



REMEDIES: Co-Creating a Plastic Litter Free Future

DELIVERABLE: D6.5

TITLE: Citizen Engagement and Co-Creation Guideline

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Executive summary

REMEDIIES is a Horizon Europe innovation Program, and part of the EU Mission “Restore our Ocean and Waters”, creating innovative solutions and technologies to monitor, collect, prevent and valorise (micro)plastic from our oceans. Our approach is rooted in science, circularity, and community engagement aiming to protect water ecosystems, reduce pollution and develop a climate-neutral blue economy.

D6.5 **Citizen Engagement and Co-Creation Guideline** presents the REMEDIIES approach to engaging citizens, communities and stakeholders in addressing Mission Ocean & Waters specific objective to Prevent and eliminate pollution. The deliverable provides a framework for designing, implementing, documenting and replicating engagement activities across the project’s three pillars: **Detection & Monitoring, Collection & Valorisation**, and **Prevention & Zero Waste**.

The guideline distinguishes between **citizen engagement** and **co-creation**. Citizen engagement covers awareness, mobilisation, participation and learning. Co-creation refers to the involvement of citizens and stakeholders in shaping, testing, adapting or improving tools, activities, products, infrastructure, recommendations or replication models.

The deliverable analyses 17 REMEDIIES case studies, including the Shoreline Marine Litter Monitoring App, beach litter monitoring protocols, GPS buoys, aerial and underwater drone monitoring, clean-ups, fisherman engagement, fishing-net recovery, seafloor litter collection, fishing gear made with biodegradable materials, zero-waste cosmetics, regenerative local value chains, the Santorini Plastic Lab, anti-litter campaigns, Plastic Fantastic webinars and Hackathon, Open Call funded project in associated regions and their activities supporting REMEDIIES agenda and Policy Workshops. Together, these cases show how REMEDIIES moved from awareness to action, learning, co-creation striving to build a plastic conscious society.

A key finding is that engagement is strongest when it is **place-based, practical and connected to a clear next step**. Clean-ups become more meaningful when linked to data collection and plastic identification. Monitoring tools become more effective when citizens understand their purpose and data pathway. Workshops and Plastic Labs are more impactful when participants test, make, reflect and provide feedback. Fisher engagement works best when it responds to real operational needs and recognises fishers as knowledge holders.

The financial support to third parties in associated regions demonstrates how REMEDIIES methods and actions can be adapted by the local or regional authorities in the Mediterranean Sea basin and connected regions. The experience on the field shows that replication is not simple duplication, but a process of local adaptation involving municipalities, NGOs, schools, fishers, merchants, artisans, recycling actors and community groups. The Policy Workshops further show how local action and citizen science can inform governance, funding, scaling and policy recommendations.

The deliverable concludes with practical cocreation guidelines and a replication toolkit, including planning templates, stakeholder mapping tools, feedback forms, citizen science and engagement protocols, replication checklists, the REMEDIIES educational materials, and the Santorini Plastic Lab materials. Overall, D6.5 positions citizen engagement as an operational component of REMEDIIES implementation: a way to generate evidence, mobilise communities, test solutions, inspire behaviour change and strengthen the transition towards plastic litter-free seas and waters.

Abbreviations and acronyms

Acronym	Title
AI	Artificial Intelligence
AITIIP	Fundacion Aitiip
ANGR	Alchemia-Nova Greece Idiotiki Kefalaiouschiki Etaireia
CAD	Computer-Aided Design
CINEA	European Climate, Infrastructure and Environment Executive Agency
CNR	Consiglio Nazionale Delle Ricerche
CRoS	Centro di Recupero del Sinis
DIY	Do It Yourself
EMODnet	European Marine Observation and Data Network
ETMI	Instituti Per Menaxhimin E Mjedisitdhe Territorit
EU	European Union
EXIT	Foundation Exit
GDPR	General Data Protection Regulation
GPS	Global Positioning System
HDPE	High-Density Polyethylene
IHA	Impact Hub Athens
INFOR	Infordata Sistemi Srl
KPI	Key Performance Indicator
LDPE	Low-Density Polyethylene
mAP	mean Average Precision
MCG	Marine Conservation Greece
ML	Marine Litter
MOH	Universite Mohammed Premier 1
MPA	Marine Protected Area
NGO	Non-Governmental Organisation

NIC	National Institute of Chemistry
NIR	Near-Infrared spectroscopy
NTT	Next Technology Tecnotessile Societa Nazionale Di Ricerca R L
OECD	Organisation for Economic Co-operation and Development
PET	Polyethylene Terephthalate
PP	Polypropylene
PS	Polystyrene
PVC	Polyvinyl Chloride
QR	Quick Response
RIC	Resin Identification Code
SMILO	Small Islands Organisation
TG ML	Technical Group on Marine Litter
UM	University of Maribor
VITO	Vlaamse Instelling Voor Technologisch Onderzoek N.V.
VLPF	Venice Lagoon Plastic Free
WP	Work Package
WWF	World Wide Fund for Nature

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1. Introduction

1.1 Purpose of the deliverable

Citizen Engagement and Co-Creation Guideline (D6.5), provides a practical framework for planning, implementing, documenting and replicating citizen engagement and co-creation activities within the REMEDIIES project and replications in associated regions. It brings together experience from REMEDIIES Demo Sites, monitoring activities, clean-ups, zero-waste workshops, Plastic Labs, regional and local public authorities in associated regions, policy workshops, innovation activities and local replication actions. Its purpose is not only to describe what was implemented, but to extract how engagement and co-creation worked in practice, what was learned, and how these methods can be applied in other territories.

The guideline supports activities across all three REMEDIIES pillars: Detection & Monitoring, Collection & Valorisation, and Prevention & Zero Waste. These pillars are directly relevant to the EU Mission “Restore our Ocean and Waters by 2030” Mediterranean Sea basin lighthouse, especially its focus on preventing and eliminating plastics and microplastics pollution and supporting a circular and sustainable blue economy.

Within this context, citizen engagement is treated as an operational part of REMEDIIES implementation, not as an additional communication layer. Citizens, schools, fishers, entrepreneurs, researchers, local authorities, civil society organisations and other stakeholders are not only audiences of environmental communication. They contribute to monitoring, clean-ups, prevention, feedback, local adaptation, behavioural change, policy learning and the uptake of circular solutions.

In REMEDIIES, co-creation means the practical involvement of citizens and stakeholders in shaping, testing, adapting, validating or improving tools, protocols, activities, products, infrastructure, recommendations or replication models. This may include fishers providing feedback on fishing gear made with biodegradable materials, local communities helping identify clean-up sites, students and citizens testing workshop formats, merchants signing plastic-free commitments, regional and local authorities in associated regions adapting REMEDIIES methods to their own territories, or workshop participants translating field experience into policy recommendations.

D6.5 contributes to Task 6.5 by connecting local communities and stakeholders with REMEDIIES actions related to marine litter prevention, reduction, monitoring, collection, valorisation and zero-waste solutions. The deliverable covers the wider engagement ecosystem of REMEDIIES, including awareness events, clean-ups, educational activities, public demonstrations, monitoring-related activities, policy workshops, innovation activities, local infrastructure, behaviour-change actions and community-led prevention and zero-waste initiatives.

For this reason, the deliverable distinguishes between two connected concepts. **Citizen engagement** refers to all forms of participation through which citizens and stakeholders are informed, mobilised, trained, consulted, involved in action, or invited to provide feedback. **Co-creation** refers to processes where citizens and stakeholders help shape, test, validate, adapt or improve an activity, tool, product, protocol, recommendation or replication model. This distinction is important for REMEDIIES because different activities involve different levels of participation. A public event may raise awareness. A clean-up may mobilise direct action. A monitoring activity may generate structured evidence. A workshop or policy roundtable may produce co-created recommendations. Together, these levels form a broader pathway from awareness to action, learning, co-creation and replication.

The guideline covers citizen engagement and co-creation activities implemented across REMEDIIES Mediterranean demo and replication sites and project actions from selected regional and local public authorities that were part of REMEDIIES Open Calls for associated region. Furthermore, it uses evidence from REMEDIIES technical deliverables part of WP1, WP2 and WP3 and established protocols, REMEDIIES demo and replications sites activities, clean-ups and anti-litter campaigns, monitoring activities and digital tools, GPS buoys, aerial and underwater drones, Fishing for Litter and fishing-net recovery actions, fishing gear made with biodegradable materials testing, zero-waste cosmetics and seaweed coating workshops, microplastic and plastic identification activities, Plastic Lab activities, PLASTIC FANTASTIC Webinars and Hackathon, Open Call Associated Regions, policy workshops and policy recommendation processes, and local value chain and zero-waste initiatives.

The scope is intentionally broad because citizen engagement in REMEDIIES goes beyond public communication. It includes practical participation, fieldwork, infrastructure use, feedback, local adaptation, stakeholder ownership, policy learning and replication. The local and regional authorities selected through Open Call for associated regions are included because they show how REMEDIIES methods can be adapted outside the REMEDIIES demo sites and lighthouse. Their projects outputs provided concrete examples of local co-creation with municipalities, schools, fishers, merchants, artisans, volunteers, NGOs, recycling actors and regional institutions. The policy workshops are also included as stakeholder engagement in a particular topic can move from activity-level participation to policy co-creation. Through facilitated discussions, roundtables and recommendation-building, these workshops translated project evidence and stakeholder experience into proposals for governance, scaling, funding, monitoring and local implementation.

1.2 Structure of the deliverable

This public deliverable is designed as a working guideline for REMEDIIES partners, regional and local public authorities in associated regions and external actors who want to design, implement, document or replicate citizen engagement and co-creation activities. It can be used before an activity to define its purpose, target groups, tools, expected outputs and co-creation element; during implementation to guide participation, facilitation, feedback collection and documentation; and after implementation to record results, lessons learned and replication potential.

The deliverable structure follows a practical sequence. **Section 2 presents the methodological framework and mapping the engagement** across the REMEDIIES pillars. **Section 3 presents the case studies** and presents how engagement and co-creation happened in practice. **Section 4 summarises the cumulative impact** of the cases. **Section 5 introduces practical co-creation guidelines** extracted from the cases. **Section 6 presents cross-cutting lessons learned**, and introducing gender dimension, inclusion and diversity. **Section 7 provides the conclusions**. As final part of the deliverable **Section 8 is sharing the annexes and reusable tools created by the REMEDIIES partners**.

2. Methodological framework for citizen engagement and co-creation

The REMEDIIES engagement methodology is based on a clear distinction between citizen engagement and co-creation. **Citizen engagement** is the broadest concept. It includes all activities through which citizens, communities and stakeholders are informed, mobilised, trained, involved in action, consulted, invited to provide feedback, or connected to further opportunities for participation. **Co-creation** refers to the process through which citizens and stakeholders influence the design, adaptation, validation or improvement of an activity, tool, protocol, product, infrastructure, recommendation or replication model. This understanding is also aligned with the **OECD Guidelines for Citizen Participation Processes**¹, where they framed meaningful citizen participation as a structured, transparent and purposeful process through which citizens and stakeholders can contribute to public decision-making and collective problem-solving.

In this deliverable, the differentiation of two concepts is presented in bullet points below:

- **Citizen engagement:** participation, awareness, mobilisation, consultation, learning, feedback and local ownership.
- **Co-creation:** practical involvement of citizens or stakeholders in shaping, testing, adapting or improving a method, tool, activity, recommendation or solution.

This distinction allows to reflect the full range of REMEDIIES activities without reducing engagement only to public awareness. A clean-up, for example, may be an awareness activity when it introduces people to the issue of marine litter; an action activity when citizens physically remove litter; a citizen science activity when collected litter is recorded through a protocol or app; and a co-creation activity when participants, municipalities or local organisations help select the site, adapt the process, identify practical barriers or propose improvements. The same applies to workshops, policy dialogues, fisher engagement, Plastic Labs and regional and local public authorities Open Call activities. The key question is not only whether people participated, but what role they played and how their contribution influenced the activity or its replication as well as their potential behaviour change.

Gender dimension, inclusion and diversity are introduced to the methodology as cross-cutting quality considerations concepts. In line with the European Commission's approach, the gender dimension refers to assessing, where relevant, whether sex and/or gender influence research and innovation activities, including their design, implementation, communication, usability or uptake. Inclusion and diversity considerations in turn focus on who is invited, who may face barriers to participation, how communication is framed, whether activities are accessible, and whether different voices can contribute safely and meaningfully. These principles support the design of more responsive and inclusive engagement, co-creation and innovation processes across REMEDIIES project activities.

In practical terms, this lens is applied within the existing steps of the methodology rather than as a separate process. Stakeholder mapping should consider gender, age, potential disability, social background, professional role, education level and local knowledge where relevant. Activity design should use inclusive language, accessible formats and safe participation conditions. Feedback and documentation should capture, where possible and proportionate, whether different participant groups were represented and whether any barriers, needs or adaptations emerged during implementation.

¹ https://www.oecd.org/en/publications/oecd-guidelines-for-citizen-participation-processes_f765caf6-en.html
(Accessed 7.8.2026)

2.1 Citizen engagement

2.1.1 Citizen engagement categories

The methodology uses three citizen engagement categories: **raising awareness, action, and learning & upscaling**. These categories are used as a practical way to classify activities, not as rigid stages.

