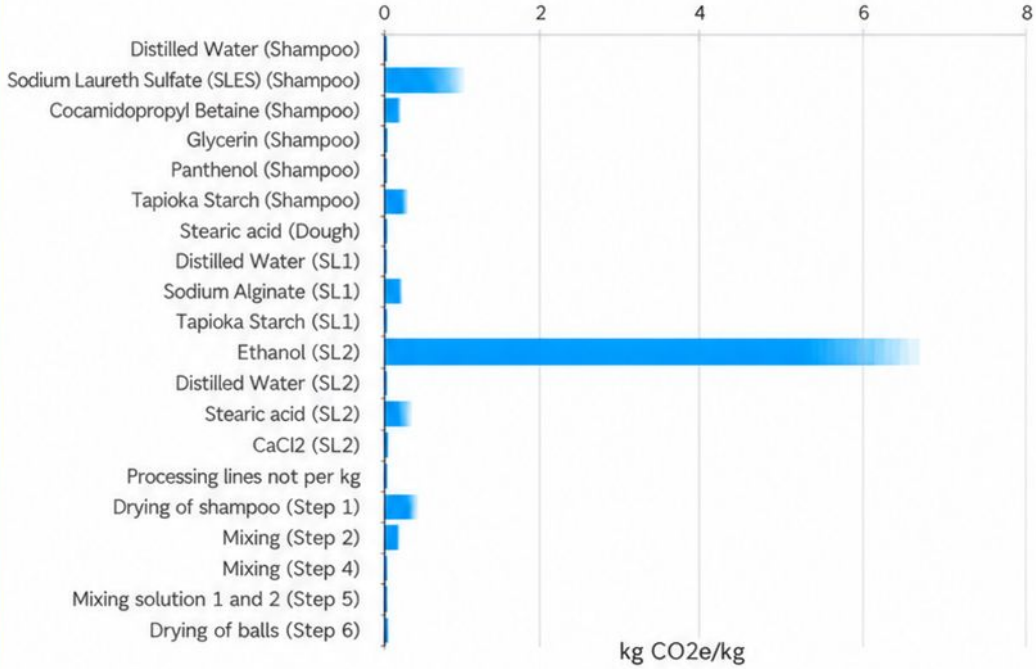
100%
Plastic Elimination
Replaces standard single-use plastic bottles with a fully dissolvable biopolymer coating.

66%
Material Efficiency
3 g vs. 9 g per hair wash.

Overuse & Use-Phase Prevention
Pre-measured 3 g portions eliminate over-dispensing.

Carbon Benchmark
33.3 g CO_2-eq per wash vs 161 g CO_2-eq for traditional bottled shampoos.

Impacts plus uncertainty gradient by component (kg CO2e/kg)



Comparative impact metrics (D3.3)

- **100% Plastic Elimination:** Replaces standard single-use plastic bottles with a fully dissolvable biopolymer coating.
- **66% Material Efficiency (3 g vs. 9 g):** Reduces required product mass per hair wash from a 9 g conventional liquid benchmark down to a pre-measured 3 g solid marble.
- **Overuse & Use-Phase Prevention:** Pre-measured 3 g portions eliminate consumer over-dispensing during the use phase – the lifecycle stage responsible for up to 80-99% of total shampoo CO_2-eq emissions.
- **Carbon Benchmark:** Achieves a cradle-to-gate production footprint of 33.3 g CO_2-eq per wash (comparable to refillable glass containers), compared to 161 g CO_2-eq total lifecycle emissions for traditional bottled shampoos.

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