Raising awareness includes activities that introduce the marine litter challenge, present REMEDIATION innovative solutions, explain the relevance of monitoring or prevention, and invite participants to become more involved.

Action includes activities where citizens and stakeholders contribute directly to litter reduction, monitoring, collection, sorting, reporting or local environmental improvement.

Learning & upscaling includes activities where participants build skills, test tools or methods, provide structured feedback, develop ideas, or support the transfer of solutions to other locations.

These categories are not standalone work packages, but an operational classification used to structure activities, ensure methodological consistency, and support replication across demo sites. In Figure 1 it is shown how participants move progressively through different levels of involvement, ensuring engagement is continuous and cumulative, connecting Awareness → Participation → Citizen Science → Co-Creation → Valorisation → Replication.

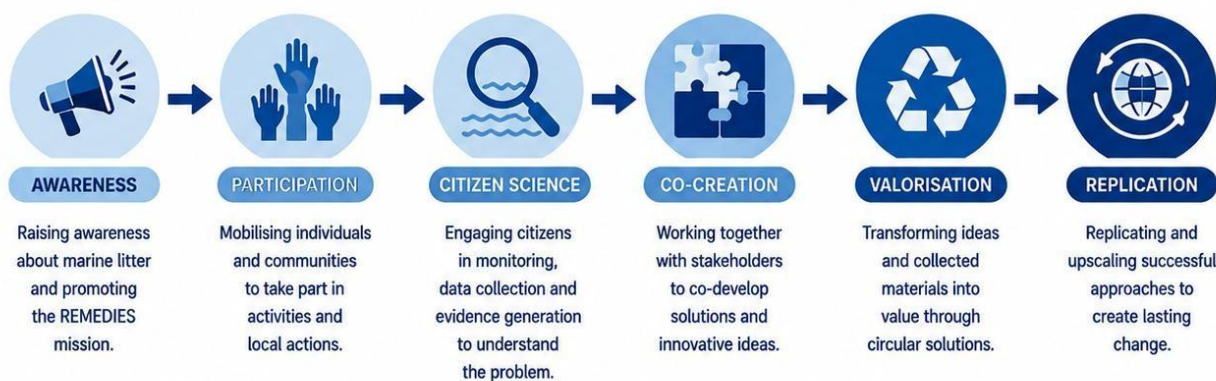


Figure 1: Progressive levels of involvement of participants in REMEDIATION.

The three categories are used throughout the case study elaborations in Section 3. Each case identifies the primary engagement category, while also noting whether the activity created secondary value through awareness, action, learning, citizen science or co-creation. This is important because REMEDIATION activities often combine several engagement functions. A public event can lead to a clean-up. A clean-up can generate data. A workshop can become a co-creation process. A policy roundtable can transform local experience into policy recommendations. The categories therefore help to organise the evidence without forcing activities into artificial boundaries.

This sequence reflects the evolution of engagement: starting with exposure to environmental issues (Raising Awareness), moving to **hands-on participation** (Action), followed by **scientific learning and co-creation** (Learning & Upscaling), and culminating in **valorisation and replication** to scale solutions across new contexts.

2.1.2 Citizen engagement pathway

The REMEDIIES citizen engagement pathway is used as a planning and analysis tool for activities across the three pillars. It follows the six steps approach.

The first step is to define the purpose and the audience of the activity. This may be to raise awareness, collect litter, test a monitoring tool, train participants, collect feedback, support behavioural change, demonstrate a zero-waste solution or develop policy recommendations. **The second step** is to identify the right stakeholders. A school workshop, a fisher consultation, a policy roundtable and a river clean-up require different participants, language, timing, facilitation and follow-up. **The third step** is to select the format that matches the purpose, such as a clean-up, training session, demonstration, workshop, public event, hackathon, roundtable or field activity. **The fourth step** is to design the engagement flow, so participants move from understanding the issue to contributing actively. **The fifth step** is to connect the activity to a next level of engagement, such as another workshop, a survey, a monitoring protocol, a local campaign, a policy recommendation or a replication opportunity. **The sixth as final step** is to document what happened, what was learned and what can be used again.

These steps help partners move from a general intention to “engage citizens” towards a clear activity design that defines who is involved, why they are involved, what they are expected to contribute, and how their participation will be documented. The same logic is translated into practical tools that are presented in Section 8 **Annex 1**, including the Activity Planning Template in **Annex 1.1**, Stakeholder Mapping Template in **Annex 1.2**, and Co-Creation Design Canvas in **Annex 1.3**.

2.2 Co-creation

Co-creation in REMEDIIES is understood as a practical process, not as a general label. An activity can be considered co-creative when citizens or stakeholders contribute to shaping, testing, adapting or validating something. In the REMEDIIES projects this may be one of the following activities:

- a monitoring protocol
- a clean-up process
- a fishing-net disposal point
- a workshop format
- a circular product
- a zero-waste solution
- a local value chain
- a policy recommendation
- a replication model

The level of co-creation may vary. In some cases, stakeholders are involved from the beginning, in defining the problem. In other cases, they test an existing solution and provide feedback. Both are relevant, as long as the contribution is documented and connected to learning or improvement.

For the purposes of this deliverable, each co-creation case is analysed through five questions:

1. What was the object of co-creation?
2. Who contributed?
3. How did they contribute?
4. What feedback or insight was generated?
5. What changed, or should change, as a result?

This structure is important because it prevents co-creation from being used as a vague term. It also helps identify where further partner input is needed. For example, if fishers tested fishing gear made with biodegradable materials, the report should document what they were asked to observe, what feedback they provided, and whether that feedback informed future testing, communication or technical adaptation. If a policy workshop generated recommendations, the report should document how participants moved from discussion to concrete policy outputs. The same five questions are included in the Section 3 Case Study Overview Table and in the Co-Creation Design Canvas in **Annex 1.3**.

2.3 Evidence and documentation standards

A central purpose of D6.5 is to move from activity description to evidence-based learning. For this reason, every activity included in the case study section (Section 3) is documented through a common evidence and documentation methodology. This methodology is used to understand not only what happened, but also how citizens and stakeholders were involved, what their participation produced, what was tested or adapted, what feedback was generated, and what can be replicated in other contexts.

The documentation methodology follows the same logic as the REMEDIIES citizen engagement pathway presented in Section 2.1.2. Each activity needs to pay attention to the following documentation presented next.

Purpose and engagement objective. The documentation should first clarify why the activity was implemented. This includes the main purpose of the activity, the REMEDIIES pillar it supports, and the primary engagement category: Raising Awareness, Action, or Learning & Upscaling. Where relevant, secondary engagement functions should also be recorded. For example, a clean-up may be primarily an Action activity, but it may also support awareness, citizen science, learning or co-creation if participants collect data, use an app, sort plastics, provide feedback or connect the activity to further action.

Stakeholders and participation. Each activity should record who was involved and what role different actors played. This includes citizens, volunteers, schools, students, fishers, divers, NGOs, municipalities, researchers, technical partners, innovators, local businesses, policy actors, Associated Regions or other relevant stakeholders. Documentation should distinguish between organisers, participants, technical contributors, decision-makers and local intermediaries. Where possible and proportionate, documentation should also record the number of participants, the profile of participants, and whether specific groups were targeted or underrepresented.

Engagement process and activity flow. The documentation should describe how the activity was implemented in practice. This includes the format used, the sequence of steps, the facilitation method, the tools or protocols applied, the role of partners, and how participants moved from understanding the issue to contributing actively. For example, a Plastic Lab should document the journey from material collection to sorting, demonstration, making and reflection. A policy workshop should document how participants moved from presentations to discussion, recommendation-building and follow-up. A monitoring activity should document how participants were briefed, how the field protocol was applied, and how results were recorded.

Evidence generated. Each activity should document the evidence produced through implementation. Depending on the activity type, this may include quantitative data, qualitative feedback, field observations, monitoring results, waste quantities, participant numbers, photos, videos, maps, workshop outputs, survey responses, policy recommendations, prototype feedback, user comments, public commitments, infrastructure decisions or replication lessons. Evidence should be linked to the activity purpose. For example, clean-ups should record plastic and non-plastic waste collected; app-based monitoring should record usability and data quality observations; fisher engagement should record operational feedback; and zero-waste workshops should record product usability and willingness to adopt.

Co-creation and feedback. Where an activity is described as co-creative, documentation should answer the five co-creation questions defined in Section 2.2:

- What was the object of co-creation?
- Who contributed?
- How did they contribute?
- What feedback or insight was generated?
- What changed, or should change, as a result?

These questions are essential because they prevent co-creation from being used as a general label. If participants only attended an event, the activity may still be valuable as awareness or learning, but it should not automatically be described as co-creation. Co-creation should be documented when citizens or stakeholders helped shape, test, validate, adapt or improve something, such as a monitoring protocol, app, clean-up process, disposal station, workshop format, fishing gear made with biodegradable materials, zero-waste product, local value chain, policy recommendation or replication model.

Lessons learned and replication potential. Documentation should conclude with what was learned and how the activity could be repeated or adapted in another context. This includes what worked well, what was difficult, what barriers appeared, what should be improved, what resources were needed, and what minimum next actions should be followed for replication. Lessons should be practical and transferable. They should help future organisers understand what to prepare, who to involve, what to document, what risks to manage, and what follow-up is needed.

The following minimum evidence fields should therefore be recorded for each activity:

- activity title
- date and location
- REMEDIATION pillar
- engagement category
- activity purpose
- organising partners
- stakeholders involved
- number and profile of participants, where available
- tools, protocols or technologies used
- engagement process
- co-creation element, where relevant
- feedback or insight collected
- quantitative outputs, where relevant
- qualitative outputs, where relevant
- communication and visibility outputs
- inclusion, accessibility and diversity considerations
- lessons learned

- replication potential
- follow-up action

The type of evidence collected should be adapted to the activity format. For monitoring and citizen science activities, documentation should record the site, protocol used, data collected, tools applied, participant briefing, data quality issues and any usability feedback. For clean-ups, it should record the site, number of participants, plastic litter collected, other litter collected, total litter collected, photos, waste handling process and participant feedback. For fisher engagement, it should record who was consulted, what operational feedback was provided, what infrastructure or gear was tested, and whether fisher input influenced implementation. For hands-on workshops and Plastic Labs, it should record the learning flow, materials used, objects or outputs created, safety considerations, participant feedback and whether the activity changed understanding or behaviour. For zero-waste and local value-chain activities, it should record the names and descriptions on the alternative tested, stakeholders involved, user feedback, barriers to adoption and potential for local uptake. For webinars, hackathons and learning activities, it should record participation, learning content, resources shared, feedback received, ideas generated, selected projects or outputs, and follow-up support. For policy workshops, it should record the policy question, participant mix, discussion format, recommendations produced and how the outputs will be used.

Inclusion, gender dimension and diversity should be documented as part of the way each activity is designed, implemented and documented. Where relevant and proportionate, organisers should note whether inclusive communication was used, whether the activity was accessible, whether different participant groups had meaningful roles, whether barriers to participation were identified, and whether feedback reflected different stakeholder perspectives. This is especially important for activities involving technical tools, fieldwork, children, schools, fishers, divers, innovation formats, public infrastructure or policy dialogue, where participation conditions may differ depending on age, gender, disability, language, digital skills, physical capacity, professional role or access to networks.

Evidence should be collected using the tools provided in the Section 8 annexes. The Activity planning template in Annex 1.1 should be used before implementation to define the purpose, stakeholders, tools, outputs and feedback method. The Stakeholder mapping template in Annex 1.2 should be used when the activity depends on several actors or when local ownership is important. The Co-creation design canvas in Annex 1.3 should be used when participants are expected to shape, test, validate or adapt something. The Feedback collection form in Annex 2 should be used after the activity to collect participant reflections, difficulties, suggestion and follow-up interests. The Citizen science protocols and supporting educational materials in Annex 3 should be used for monitoring, clean-up and data-generating activities. The Replication checklists in Annex 4 should be used to assess whether an activity can be repeated in another location and what adaptations are needed.

This documentation standard is necessary because citizen engagement is often reported only through numbers, photos or communication outputs. These are useful, but they do not fully explain how engagement contributed to implementation. D6.5 therefore focuses on what participation produced: data, feedback, improved understanding, local ownership, adapted methods, public commitments, infrastructure use, policy recommendations, circular products, educational material, innovation ideas or replication pathways. This makes it possible to compare activities across different contexts and to extract practical guidelines that can support future REMEDIIES actions, regional and local public authorities and communities working on plastic marine litter reduction.

Each case study also identifies the main REMEDIIES deliverables, reports and supporting evidence from which the case information was extracted. This ensures transparency between the technical project evidence; the engagement analysis and the practical annex tools proposed for replication.

2.4 Mapping engagement across REMEDIES pillars

This subsection provides a compact map of how citizen engagement and co-creation are connected to the three REMEDIES pillars: **Detection & Monitoring, Collection & Valorisation, and Prevention & Zero Waste**. It also includes policy and replication-oriented engagement, because several REMEDIES activities moved beyond local implementation and generated recommendations, scaling pathways and governance lessons. The purpose of this section is not to describe all activities in detail. The evidence base on the REMEDIES project outputs is organised and how each type of activity contributes to the wider engagement and co-creation methodology. The more detailed analysis is provided in Section 3 through case studies.

2.4.1 Engagement matrix

The activity examples in Table 1 uses case studies from Sections 3.1 to 3.12, so the matrix can be read as a bridge between the methodology and the detailed case analysis.

Table 1: REMEDIES pillars engagement matrix

REMEDIES pillar / field	Activity examples	Main engagement category	Main stakeholders	Co-creation element	Relevant case study section
Detection & Monitoring	Shoreline ML App and Citizen-Supported Monitoring; Beach Litter Monitoring and Field Protocols; GPS Buoys and Public Engagement; Aerial and Underwater Drone Monitoring	Action / Learning & Upscaling	Citizens, volunteers, researchers, technical partners, local authorities, schools, fishers, NGOs	Testing and applying monitoring tools, protocols and technologies; supporting reporting; improving usability, interpretation and public understanding.	3.1 - 3.4
Collection & Valorisation	Beach, River and Coastal Clean-Ups; Fishing for Litter and Fisher Engagement; Fishing Net Recovery, Recycling and Valorisation; Seafloor Litter Collection with Divers	Action / Learning & Upscaling	Citizens, volunteers, NGOs, municipalities, fishers, divers, port authorities, waste operators, recycling actors	Site selection, local mobilisation, sorting practices, practical feedback, underwater and port-based recovery, and connection of collected materials to disposal or valorisation pathways.	3.5 - 3.8
Prevention & Zero Waste	Fishing Gear made with biodegradable materials and Fisher Feedback; Zero-Waste Cosmetics and Seaweed Coating Workshops; Regenerative Local Value Chains as Alternatives to Plastic; Santorini Plastic Lab	Learning & Upscaling / Action	Citizens, schools, fishers, entrepreneurs, innovators, artisans, local businesses, researchers, civil society organisations	Testing products and materials, adapting workshops, identifying barriers to adoption, developing local alternatives to plastic, and linking valorisation with prevention.	3.9 - 3.12

The cross-cutting cases that are connecting multiple pillars are presented in Table 2. These cases combine awareness, action, learning, replication and policy engagement. The activity examples use the case study titles from Sections 3.13 to 3.17.

Table 2: Cross-cutting pillar engagement matrix

Pillar / field	Activity examples	Main engagement category	Main stakeholders	Co-creation element	Relevant case study section
Cross-pillar campaign and learning activities	REMEDIIES Anti-Litter Campaigns and Open Days; Plastic Fantastic Webinars; Plastic Fantastic Hackathon	Raising Awareness / Action / Learning & Upscaling	Citizens, volunteers, schools, NGOs, local authorities, students, entrepreneurs, researchers, technology providers, Demo Site partners	Local adaptation of REMEDIIES campaign methods, preparation of citizens for field action, use of educational tools, innovation learning and solution development.	3.13 - 3.15
Open Call Associated Regions	Open Call Associated Regions: Co-Creation Beyond the Demo Sites	Action / Learning & Upscaling	Municipalities, science centres, schools, fishers, merchants, artisans, women and youth groups, volunteers, NGOs, recycling companies	Local adaptation of REMEDIIES methods, community mobilisation, public infrastructure, merchant commitments, fisher involvement, valorisation and education outputs.	3.16
Policy, replication and ecosystem engagement	Policy Workshops	Learning & Upscaling / Policy co-creation	Researchers, policymakers, public authorities, civil society, entrepreneurs, EU projects, innovation ecosystem actors, local stakeholders	Co-created recommendations, governance pathways, scaling protocols, policy learning, and identification of implementation barriers and enablers.	3.17

2.5 Selection of the cases

The cases included in Section 3 were selected because they provide practical evidence of how REMEDIIES involved citizens and stakeholders across different types of activities and contexts. The selection includes technical monitoring cases, direct action cases, prevention and zero-waste cases, regional and local public authorities Open Calls cases and policy co-creation cases. Together, they show how engagement moved from awareness and participation towards testing, feedback, local ownership, policy learning and replication.

The case was selected because it contributes at least one of the following elements:

- direct citizen or stakeholder participation

- use of citizen science protocols, tools or data collection
- feedback from users, participants or local actors
- adaptation of an activity to local conditions
- co-creation of infrastructure, methods, recommendations or outputs
- lessons learned from implementation challenges
- clear potential for replication in other territories

These case studies are not presented as isolated communication examples. They are used as evidence for extracting the guidelines in Section 5 and the toolkit in Section 8. Analytical structure follows the evidence and documentation methodology in Section 2.3.

3. REMEDIIES citizen engagement and co-creation cases

This section presents selected REMEDIIES activities as case studies of citizen engagement and co-creation. The aim is not to repeat the full technical content of the related deliverables, but to show how citizens and stakeholders were involved in practice, what they contributed, what was tested or adapted, what feedback or insight was generated, and what can be replicated in other territories. Each case follows the same logic: activity overview, what engagement channels and methods were used, what was co-created, tested, adapted or validated, what was learned, and guideline for replication.

The cases are organised around the three REMEDIIES pillars: Detection & Monitoring, Collection & Valorisation, and Prevention & Zero Waste. Additional cases are included for the Open Call Associated Regions and the REMEDIIES Policy Workshops, because these activities show how engagement and co-creation were extended beyond the original demo sites and translated into local implementation, replication and policy learning. See Case Study Overview in Table 3 below:

Table 3: REMEDIIES selected case studies overview

Case study	REMEDIIES pillar	Engagement category	Main engagement method	Main co-creation / learning element
Shoreline ML App and Citizen-Supported Monitoring	Detection & Monitoring	Action / Learning & Upscaling	App-based reporting, citizen-supported monitoring, field data collection	Citizens and local actors support structured marine litter reporting and provide feedback on usability and field application.
Beach Litter Monitoring and Field Protocols	Detection & Monitoring	Action	Beach litter monitoring, field protocols, seasonal observations	Local teams and volunteers apply harmonised protocols in different coastal contexts, generating comparable field evidence.
GPS Buoys and Public Engagement	Detection & Monitoring	Raising Awareness / Learning & Upscaling	Demonstration of tracking tools, public communication, local knowledge exchange	GPS buoy deployment helps explain litter pathways and connects technical monitoring with public understanding of marine currents and litter movement.



Aerial and Underwater Drone Monitoring	Detection & Monitoring	Learning & Upscaling	Technology demonstrations, Open Days, webinars, expert-led monitoring	Stakeholders observe and discuss how drones can support marine litter detection, hotspot identification and local monitoring strategies.
Beach, River and Coastal Clean-Ups	Collection & Valorisation	Action	Clean-ups, sorting, weighing, documentation, citizen science reporting	Participants remove litter while contributing basic evidence on plastic and non-plastic waste and learning about local pollution sources.
Fishing for Litter and Fisher Engagement	Collection & Valorisation	Action / Learning & Upscaling	Fisher workshops, port-based engagement, disposal infrastructure, practical consultation	Fishers contribute local knowledge, validate practical solutions and help identify operational barriers to marine litter collection.
Fishing Net Recovery, Recycling and Valorisation	Collection & Valorisation	Action / Learning & Upscaling	Abandoned-net recovery, disposal stations, recycling testing, study visits	Local actors, fishers, divers and recycling companies test practical pathways for recovering, storing and potentially valorising fishing nets.
Seafloor Litter Collection with Divers	Collection & Valorisation	Action	Diver clean-ups, seabed litter removal, public visibility	Divers reveal hidden underwater pollution and help connect seabed litter with wider public awareness and local action.
Fishing Gear made with biodegradable materials and Fisher Feedback	Prevention & Zero Waste	Learning & Upscaling	Field testing, fisher feedback, gear comparison	Fishers and researchers test gear made with biodegradable materials under real fishing conditions and document performance, handling and adoption barriers.
Zero-Waste Cosmetics and Seaweed Coating Workshops	Prevention & Zero Waste	Learning & Upscaling	Hands-on workshops, product testing, citizen science surveys	Participants test zero-waste cosmetic alternatives and provide feedback on usability, awareness and willingness to adopt.

Regenerative Local Value Chains as Alternatives to Plastic	Prevention & Zero Waste	Learning & Upscaling	Local value chain mapping, stakeholder dialogue, policy learning	Local actors explore how locally rooted materials, skills and production systems can replace single-use plastics and support territorial resilience.
Santorini Plastic Lab	Collection & Valorisation / Prevention & Zero Waste	Action / Learning & Upscaling	Plastic collection, sorting, upcycling, maker education, school workshops	Participants follow the journey from local plastic waste to material learning, creative reuse and reflection on plastic reduction.
REMEDIIES Anti-Litter Campaigns & Open Days	Cross-pillar	Raising Awareness / Action / Learning & Upscaling	Local campaign packages, clean-ups, citizen science, education, communication, technology demonstrations	Demo Sites adapt REMEDIIES engagement methods into local campaigns that combine awareness, field action, innovation uptake and community mobilisation.
PLASTIC FANTASTIC Hackathon	Cross-pillar	Learning & Upscaling	Open call, Bootcamp, inspirational talks, mentoring, pitching, jury feedback, awards and acceleration support	Participants develop plastic-pollution solutions, receive expert input, pitch their ideas and move selected projects towards acceleration and implementation.
PLASTIC FANTASTIC Webinars	Cross-pillar	Raising Awareness / Learning & Upscaling	Webinars, volunteer preparation, plastic identification flag, Demo Site updates and technology presentations	The series responds to volunteers' need for field preparation and adapts scientific and technical knowledge into accessible learning formats for clean-ups, monitoring and citizen science.
Open Call Associated Regions: Co-Creation Beyond the Demo Sites	Cross-pillar	Learning & Upscaling	Local replication, clean-ups, infrastructure, education, prevention, fisher engagement	Associated Regions adapt REMEDIIES methods to their own territories, testing replication through local co-creation and practical implementation.
Policy Workshops	Cross-pillar	Learning & Upscaling	Policy dialogue, roundtables, recommendation-building	Stakeholders translate field evidence, citizen science, local action and innovation lessons into policy and governance recommendations.

3.1 Shoreline ML app and citizen-supported monitoring

Activity overview

The REMEDIIES Shoreline Marine Litter App (REMEDIIES app) and related data management infrastructure were developed under the Detection & Monitoring pillar to support the collection, organisation and use of marine litter data from monitoring and clean-up activities. The app is relevant to citizen engagement because it gives field participants, volunteers, local partners and non-expert users a structured way to record and report litter data. It therefore connects local action with wider monitoring needs and supports the transition from clean-up participation to citizen-supported evidence generation.

The REMEDIIES app was used and presented in several Demo Site contexts. In Saïdia, Morocco, during the monitoring workshop and first beach litter monitoring campaign on 30 November 2023, partners monitored a 100-meter section of Saïdia beach, collected 747 litter items weighing 13.39 kg, sorted them using the TG ML J-List method, tested the PlasTell handheld NIR device by MATOHA, and used the REMEDIIES mobile app developed by Infordata for categorising and reporting litter. In Albania, the app was used in Hamallaj Beach monitoring activities, including the 17 March 2024 monitoring of a 100-meter beach section that collected 51 kg of waste, including 28 kg of plastic waste, and the 16 November 2025 autumn monitoring and clean-up at Hamallaj Beach, where 689 items were categorised and reported through the REMEDIIES App. In Koper, Slovenia, identified litter from seasonal monitoring at Bele Skale is categorised through the monitoring app and portal developed by Infordata, with data sent to EMODnet. In the Cyclades, the REMEDIIES App was also presented as part of the Greece edition of the PLASTIC FANTASTIC webinar, supporting standardised litter logging and data collection for volunteers and Adopt a Beach participants. Snapshot of the activities can be seen in Figure 2.

Because the REMEDIIES app is intended to support field participation by both expert and non-expert users, its engagement value also depends on whether different user groups can understand, access and apply it in real monitoring conditions. Accessibility, inclusive instructions, gender-sensitive communication and user support are therefore important parts of the engagement approach.



Figure 2: Training, field testing and data collection activities supporting the REMEDIIES shoreline monitoring and citizen science tools. (Source: REMEDIIES archive)

At the time of reporting, the app does not include dedicated gender or title fields, gender-disaggregated reporting, or an in-app survey concerning participants' perception of the tool. Consequently, gender-specific conclusions cannot currently be produced from the data collected through the application. Before the end of the project, the gender dimension will be addressed through the T7.6 survey, a review of the REMEDIIES app's language and visual communication, broader and more diverse usability testing, and the documentation of possible differences in user experience. Where justified, technically feasible and compliant with data-protection requirements, optional demographic data collection and aggregated analysis may also be considered.

What engagement channels and methods were used

Engagement through the app happened through a combination of field training, monitoring workshops, clean-up activities and webinars. In Saïdia, the app was introduced during a monitoring workshop involving REMEDIIES partners, local Moroccan actors, universities, NGOs and students. The workshop helped participants understand how beach and seafloor litter monitoring, polymer identification, data collection, EMODnet reporting and the REMEDIIES app are connected. The following field campaign allowed participants to apply this knowledge directly on Saïdia beach. In Albania, ETMI, VITO, NIC and local NGOs tested the monitoring protocol and app-based reporting in real field conditions at the Ishëm River mouth and Hamallaj Beach. In Slovenia, UM, NIC and INFOR linked app-based categorisation to seasonal monitoring along the adopted 100-meter coastline section at Bele Skale.

This engagement process shows that the app works best when it is embedded in a wider learning process. Participants need to understand not only how to upload data, but why categories matter, why standardisation is important, and how local litter observations become part of a larger monitoring

framework. The app therefore functions as both a technical tool and an engagement bridge between citizens, researchers and policy-relevant data systems.

From an inclusion and diversity perspective, the engagement process around the Shoreline Marine Litter App also highlights the need to make digital monitoring tools accessible to a wide range of user groups. Participants may include students, volunteers, NGOs, local authorities, researchers, community members and non-expert users with different levels of digital literacy, scientific knowledge, language confidence and fieldwork experience. For this reason, app-based engagement should be supported by clear instructions, inclusive language, facilitator guidance and practical demonstrations, enabling participants with varying backgrounds and levels of experience to understand the purpose of the tool and contribute meaningfully to data collection and reporting. The T7.6 survey will provide an additional mechanism for documenting whether different groups experience the app, its instructions or the monitoring process differently. The findings should be used to identify barriers, prioritise improvements and support evidence-based reporting on the gender dimension.

What was co-created, tested, adapted or validated

The main co-creation element concerns the field usability of the app and the monitoring process around it. Citizens and local actors did not design the digital infrastructure itself, but their use of the app in beach monitoring, clean-ups and training activities helped to test whether the reporting process can work in real local contexts. The Moroccan, Albanian, Slovenian and Greek examples show how the app can be introduced to different audiences, including students, volunteers, NGOs, researchers, local authorities and citizen science participants.

The Venice lighthouse training workshops further strengthened this testing and validation pathway. In April 2023, VLPF hosted a two-day international workshop in Venice with the participation of REMEDIIES Demo Site representatives, focusing on shared methodologies for beach litter monitoring and clean-up activities. The workshop combined methodological exchange, partner presentations, field application and debriefing, including a monitoring and cleaning session on a 100-meter beach transect at San Piero in Volta, Lido di Venezia, following European-level marine litter monitoring standards. The results from Pellestrina were also shared, where monitoring recorded 2,655 objects in a 100-meter transect and 27.41 kg of waste, mainly plastic. In October 2023, a second lighthouse training workshop in Venice focused more specifically on the Beach Litter Monitoring App, including app installation and use, NIR device testing, field monitoring and clean-up at the WWF Oasis of Alberoni, data acquisition, app evaluation and training feedback. The workshop feedback identified practical app improvement needs, including installation issues, GPS functionality, litter search functions, missing item categories, limited item photos, multi-user data entry and report export options. This confirms that Venice functioned as a lighthouse site not only for training, but also for testing the app, validating field procedures and collecting user feedback for future improvement.

The activities tested whether participants could understand the monitoring logic, apply litter categories, use the app during field conditions and connect data collection with clean-up or monitoring objectives. These cases also validated the need for facilitation. App-based citizen science cannot be reduced to downloading a tool. It requires preparation, explanation, local coordination, field support and feedback after the activity.

The inclusion dimension is also relevant to the usability of the tool. If participants experience difficulties because of language, digital literacy, unclear categories or lack of confidence in using monitoring tools, this should be treated as useful feedback for future engagement design. In this sense, user diversity becomes a significant part of the testing process: the app and its supporting instructions should work not only for technical partners, but also for volunteers, students, local organisations and other non-specialist users.

The current application does not yet collect gender information or support gender-disaggregated usability analysis. The T7.6 survey and subsequent user feedback activities will therefore be used to identify whether participants report different needs, barriers or perceptions. Relevant findings will be documented and, where feasible, translated into improvements to the interface, instructions, onboarding process or supporting materials.

What was learned

The main lesson is that **digital tools strengthen citizen science** when they are connected to hands-on activity and local explanation. The Saïdia, Albania, Koper and Cyclades examples show that app-based reporting becomes more meaningful when participants physically observe, sort, categorise and discuss litter. The tool helps participants move from general awareness to structured contribution, but only when the process is guided.

The case also shows that digital participation should not be assumed to be equally accessible to all users. Differences in age, education, digital skills, language, previous fieldwork experience, gender-related social factors or confidence with scientific terminology may affect how easily participants use the app and understand monitoring categories. Future app-based activities should therefore include inclusive onboarding, simple visual instructions, facilitator support and structured feedback opportunities, ensuring that the tool supports broad participation rather than only technically confident users.

At present, the available app data do not allow differences in participation or user experience to be analysed by gender. A key lesson is therefore that claims concerning the gender dimension should be supported by documented evidence rather than assumptions. The T7.6 survey will help gather this evidence. Any collection of demographic information should be voluntary, proportionate, privacy-compliant and accompanied by a clear explanation of how the information will be used. Results should be reported only in aggregated form and only where the number of responses is sufficient to protect participants' privacy.

A second lesson is that app-based monitoring can support both local and European-level data needs. In Koper, for example, seasonal monitoring data are connected to EMODnet, while in Saïdia and Albania the app helped to demonstrate how field activities can generate comparable records. However, the cases also show the need to document participant experience more systematically. Future reports should record how many participants were trained in app use, what difficulties they faced, whether data quality was sufficient, and what improvements were suggested.

Guideline for replication

For replication, the app should be introduced as part of a complete citizen science activity, not as a standalone digital tool.

The minimum replication sequence should include:

1. Define the monitoring objective and the type of data to be collected.
2. Select the site and clarify whether the activity is monitoring, clean-up reporting or both.
3. Brief participants on the purpose of the app, litter categories, data quality and the wider data pathway.
4. Use inclusive and accessible instructions, taking into account language, age, digital literacy and different levels of previous experience with monitoring tools.
5. Review invitations, registration forms, training materials, images and examples to avoid stereotypical or exclusionary language and representation.
6. Test the app before fieldwork and assign facilitators to support users during data entry.
7. Where possible, involve a diverse and gender-balanced group of participants in testing and feedback activities.

8. Collect and review participant feedback on usability, clarity, accessibility and field difficulties. The T7.6 survey should be used where applicable.
9. Where demographic information is collected, ensure that participation is voluntary, explain the purpose of the collection, comply with applicable data-protection requirements and report results only in aggregated form.
10. Record whether different groups experienced specific barriers and document any resulting adaptations to the app, instructions or engagement process.
11. Share results back with participants in accessible language where possible.

Source deliverables and supporting evidence used for this case: *D1.2 Shoreline ML App and data repository/management portal*; *D1.1 Methodologies for monitoring plastic macro beach and seafloor marine litter and plastic macro floating riverine litter*; relevant REMEDIIES app testing and field demonstration material.

The Citizen Science Readiness Checklist in **Annex 4.4** and the Feedback Collection Form in **Annex 2** should be used before and after implementation. The T7.6 survey should additionally be used to document gender-related and inclusion-related feedback and to support any resulting adaptations.

3.2 Beach litter monitoring and field protocol

Activity overview

Beach litter monitoring and field protocols are central to the Detection & Monitoring pillar of REMEDIIES. They provide the methodological basis for identifying, recording and comparing marine litter in coastal and riverine environments. The monitoring work is directly connected to several Demo Sites, including Saïdia in Morocco, Koper and Bele Skale in Slovenia, Durrës and Tirana in Albania, the Cyclades in Greece, Porquerolles in France, and Sardinia in Italy. These activities show how scientific protocols can be translated into field-based engagement with citizens, NGOs, students, local authorities, volunteers and local environmental actors.

Several concrete examples demonstrate this approach. In Saïdia, Morocco, the first beach litter monitoring campaign took place on 30 November 2023 on a 100-meter beach section and collected 747 litter items weighing 13.39 kg. In Albania, ETMI organised a beach litter monitoring workshop with local NGOs on 30 January 2024, followed by a field activity at the Ishëm River mouth on 31 January 2024 with around 10 participants from ETMI, VITO, NIC and local NGOs, collecting around 250 kg of waste during the testing activity. On 17 March 2024, ETMI carried out beach litter monitoring at Hamallaj Beach on a 100-meter section, collecting 51 kg of waste, including 28 kg of plastic waste and 23 kg of other waste. In Slovenia, UM adopted a 100-meter coastline section at Bele Skale through the “Adopt your piece of the coast” initiative, with seasonal beach litter monitoring planned four times per year over three years. In the Cyclades, Marine Conservation Greece began seasonal monitoring at Merchias Beach in northern Mykonos on 29 January 2024, using a 100-meter beach section and planning monitoring every three months.

From an inclusion and diversity perspective, beach litter monitoring is relevant because it often involves mixed groups of citizens, students, volunteers, NGOs, researchers and local actors with different levels of field experience, physical capacity, language confidence and scientific knowledge. The activity should therefore be designed so that participation is safe, understandable and accessible, and so that different participants can contribute according to their role and capacity. Where relevant, the gender dimension was considered by ensuring that communication and engagement approaches do not create gender-related barriers to participation and by applying gender-inclusive practices as well as highlighting accessibility,

inclusive language and paying attention to different user needs in project activities. Snapshot of the activities can be seen in Figure 3.



Figure 3: Beach litter monitoring in practice: litter identification, data recording and shoreline observations. (Source: REMEDIIES archive)

What engagement channels and methods were used

Engagement happened through workshops, field monitoring, clean-up-linked data collection, and training activities. In Albania, the process started with a workshop for local NGOs, where ETMI presented the marine litter protocol and criteria for identifying monitoring hotspots, while VITO introduced the marine litter app for data uploading and monitoring. This was followed by field testing, where local NGOs and project partners applied the protocol in real conditions. In Saïdia, the monitoring campaign was embedded in a broader REMEDIIES event in Oujda that included the General Assembly, Cluster Meeting, monitoring workshop, beach monitoring campaign and clean-up action. In Koper, the engagement model is longer-term, based on repeated seasonal monitoring by UM and NIC scientists on the same adopted coastline section, with app-supported categorisation and reporting to EMODnet.

The engagement value of monitoring protocols is that they transform participants from observers into contributors to evidence generation. Citizens and local actors are introduced to what counts as marine litter data, how litter items are categorised, why standardised sections such as 100-meter beach areas are used, and how results can support comparison, policy, prevention and future action. This is especially important in Demo Sites where monitoring is combined with clean-ups, app use, plastic identification and local awareness.

Inclusion should be considered in the way field protocols are introduced and facilitated. Beach litter monitoring can be physically demanding and methodologically detailed, so organisers should ensure that roles are clearly distributed and adapted to participant capacities. Some participants may collect litter, others may record data, photograph findings, support sorting, assist with logistics or participate in reflection. This allows people with different ages, abilities, confidence levels and previous experience to contribute meaningfully without excluding those who may not be able to perform all field tasks.

What was co-created, tested, adapted or validated

The co-creation element concerns the practical application of protocols in local field conditions. The monitoring protocol itself must remain harmonised, but the way it is introduced, explained and applied can be adapted through participant and organiser feedback. Local NGOs, volunteers, schools and authorities can help to validate whether the selected site is relevant, whether access is feasible, whether the instructions are clear, and whether additional training is needed.

The Albanian case is particularly useful because it shows a sequence from workshop to field testing. Local NGOs were first introduced to the protocol, then participated in monitoring at the Ishëm River mouth and Hamallaj Beach. The Saïdia case shows how a monitoring workshop can prepare local partners to conduct regular monitoring independently. The Koper and Cyclades examples show the importance of repeated monitoring in the same area, allowing participants and partners to build familiarity with the protocol and compare data over time.

From an inclusion and diversity perspective, these activities also test whether harmonised protocols can be applied by different types of participants, not only by technical or scientific partners. If participants find the categories unclear, the instructions too technical, the site difficult to access or the activity too physically demanding, this should be documented as part of the learning process. This feedback can help improve future briefings, visual guidance, role distribution, safety planning and accessibility of monitoring activities.

What was learned

The main lesson is that monitoring protocols work as engagement tools when participants understand why the method matters. Standardisation can be difficult for non-expert users, but it also gives participants a stronger sense that their contribution is part of something larger than a local clean-up. The use of 100-meter sections in Saïdia, Albania, Koper and Mykonos help make the monitoring process concrete and replicable.

A second lesson is that field training is essential. Workshop-based explanations are useful, but participants understand the protocol better when they apply it in real conditions. The Albanian and Moroccan examples show how monitoring workshops, app use and field campaigns can be combined into a coherent engagement process. The main improvement needed is more consistent documentation of participant feedback: future monitoring reports should record what participants found difficult, whether the categories were clear, how long the process took, and whether they felt able to repeat the activity.

A third lesson is that inclusive monitoring requires attention to both method and participation conditions. A protocol may be scientifically sound, but its engagement value depends on whether participants can understand it, access the site, feel safe, and contribute in a role that matches their capacity. Future beach litter monitoring activities should therefore document not only the data collected, but also whether the activity was accessible, whether instructions were understandable, whether inclusive language and visual support were used, and whether different participant groups were able to contribute.

Guideline for replication

Beach litter monitoring should be replicated through a structured sequence of briefing, field application and feedback.

The minimum replication sequence should include:

1. Explain the purpose of monitoring, the protocol, the litter categories and the data pathway.
2. Select and mark the monitoring area, ideally using a defined section that can be monitored repeatedly.
3. Assess site accessibility, safety, environmental sensitivity and possible barriers to participation.

4. Brief participants on safety, roles, categories, recording method and quality expectations.
5. Distribute roles in an inclusive way, allowing participants to contribute through collection, sorting, recording, photography, logistics or reflection according to their capacity and experience.
6. Apply the protocol in the field, using app-based recording or data sheets where relevant.
7. Review what was found, what was difficult and what should be improved before the next monitoring activity.
8. Share the results with participants and local partners in accessible language.

Source deliverables and supporting evidence used for this case: D1.1 *Methodologies for monitoring plastic macro beach and seafloor marine litter and plastic macro floating riverine litter*; D1.2 *Shoreline ML App and data repository/management portal*; D2.4 *Clean-up and valorisation guideline*.

Activity Planning Template in **Annex 1.1**, Citizen Science Readiness Checklist in **Annex 4.4** and Feedback Collection Form in **Annex 2** should be used to support replication.

3.3 GPS buoys and public engagement

Activity overview

The GPS buoy activities under REMEDIIES contribute to the Detection & Monitoring pillar by improving understanding of floating litter movement and accumulation patterns. According to the REMEDIIES monitoring evidence, 200 GPS-tracked buoys were deployed across the Aegean Sea, including river mouths in Northern Greece, to monitor drift and accumulation of floating litter. Public involvement was significant, with more than 100 individuals and institutions contributing, including local volunteers, fishers, municipalities, ministries and national media.

The Cyclades Demo Site provides a concrete local connection to this work. Marine Conservation Greece began using GPS devices to trace the route of garbage through waterways and marine currents, helping map how waste travels before reaching sensitive marine areas. A key part of the Cyclades work is the identification and monitoring of plastic movement in the Aegean Sea. Marine Conservation Greece (MCG) began using GPS-equipped buoys to trace the movement of waste through rivers, waterways, and marine currents, helping to map the routes followed by floating litter before it reaches sensitive marine and coastal areas.

The monitoring programme involved the deployment of more than 200 buoys across the Cyclades, several Greek rivers, and other areas of the Aegean Sea. Its aim was to monitor not only waste entering the Aegean from Turkey and the Dardanelles, but also litter transported into Greek waters through transboundary rivers, as well as waste associated with tourism and other human activities in Greece. The activities were supervised and coordinated by MCG, while their implementation and public outreach were supported by national Greek radio and television networks. Environmental organisations and groups active in coastal fishing also contributed to the deployment activities, monitoring efforts, and wider dissemination of the initiative.

These activities provide valuable evidence on plastic pollution pathways and help identify accumulation zones and floating-litter hotspots, supporting the development of more targeted prevention, monitoring, and clean-up interventions. The activity supports the wider objective of tracking currents for plastic hotspot identification over more than 15,000 km.

From an inclusion and diversity perspective, GPS buoy activities are relevant because they depend on communication with a wide range of sea users and local actors, including fishers, volunteers, coastal communities, municipalities and media. These groups may have different levels of technical knowledge,

access to information, trust in scientific equipment, language needs and familiarity with monitoring tools. The engagement approach therefore needs to ensure that public messages are clear, inclusive and accessible, so that different community members can understand the purpose of the devices and know how to respond if they encounter them. Snapshot of the activities can be seen in Figure 4.



Figure 4: Deployment and tracking of GPS buoys. (Source: REMEDIIES archive)

What engagement channels and methods were used

Engagement happened through public communication, local interaction and the involvement of actors who use or manage the marine and coastal environment. Fishers, local volunteers, municipalities, ministries and media were important because they could help explain the purpose of the buoys, support correct public responses and reduce the risk of devices being misunderstood or removed. In the Cyclades, the involvement of Nerd Fishing and Marine Conservation Greece helped link technical tracking with local marine knowledge and public-facing communication.

This case shows that citizen engagement is not limited to workshops or clean-ups. It can also be required for the successful implementation of a scientific monitoring method. GPS devices placed in the sea become

visible objects in a shared environment. Their success depends partly on whether local users understand what they are, why they are there, and what should happen if they are encountered.

The inclusion dimension is especially relevant in the communication around the devices. Public-facing information should be simple, visual and available through channels that reach different audiences, including professional sea users, local residents, volunteers and visitors. Communication should avoid technical language where possible and should clearly explain the purpose of the devices, the environmental value of the activity, and the contact point or expected action if a device is found. This helps avoid excluding people who are not familiar with scientific monitoring or GPS-based tracking.

What was co-created, tested, adapted or validated

The co-creation element concerns the communication and local implementation conditions around the monitoring activity. The public did not co-design the GPS technology itself, but local actors helped validate the need for clear messages, trusted intermediaries and community awareness around buoy deployment. Fishers and local sea users are especially important because they are likely to encounter devices or understand the movement of marine litter from direct experience.

The activity also tested how scientific evidence on litter pathways can be connected to public understanding. By tracing where floating litter moves, the GPS buoy work helps make marine pollution less abstract. It shows that plastic litter travels across borders, currents and marine systems, and that prevention and monitoring must therefore be coordinated across locations.

From an inclusion perspective, the case also validates the importance of adapting technical communication to different stakeholder groups. A message designed for a ministry, a municipality or a research partner may not be suitable for fishers, volunteers, local residents or visitors. Future GPS buoy activities should therefore treat communication materials as part of the engagement design, ensuring that they are accessible, understandable and relevant to the people most likely to encounter or support the monitoring activity.

What was learned

The main lesson is that visible monitoring technologies require social preparation. A buoy or GPS device is not only a scientific object once it enters a shared marine space. It becomes something that fishers, residents, visitors, authorities or media may see, question, retrieve or report. The success of this type of activity therefore depends on whether local actors understand and support the monitoring purpose.

Another lesson is that public engagement around GPS tracking can strengthen awareness of floating litter pathways. Rather than presenting marine litter as a static beach problem, the activity helps explain drift, accumulation, river-mouth influence, wind direction and cross-border movement. This can support better public understanding of why marine litter prevention and monitoring need to be coordinated at regional and Mediterranean level.

A further lesson is that inclusive communication is essential when scientific equipment is deployed in public or shared environments. People may respond differently depending on their role, previous experience, access to information, language, age or level of trust in institutions. Future GPS buoy activities should therefore include short, accessible explanations, visual material where possible, and locally trusted communication channels. This would support wider understanding and reduce the risk that only technically informed stakeholders can engage meaningfully with the monitoring activity.

Guideline for replication



Any visible monitoring technology deployed in marine, coastal or riverine environments should be accompanied by a stakeholder and communication plan.

The minimum replication sequence should include:

1. Identify the monitoring purpose and the local area where the technology will be deployed.
2. Map fishers, port authorities, municipalities, local volunteers, coastal communities, media and other groups who may interact with the devices.
3. Prepare clear and inclusive messages explaining what the device is, what it monitors, what people should do if they find it, and who to contact.
4. Adapt communication to different audiences, using simple language, visual material and locally trusted channels where possible.
5. Coordinate permissions, deployment logistics, retrieval procedures and safety considerations.
6. Use public engagement opportunities to explain how GPS data helps understand litter pathways.
7. Communicate key results back in accessible language where possible.

Source deliverables and supporting evidence used for this case: D1.4 *Buoy with GPS*; D1.2 *Shoreline ML App and data repository/management portal*, especially the device monitoring and buoy tracking components.

The Stakeholder Mapping Template in **Annex 1.2**, Activity Planning Template in **Annex 1.1** and Communication and Visibility Checklist in **Annex 4.10** should be used for replication.

3.4 Aerial and underwater drone monitoring

Activity overview

Aerial and underwater drone monitoring activities contribute to the Detection & Monitoring pillar by supporting the identification, documentation and mapping of marine litter in coastal, riverine, marina and underwater environments. Within REMEDIIES, drone-based monitoring is relevant because it can help partners observe areas that are difficult, time-consuming or unsafe to monitor only through manual fieldwork. This is especially important for wild beaches with poor accessibility, marina environments, seabed areas and coastal zones affected by tourism, urban pressure, river inputs or accumulated plastic debris.

The Demo site updates and technical protocols provide two strong examples: the Aerial Drone & AI Solution in Saïdia, Morocco, and the Underwater Drone Technology demonstrated in the Koper Demo Site at Marina Izola, Slovenia. Sardinia also provides a relevant context through underwater monitoring and seafloor action in the Sinis Peninsula, where CNR, the Sinis Marine Protected Area, local NGOs and fishermen are working on beach litter, microplastics, abandoned fishing gear and underwater plastic pollution.

In Saïdia, the Aerial Drone & AI Solution was developed by MOH and INFOR. The protocol for beach plastic monitoring using aerial drones defines the technology as a monitoring approach for identifying the most affected beach areas, quantifying plastic pollution and tracking pollution trends over time. The system uses aerial drone footage, image and video collection, artificial intelligence and image analysis to detect plastic debris. The model is designed to detect plastic debris in general, with ongoing improvements aiming to count the number of detected debris items and distinguish between several plastic classes such as bottles, caps, goblets and bags.

The aerial monitoring protocol was designed for Saïdia Beach, a site of biological and ecological interest near the Moulouya estuary in Eastern Morocco. The monitoring area was selected because it is representative of a coastal environment where river discharge, tourism activities, and coastal currents contribute to the accumulation of marine litter, making it an appropriate site for evaluating drone-based monitoring

methodologies.) was selected because it is representative of a coastal environment where river discharge, tourism activities, and coastal currents contribute to the accumulation of marine litter, making it an appropriate site for evaluating drone-based monitoring methodologies. The flight plan is based on low-altitude, high-precision monitoring, using a DJI Mavic Air drone, with a future transition to Mavic Air 3 foreseen. The drone is equipped with a high-quality camera, and the protocol uses DJI GO 4 for piloting and flight planning. The monitoring approach includes a defined flight path, video recording, asynchronous analysis on a powerful server, AI-supported detection and mapping of plastic debris. In Koper, the Underwater drone for microplastics sampling technology, developed by CLERA, INFOR and CNR, was demonstrated at Marina Izola during the REMEDIES Open Day on 18 March 2026. The Open Day was organised by the University of Maribor with the support of You(r)Sea Institute, ZRS Koper, Marina Izola, CLERA, INFOR and NIC. It included live demonstrations of underwater drone monitoring and microplastic sampling technology. From an inclusion and diversity perspective, drone monitoring is relevant because it is a technical activity that needs to be made understandable and accessible to non-specialist audiences. Participants and observers may include citizens, local authorities, marina operators, NGOs, students, researchers, fishers, tourism actors and local communities with different levels of technical knowledge, digital confidence and familiarity with AI or monitoring technologies. The engagement approach should therefore use clear language, accessible explanations and inclusive facilitation, ensuring that drone monitoring is not perceived as a closed expert-only activity. Snapshot of the activities can be seen in Figure 5.

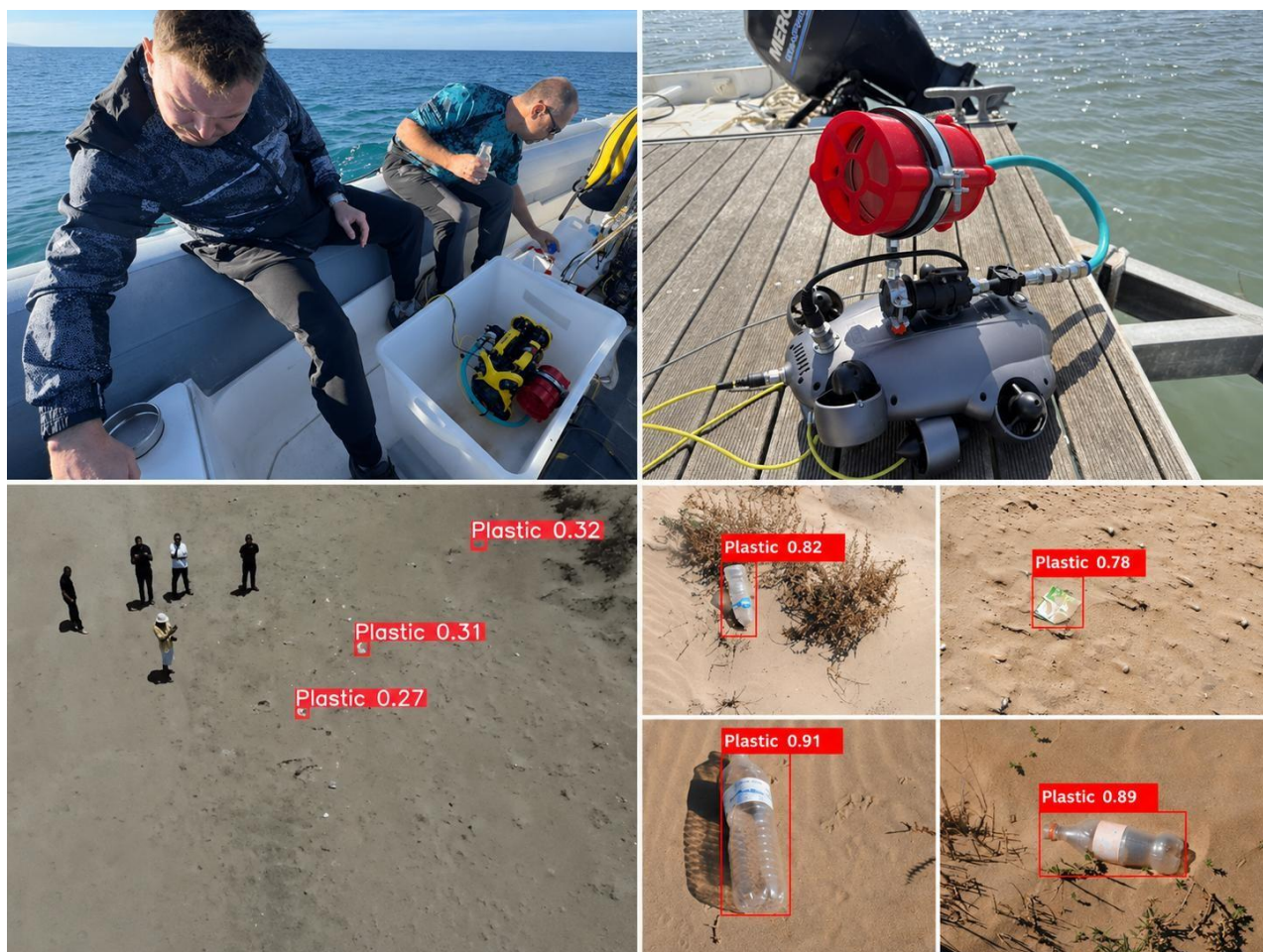


Figure 5: Aerial and underwater drone monitoring in REMEDIIES, showing field teams operating aerial and underwater drones during coastal and marina monitoring activities. (Source: REMEDIIES archive)

What engagement channels and methods were used

Engagement around drone monitoring happened through technology demonstrations, seminars, webinars, open days, cluster meetings and field-based exchanges. These formats were important because drone monitoring is a technical activity that requires translation for non-specialist audiences. Citizens, local authorities, marina operators, NGOs and local stakeholders do not necessarily operate the drones, but they can understand the monitoring purpose, interpret the results, identify areas of concern, and connect the technology to practical action.

In Saïdia, aerial drone and AI technology was introduced as part of the wider Moroccan Anti-Litter Campaign, which aimed to reduce plastic pollution, activate local engagement, showcase REMEDIIES technologies, mobilise communities, researchers, institutions, students, civil society and local authorities, and promote scalable circular solutions. The 5th PLASTIC FANTASTIC Webinar on 3 July 2025 focused on Beach Litter Monitoring and included updates from the Saïdia Demo Site. The 6th PLASTIC FANTASTIC Webinar on 23 July 2025 focused on Plastic Identification and introduced the Aerial Drone & AI Solution. In this way, the technology was presented not only as a technical monitoring system, but as part of a wider citizen science, awareness and anti-litter pathway.

The aerial drone protocol also provides a practical structure for how monitoring is implemented. Before each flight, the drone must be inspected, including the drone exterior, battery, remote controller, camera and gimbal functionality. The drone is connected to DJI GO 4 to verify flight settings such as return-to-home altitude, maximum flight altitude and intelligent flight modes. A short test flight in a safe and open area is also included to verify stability and responsiveness. The protocol recommends a maximum wind speed of 5 m/s for flight, although it notes that the upper limit can be 10 m/s.

The flight plan is designed to cover the monitoring area systematically. The protocol specifies a flight altitude of 2 meters and a speed of 1 m/s for the most precise monitoring mode. Images should have 20% overlap to ensure complete coverage, and the flight path follows a zigzag pattern with a 1-meter step. The protocol notes that, at this speed, flying over a 100 x 28-meter zone takes almost 47 minutes and requires three batteries. This operational detail is important for replication because it shows that drone monitoring requires time, battery planning and trained technical operators.

Data analysis happens after the flight. Videos are recorded during flight coverage and uploaded for asynchronous analysis on a powerful server. The technical team processes the video within 24 to 72 hours and produces outputs showing detected plastic waste. Once the counting system is operational, resulting videos can include localised plastic waste and counts. When plastic class detection is finalised, the outputs are expected to include plastic classes and cumulative numbers. The protocol also includes comparison between automatically detected results and manually performed operations in order to calculate model accuracy.

In Koper, engagement was organised through an in-person seminar, a Slovenia edition of the PLASTIC FANTASTIC seminar, and live demonstrations at Marina Izola. The event brought together stakeholders from research, industry, local authorities and civil society. Participants explored plastic identification, marine litter science, Koper pilot activities, underwater drone monitoring for seafloor mapping, and the microplastic filtration system treating wastewater from boat maintenance. The 7th REMEDIES Cluster Meeting, “Co-creating Local Innovations”, held the same day under the theme “Marina Izola as a Space for Sustainable Solutions for a Clean Sea,” further connected the technology to local innovation, European data integration and cross-project synergies.

The inclusion dimension is important in the way technical demonstrations are framed. Drone and AI monitoring can create distance between technical experts and local stakeholders if the methods, data outputs or operational requirements are not explained clearly. For this reason, demonstrations should include simple explanations of what the technology does, what it cannot do, why it is used, how data is checked, and how the findings can support local action. This helps different groups participate in the discussion, including people who may not have previous experience with drones, AI, marine monitoring or technical terminology.

What was co-created, tested, adapted or validated

The co-creation element lies in connecting technical monitoring with local knowledge, practical needs and stakeholder understanding. In Saïdia, the drone and AI solution was tested in a Demo Site where beach litter, microplastics and floating plastic hotspots are linked to tourism, urbanisation, the Moulouya River and coastal pressure. The technology supports identification and classification of plastic litter in areas that can be difficult to monitor manually, while local actors can help interpret where monitoring is most needed and how results can support clean-up planning, awareness activities or policy discussion.

The aerial drone protocol also validates a replicable monitoring workflow: define the monitoring objective, inspect the equipment, prepare the flight plan, collect video data, analyse footage, detect and quantify plastic

debris, create maps, analyse spatial and temporal trends, and report the findings. This gives REMEDIATION a structured pathway for using drone data in a way that can support both science and local action.

The protocol includes important technical validation elements. The AI model is evaluated through performance metrics such as precision, recall, F1 score (the harmonic mean of precision and recall, providing a balanced measure of detection performance), and mean average precision (mAP). It also recognises that flight height influences detection accuracy, confirming the need to test operational parameters rather than assuming that a single flight setup will work in all contexts. The protocol therefore shows that drone monitoring is not only a visibility tool; it is also a developing technical methodology that requires testing, refinement and comparison with manual results.

In Koper, the underwater drone demonstration allowed stakeholders to see how underwater monitoring can support cleaner marina environments, seafloor mapping and long-term litter assessment. The value of the demonstration was not only technical. It helped local stakeholders understand what can be detected underwater, how underwater data can support marina management, and how monitoring can be connected to other prevention technologies, such as microplastic filtration for wastewater generated during boat washing and antifouling paint rinsing.

The co-creation question is not whether citizens operate the drones. In most cases, they do not. The relevant question is how technical outputs can be made useful to local authorities, marina operators, NGOs, citizens and clean-up actors. This includes identifying priority areas, interpreting findings, connecting monitoring to action, and making the technology understandable for non-specialist audiences.

From an inclusion perspective, the case also tests whether advanced monitoring outputs can be communicated in a way that different stakeholders can understand and use them. Maps, images, detection results and technical indicators should be translated into practical messages for local authorities, citizens, marina users, NGOs and other non-specialist actors. This is important because the co-creation value of drone monitoring does not depend only on operating the equipment, but also on whether different groups can understand the findings and contribute to decisions on what should happen next.

What was learned

The main lesson is that advanced monitoring technologies require translation into practical local value. Drone outputs can be technically strong, but their engagement value depends on whether they help local stakeholders understand pollution patterns and decide what action should follow. The Saïdia and Koper examples show that webinars, Open Days, seminars and live demonstrations can make advanced monitoring more accessible and can build trust between technology providers, researchers, public authorities and civil society actors.

A second lesson is that drone monitoring must be planned carefully. The aerial drone protocol shows that effective monitoring depends on flight permissions, operator capacity, weather conditions, equipment checks, battery planning, flight altitude, flight speed, image overlap, flight path design, data processing capacity and post-flight analysis. These operational requirements should be communicated clearly when drone monitoring is presented to local stakeholders, so that expectations remain realistic.

A third lesson is that AI-supported monitoring should be validated against manual or expert assessment. The Saïdia protocol includes comparison between automatically detected results and manually performed operations in order to calculate model accuracy. This is important because local stakeholders may trust drone and AI outputs more when they understand how the results are checked and improved.

A fourth lesson is that privacy and ethics need to be addressed explicitly. The aerial drone protocol highlights the need to respect the privacy of people on beaches and mentions the development of a deep learning model to hide people's faces in recordings. It also stresses the need to minimise the environmental impact of flight operations and comply with local drone regulations. These points are essential for public trust and should be included in all drone-based engagement and replication activities.

A fifth lesson is that drone monitoring becomes more relevant when connected to other activities. In Saïdia, drone and AI monitoring was linked to beach litter monitoring, app use, plastic identification and anti-litter campaigning. In Koper, underwater drone monitoring was linked to marina pollution, microplastic filtration, seasonal beach monitoring, plastic identification and data integration. These connections make the technology part of a wider engagement and intervention pathway, rather than a standalone demonstration.

Guideline for replication

Drone-based engagement should be used when the technology responds to a clear local monitoring, mapping or clean-up need. Before implementation, partners should define the monitoring question, confirm permissions, identify trained operators, map relevant local stakeholders and prepare a communication plan. They should also assess whether aerial or underwater drone monitoring is appropriate for the site, taking into account accessibility, weather, water conditions, environmental sensitivity, privacy issues and local regulations.

The minimum replication sequence should include:

1. Define the monitoring objectives, such as identifying affected areas, quantifying beach plastic pollution or tracking trends over time.
2. Select the study area and record exact coordinates.
3. Confirm permissions and compliance with local drone regulations.
4. Map stakeholders who should understand or use the results, including local authorities, NGOs, marina operators, fishers, citizens, schools or coastal communities.
5. Prepare inclusive and accessible communication materials explaining the purpose of the technology, privacy safeguards, expected outputs and possible follow-up actions.
6. Prepare the drone, batteries, controller, camera, gimbal and flight planning software.
7. Define the flight plan, including altitude, speed, overlap, flight path and monitoring area.
8. Check weather conditions, especially wind speed.
9. Conduct a short test flight before data collection.
10. Record video or image data following the flight plan.
11. Upload data for processing and AI-supported detection.
12. Compare automated outputs with manual or expert assessment where possible.
13. Produce maps, graphs, statistics or visual outputs showing debris distribution.
14. Share results with local authorities, local communities and relevant stakeholders in accessible language.
15. Connect the findings to practical next steps, such as clean-ups, further monitoring, infrastructure changes or policy recommendations.

For underwater drone monitoring, replication should also include site-specific safety assessment, marina or port coordination, trained operators, water visibility checks, seafloor mapping objectives, stakeholder briefing and interpretation of underwater findings for non-specialist audiences.

Source deliverables and supporting evidence used for this case: D1.1 *Methodologies for monitoring plastic macro beach and seafloor marine litter and plastic macro floating riverine litter*; D1.2 *Shoreline ML App and data repository/management portal*; D1.3 *Deployment of underwater and aerial drones*; relevant Demo Site updates and technology demonstration material.

The Activity Planning Template in **Annex 1.1**, Stakeholder Mapping Template in **Annex 1.2**, Co-Creation Design Canvas in **Annex 1.3**, Feedback Collection Form in **Annex 2**, the Citizen Science Protocol for beach plastic monitoring using aerial drones in **Annex 3.3**, Citizen Science Readiness Checklist in **Annex 4.4**, Communication and Visibility Checklist in **Annex 4.10** and Replication Readiness Checklist in **Annex 4.11** should be used to support replication.

3.5 Beach, riverine and coastal clean-ups

Activity overview

Beach, river and coastal clean-ups are among the most visible and widely implemented citizen engagement actions in REMEDIIES. They are primarily linked to the Collection & Valorisation pillar, while also contributing to Detection & Monitoring and to Prevention & Zero Waste, whenever they incorporate litter categorisation, plastic identification, app-based documentation, awareness-raising activities or links to circular reuse and valorisation. Between 8 March 2023 and 26 June 2026, REMEDIIES clean-up actions mobilised 5,487 participants across 187 reported clean-ups, collecting 8,864.49 kg of plastic litter and 14,937.38 kg of other litter, representing a total of 23,8 tons of marine litter (for recent number see the REMEDIIES dashboard²). In total, these actions removed approximately 23.8 tonnes of litter from beaches, rivers, coastlines, seabeds and related environments. These figures show that clean-ups functioned not only as awareness activities, but also as structured environmental interventions that generated measurable removal, monitoring and engagement outputs.

The clean-up methodology is underpinned by the REMEDIIES Citizen Science Protocol for Beach Litter Clean-Ups, which frames clean-ups as practical, visible and inclusive citizen science actions. The Protocol establishes that clean-ups should not be limited to waste removal, but should also engage citizens and local stakeholders, ensure the separation of plastics from non-plastics, document results in a harmonised manner, and raise awareness of common litter types and local pollution drivers. It requires organisers to record, as a minimum, the number of participants, the total weight of plastics collected, the total weight of non-plastics collected, and photographic evidence of both the activity and the collected waste. Wherever possible, this information is to be recorded through the REMEDIIES App or subsequently entered via the web portal. The Protocol and its supporting materials are provided in Annex 3.1.

Several clean-ups illustrate how this methodology was applied across the different REMEDIIES contexts. In Saïdia, Morocco, MOH, UM and VLPF co-organised the first Moroccan beach clean-up together with Association Homme & Environnement, the Ecoloplatforme de la région de l'Oriental and Ras El Ma High School: more than 40 volunteers and students took part in the action at Ras El Ma, removing over 360 kg of litter, of which 160 kg consisted of plastic waste. In Koper, Slovenia, researchers from the University of Maribor joined the Municipality of Ankaran and more than 100 participants of all ages on 6 April 2024 to clean the coastal area surrounding Ankaran and the Debeli Rtič Landscape Park, collecting 124.8 kg of plastic

² <https://dashboard-remedies.mycibos.eu/dashboards/campaigns/beachcleanups> (Accessed 7.8.2026)

waste and 41.2 kg of other waste. In Albania, ETMI and local partners combined clean-ups with monitoring and app-based reporting, including the activity held at Hamallaj Beach on 16 November 2025, during which 251 kg of litter were collected 157 kg of plastic waste and 94 kg of other waste.

The Porquerolles island Demo Sites further demonstrate how clean-ups were adapted to distinct local contexts. In Porquerolles, France, Explore & Preserve and SMILO organised a beach clean-up at 3ème Courtade Beach on 3 July 2024, involving 25 volunteers, who covered 100 metres of coastline and collected 28 kg of waste, including 6 kg of plastic litter. This initiative was subsequently scaled up through wider clean-up operations conducted from 17 to 19 January 2025 along the French coastline, during which 62 participants cleared more than 1,207 meters of coastline, collecting 163 kg of plastic litter and 74 kg of other waste. In Sardinia, CNR and CReS organised a combined beach and seabed clean-up on the Sinis Peninsula on 1 August 2023, involving 56 participants across more than 700 meters of beach, with 21 snorkelers engaged in the seabed operation. In the Cyclades, clean-ups were carried out across Mykonos, Rinia, Syros and Santorini, including the Santorini Plastic Lab clean-up at the Vlychada Fishing Shelter on 16 May 2026, where young sailing athletes from the Nautical Club of Santorini collected 62 kg of plastic and 20 kg of mixed waste.

These examples demonstrate that REMEDIES clean-ups were not implemented as isolated volunteering activities. Rather, they served as entry points for citizen science, awareness raising, monitoring, local mobilisation and, in several cases, plastic valorisation. Depending on the location, clean-ups involved municipalities, research partners, NGOs, schools, youth groups, fishers, divers, protected-area managers, volunteers and local communities. Their value lies not only in the quantity of litter removed, but equally in the opportunities they created for citizens and stakeholders to observe local pollution patterns, understand waste composition, document results, and connect immediate action with longer-term prevention and circular economy objectives.

From an inclusion and diversity perspective, clean-ups are particularly relevant as public-facing activities capable of involving highly diverse participant groups: children, students, older people, residents, visitors, volunteers, fishers, divers, NGOs, schools, local authorities and community organisations. Inclusive clean-up design takes into account accessibility, safety, timing, language, physical capacity, childcare and school participation needs, as well as differing levels of environmental knowledge. These considerations help ensure that clean-ups are not merely open in principle, but also practically accessible to a diverse range of participants. While no specific gender-related differences affecting participation were identified, the organisation of clean-up activities considered inclusive safety requirements, including the availability of protective equipment in different sizes to accommodate children and adults and participants with different physical characteristics. Such measures contribute to equitable participation and reflect the REMEDIES approach to inclusive engagement. Snapshot of the activities can be seen in Figure 6.



Figure 6: REMEDIES clean-up activities combining volunteer mobilisation, shoreline litter collection, waste documentation and plastic identification support. (Source: REMEDIES archive)

Engagement Channels and Methods

Stakeholder engagement was achieved through practical field activities combined with awareness-raising, environmental monitoring, education and local mobilisation. Clean-up actions were designed to ensure accessibility for a broad range of participant categories, including citizens, students and schools, youth groups, coastal communities, NGOs, local authorities, corporate volunteer teams and visitors, in accordance with the specific local context. In line with the Citizen Science Protocol, participation modalities were adapted to local safety requirements, site conditions and environmental sensitivities, with particular attention to the protection of sensitive habitats and species.

Prior to implementation, organisers were responsible for identifying suitable sites, coordinating with local authorities and waste management bodies, assessing site access and safety conditions, preparing the necessary materials, communicating the date and meeting point, and briefing participants. During the activity itself, participants were instructed to collect litter safely and to separate plastic from non-plastic waste, using dedicated bags where feasible. Organisers were further encouraged to deliver short training sessions on the different types of plastics, supported by the REMEDIES Flag on the Different Types of Plastics, and to document the number of participants, the quantities of waste collected and the related visual evidence prior to waste removal.

In practice, clean-up events typically combined several complementary engagement stages: participants were first informed about the issue of marine litter, then mobilised into action, subsequently invited to observe and sort the litter collected, and finally introduced to the broader REMEDIES messages on

prevention, monitoring and circularity. In Saïdia, the clean-up action followed monitoring and training activities, enabling students and volunteers to progress from learning to direct shoreline intervention. In Albania, clean-ups were combined with app-based monitoring, with the REMEDIIES Shoreline Marine Litter App, and youth engagement initiatives. In Koper, the Ankaran clean-up brought together researchers, the municipality and a multi-generational group of participants, demonstrating how community mobilisation can effectively complement scientific monitoring and technology testing. In Santorini, the clean-up at the Vlychada Fishing Shelter served as the entry point to the Plastic Lab process, through which participants explored how locally collected plastic can be sorted, processed and transformed into opportunities for learning and circular experimentation.

The inclusion dimension is reflected in the distribution of roles during clean-up activities. Since not all participants can, or should, perform the same tasks, roles were differentiated accordingly: some participants collected litter, while others sorted, weighed or photographed the waste, recorded data, supervised children, supported logistics, assisted with communication activities or took part in the final reflection. This distribution of roles enables individuals of different ages, physical capacities, experience levels and degrees of confidence to contribute meaningfully, while also preventing clean-ups from becoming accessible only to physically able participants or experienced volunteers.

What was co-created, tested, adapted or validated

The co-creation dimension of clean-up activities lies in the role played by local actors in shaping their practical implementation. Local NGOs, municipalities, schools, protected-area managers, volunteers, fishers, divers and community groups contributed to identifying relevant sites, mobilising participants, adapting logistics, facilitating permissions, providing local knowledge and connecting the collected waste to awareness-raising or valorisation pathways. In many cases, the clean-up site served not only as a place of action, but also as a setting in which local pollution patterns became visible and could be discussed directly with those who know or use the area.

The activities also served to test the REMEDIIES clean-up documentation logic. Through the separation of plastic from non-plastic waste, the recording of weights, the documentation of participant numbers and the use of photographic or app-based tools, clean-ups evolved beyond communication activities into structured citizen science actions producing comparable outputs across locations. This is of particular importance for a project implemented across multiple Mediterranean Demo Sites and Associated Regions, where harmonised reporting enables local actions to be aggregated into project-level impact.

In several cases, clean-ups also paved the way for valorisation and circular learning. In Santorini, the collected plastic was integrated into the Plastic Lab process. In the Island Guardians initiative in Malta, recovered plastic waste contributed to educational and artistic outputs. In CLEANUP4Guimarães, the plastics collected were channelled into art projects, recycling kits and environmental education furniture. These examples demonstrate that clean-ups can generate an initial material base for further circular economy experimentation, provided that suitable partners and facilities are available.

From an inclusion perspective, clean-ups also served as a test of whether the engagement format is effective for different participant groups. Implementation barriers such as meeting points that are difficult to reach, unclear instructions, physically demanding tasks, scheduling that excludes certain groups, or communication that fails to reach diverse communities were systematically identified and documented. This feedback contributes to improving future clean-ups, making them more inclusive, safer and easier to replicate.

What was learned

The clean-up cases demonstrate that the quality of participation increases when clean-ups are anchored to a clear local narrative, a visible site and a follow-up activity. In Saïdia, the action was linked to knowledge transfer and to the first Moroccan monitoring campaign. In Koper, the clean-up highlighted the value of combining community participation with scientific work. In Porquerolles, clean-ups connected residents and visitors to the island's broader zero-waste transition. In Santorini, the clean-up formed part of a Plastic Lab and seabed action, enabling participants to grasp the relationship between local waste, port activity, marine ecosystems and circular material use.

The cases further indicate that clean-ups should not be treated as isolated events. Their value increases when results are documented, data are reported, participants are given the opportunity to reflect on their findings, and collected materials are channelled, where possible, into education, recycling or valorisation. A clean-up with documented weights, photographic evidence, participant numbers and basic plastic separation can support communication and impact reporting; a clean-up additionally connected to monitoring, plastic identification, feedback and local prevention can foster learning and behavioural change.

A further lesson is that inclusive clean-ups require more than an open invitation. Organisers must consider who can realistically attend, who may be excluded by the site, timing, language or physical requirements, and which alternative roles can be offered. Activities involving children, schools, older participants, divers, volunteers or mixed public groups each call for tailored safety and facilitation measures. Future clean-up reports should therefore document not only what was collected, but also whether the activity was accessible, whether roles were inclusively distributed, whether participants felt safe, and whether any barriers to participation were identified.

The main improvement identified concerns the more consistent documentation of participant feedback and post-activity learning. While the Protocol clearly defines the minimum data to be recorded, future activities should also capture what participants learned, which types of litter they found unexpected, whether they understood the origin of the waste, whether the instructions provided were clear, and whether they would be willing to take part in further monitoring, prevention or zero-waste actions.

Guideline for replication

For replication purposes, clean-ups should be designed as engagement and awareness activities, rather than solely as waste removal operations. Partners should select the site in consultation with local actors, clarify whether the activity includes monitoring or is limited to collection, involve local authorities and waste management operators, prepare safety and sorting instructions, make use of the REMEDIIES Citizen Science App or the clean-up data sheet where relevant, and gather participant feedback following the activity. Results should be publicly communicated, including the date and area covered, the number of participants and partners involved, the weights of plastic and non-plastic litter collected, photographic documentation, and any follow-up actions undertaken.

The minimum replication sequence comprises the following steps:

1. Select a safe, accessible and relevant clean-up site.
2. Coordinate permissions and waste removal arrangements with the competent local authorities.
3. Assess accessibility, timing, transport needs, physical requirements and potential barriers to participation.

4. Prepare the necessary materials, including gloves, bags, a weighing scale, a first aid kit and documentation tools.
5. Brief participants on safety procedures, plastic separation, environmental sensitivities and the roles available.
6. Distribute roles inclusively, enabling participants to contribute through collection, sorting, weighing, photography, data recording, logistics, communication or reflection.
7. Separate plastic from non-plastic litter during collection.
8. Record participant numbers, weights and photographic evidence prior to waste removal.
9. Upload or store the data through the REMEDIIES Citizen Science App or web portal, where possible.
10. Collect participant feedback on clarity, safety, accessibility, learning outcomes and willingness to participate in future actions.
11. Communicate the results and invite participants to a subsequent engagement step.

Source deliverables and supporting evidence used for this case: D2.4 *Clean-up and valorisation guideline*; D1.1 *Methodologies for monitoring plastic macro beach and seafloor marine litter and plastic macro floating riverine litter*; D1.2 *Shoreline ML App and data repository/management portal*; REMEDIIES clean-up database and campaign reporting material.

The Clean-Up Engagement Checklist in **Annex 4.5**, the Activity Planning Template in **Annex 1.1**, Citizen Science Protocols in **Annex 3**, the Feedback Collection Form in **Annex 2** and activity documentation notes should be used to support implementation and reporting.

3.6 Fishing for Litter and fisher engagement

Activity overview

Fishing for Litter and fisher engagement activities are connected to the Collection & Valorisation pillar. These activities recognise fishers as key marine stakeholders because they encounter marine litter directly, understand local fishing grounds, and can support the collection, reporting and prevention of abandoned, lost or discarded fishing gear. In REMEDIIES, fisher engagement is relevant across several regions, including Sardinia, the Cyclades, Porquerolles and the MARICES Open Call Associated local authority in Ulcinj, Montenegro.

In Sardinia, the Sinis Peninsula Demo Site works with the National Research Council of Italy, local NGOs, the Sinis Marine Protected Area and local fishermen groups to address beach litter, underwater plastic pollution and abandoned fishing gear. The area includes a small-scale fishing fleet and port activity in the Gulf of Oristano, making fisher involvement important for understanding both the sources and impacts of marine litter. The Demo Site also connects fisher engagement with the development and testing of fishing nets made with biodegradable polymers, a Prevention & Zero Waste innovation intended to reduce ghost fishing and microplastic contamination from conventional fishing gear. D2.3 Plastic litter collection in the sea provides a more concrete example of Fishing for Litter in practice through the Torregrande fishing community in Sardinia. In this activity, local fishers were not involved in a dedicated clean-up campaign, but integrated litter collection into their regular fishing operations. The participating vessels were small-scale fishing boats based in Torregrande marina, using fishing methods such as gillnetting, trammel netting and bottom trawling. Selection was based on active fishing schedules, overlap between fishing zones and litter accumulation areas, and stakeholder motivation and reliability.

The engagement process was designed to minimise additional burden on fishers while generating usable environmental data. Fishers collected litter that became entangled in their own fishing gear during routine

activity, used designated containers for separating collected litter, and supported documentation through location recording, timestamps, photographs and drop-off at a designated collection point. The protocol included three sorting categories: macroplastics, fishing gear and other materials. It also required visual identification, separation into material types, documentation of item condition, chain-of-custody records, photographic documentation and entry of data into the project database.

Between July 2024 and August 2025, the Torregrande Fishing for Litter activity engaged 12 local fishers across 12 sampling events and resulted in the recovery of 30.3 kg of plastic litter, consisting exclusively of plastic. Although the quantities collected per event were relatively small, the activity shows the value of Fishing for Litter as a continuous, low-disruption engagement model. It turns routine fishing activity into an ongoing pathway for litter interception, monitoring and fisher-led reporting, while also strengthening the role of fishers as environmental stewards and knowledge holders.

In the Cyclades, fisher engagement is connected to port-based action, fishing gear made with biodegradable materials testing, monitoring of plastic pathways and the Santorini Plastic Lab at Vlychada Fishing Shelter. During the Plastic Lab programme in May 2026, the activity opened conversations with local fishermen about the sources and impacts of marine litter, while the wider programme connected shoreline clean-up, seabed clean-up, plastic sorting, upcycling and local circular experimentation. In Porquerolles, a later abandoned-net operation near the island involved a mixed team of Palana Environnement divers, Port-Cros National Park divers and one local fisher, showing how fisher knowledge can support targeted underwater intervention.

The MARICES Open Call Associated Region in Ulcinj, Montenegro provides the most structured example of fisher engagement around fishing-net management. Implemented by DOO Komunalne djelatnosti Ulcinj, the project focused on proper management and recycling of waste fishing nets. It organised three workshops that trained at least 45 representatives from the fishing sector and other relevant groups, identified five net disposal station locations through assessment and stakeholder feedback, and installed five dedicated disposal stations in areas used by local fishers.

From an inclusion and diversity perspective, fisher engagement requires particular attention because fishing communities are not homogeneous. They may include professional fishers, small-scale fishers, family members involved in fishing-related work, port users, local associations, younger and older workers, and people with different levels of literacy, digital access, availability and trust towards project-led initiatives. Although the available evidence does not provide gender-disaggregated participation data, the engagement methodology should recognise that access to consultation, workshops and decision-making around fishing-net management may be shaped by professional role, gender, age, working schedules and local social dynamics, which highlights the importance of inclusive practices, diversity, accessibility, inclusive communication and attention to different user needs in project activities. Snapshot of the activities can be seen in Figure 7.

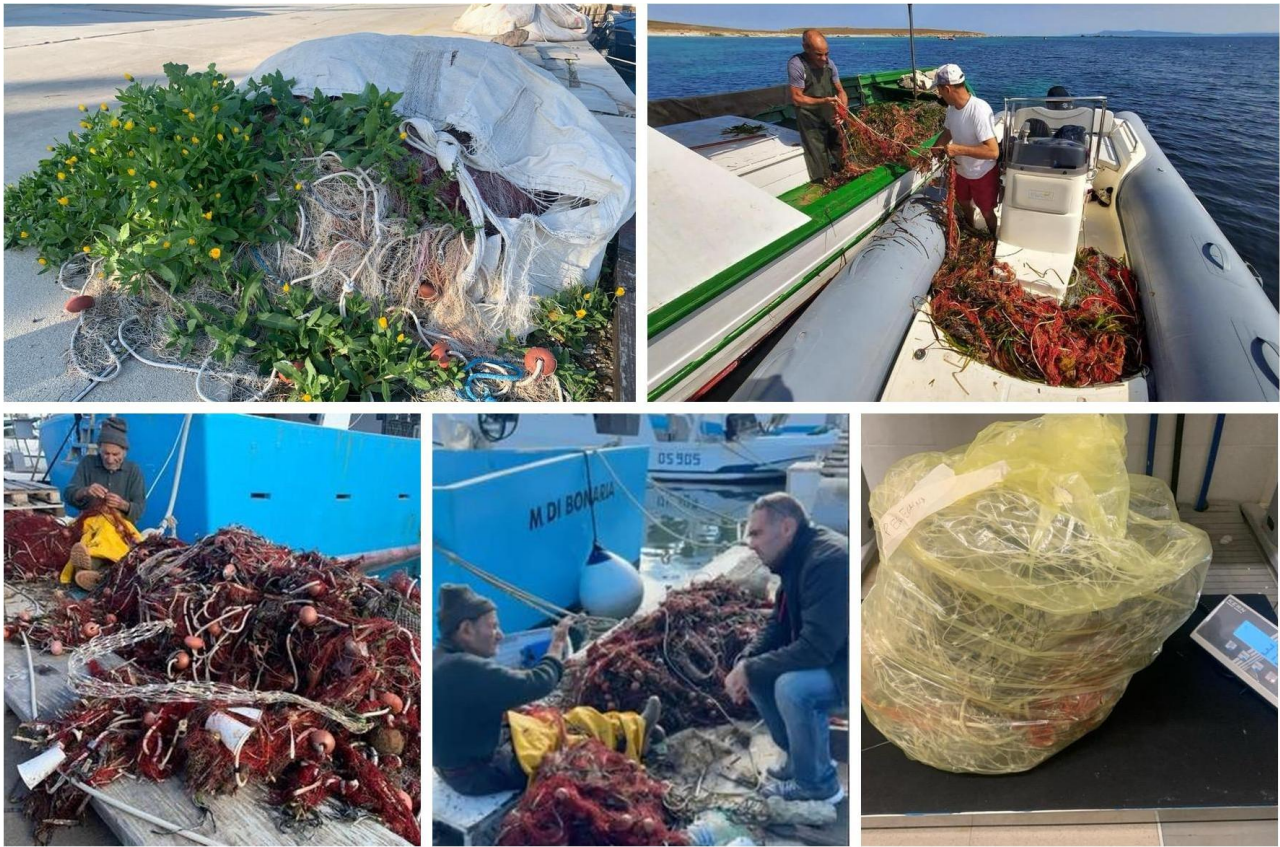


Figure 7: Fishing for Litter and fisher engagement in Sardinia, showing collaboration with local fishers, collection and handling of material retrieved during routine fishing operations, dialogue with fishers, and documentation of recovered litter. (Source: REMEDIIES archive)

What engagement channels and methods were used

Engagement with fishers happened through field activities, local consultation, practical infrastructure, training workshops, site visits and discussions around collection and disposal solutions. In Sardinia, engagement was embedded in the Demo Site's cooperation with fishermen groups, protected-area actors and research partners. This cooperation is important because fishers can provide information on where gear is lost, where litter accumulates, what operational constraints exist, and what kind of end-of-life solutions are realistic for the sector.

In the Cyclades, fisher engagement happened in a more place-based and informal way, linked to the Santorini Plastic Lab and the Vlychada Fishing Shelter. The location itself was important: a working fishing shelter where marine litter, fishing activity, port waste and local circularity could be discussed with the people who use the space. The engagement process connected local fishermen with other actors, including Impact Hub Athens, Aegean Rebreath, the Municipality of Thira, the Thira Municipal Port Fund, SYN FAB LAB, the Blue Municipalities Network, young sailing athletes, divers, schools, technical students and invited guests.

In MARICES, engagement followed a more systematic process. Fishermen and other stakeholders were invited to workshops on marine litter and discarded fishing nets. During these workshops, and through later communication and site visits, local fishers contributed to the selection of disposal station locations. This was essential because infrastructure for fishing-net collection needs to be located where it is actually useful and accessible. The project also involved municipal services and explored cooperation with the local recycling

company Maniplast to assess whether collected net materials could be processed with existing equipment and products.

An inclusive approach to fisher engagement should also consider how and when engagement takes place. Fishers' participation can be affected by working hours, seasonality, weather, income pressures, family responsibilities, language, administrative burden and trust in external organisations. For this reason, workshops and consultations should be organised at times and places that are realistic for the fishing community, using direct and practical language, trusted intermediaries and accessible formats. Where possible, engagement should also consider whether women, younger people or other community members involved in fishing-related value chains are being reached, even if they are not always visible as the primary gear users.

What was co-created, tested, adapted or validated

The co-creation element in fisher engagement is practical and operational. Fishers can help identify where marine litter is encountered, where disposal infrastructure should be placed, what barriers prevent responsible disposal, and whether new materials or collection systems are usable in real conditions. In MARICES, fishers helped validate the locations of net disposal stations, turning their local knowledge into an infrastructure decision. In Sardinia and the Cyclades, fisher engagement is linked to the testing of fishing nets made with biodegradable polymers, where performance, usability, acceptance and end-of-life management need to be assessed with the people who will use the gear.

In Porquerolles, the involvement of a local fisher in the abandoned-net removal operation shows a more targeted form of co-creation: local knowledge supporting a specific marine protection action. Fishers may know where nets have been lost, where underwater obstacles exist, or where retrieval is needed. Their contribution can therefore improve the precision and feasibility of underwater interventions.

Across these cases, the key co-creation question is: what do fishers need in order to participate in marine litter reduction without adding unrealistic burdens to their work? This includes accessible infrastructure, trusted intermediaries, clear environmental and operational benefits, simple reporting routes, recognition of fisher knowledge, and direct involvement in testing or validating solutions.

The inclusion dimension strengthens this co-creation logic by asking whose knowledge is included and whose may be missing. In fishing communities, practical knowledge may be held not only by vessel owners or the most visible professional fishers, but also by crew members, younger workers, port users, women involved in family businesses, local associations, processors, waste handlers and community intermediaries. Future fisher engagement activities should therefore document participant profiles more clearly and assess whether the consultation process reflects the diversity of the local fishing ecosystem.

What was learned

The main lesson is that fisher engagement requires trust, time and practical relevance. The MARICES case shows that initial fisher engagement can be limited by scepticism and lack of awareness of the environmental and economic value of recycling waste fishing nets. This was addressed through targeted awareness-raising, workshops and trust-building with the support of local actors. This lesson is relevant for all REMEDIES activities involving fishers: environmental messaging is important, but it must be connected to daily work, cost, convenience, safety and clear practical benefit.

A second lesson is that fisher engagement works best when linked to concrete action or infrastructure. Disposal stations, net removal, gear made with biodegradable materials testing, port-based clean-up, Fishing

for litter and local conversations in fishing shelters are more effective than abstract consultation. They give fishers a defined role and make participation tangible. The cases also show that fishers should not be approached only as a source of pollution or waste. They should be recognised as sea users with local knowledge and as potential partners in prevention, collection and monitoring.

A third lesson is that in Torregrande Fishing for litter activity shows that fisher engagement can produce value even when the collected quantities per trip are modest. Its strength is continuity, trust and repeated participation. Because the activity is embedded in normal fishing routines, it can generate regular observations about where litter is encountered, what types of materials are caught in fishing gear, and how collection can be organised without creating unrealistic additional work for fishers. This makes Fishing for Litter both a collection practice and a relationship-building method.

The case also shows that fisher engagement should be supported by simple, practical documentation tools. Recording date, time, fishing area, fishing effort, litter mass, item count, photographs and material type makes fisher participation more useful for monitoring and reporting. However, the process should remain light enough to be feasible for working fishers.

A further lesson is that inclusion in fisher engagement requires attention to access, trust and representation. If only the most available or formally recognised fishers participate, important perspectives may be missed. Younger fishers, seasonal workers, small-scale operators, women connected to fishing households or local value chains, and less formally organised groups may experience different barriers or have different insights. Future activities should therefore consider whether the engagement process reaches a representative range of fishing and port-related actors, and whether feedback is collected in a way that allows different voices to be heard.

The main improvement needed is more systematic documentation of fisher feedback, especially in relation to fishing gear testing in Sardinia and the Cyclades. Future reporting should capture what fishers tested, what they observed, what worked, what did not, whether the gear affected daily practice, and whether any adaptations followed.

Guideline for replication

Fisher engagement should begin with trusted local intermediaries and practical questions.

The minimum replication sequence should include:

1. Identify relevant fishing groups, port users or maritime professionals.
2. Clarify the purpose of engagement and avoid technical or abstract language.
3. Consider diversity within the fishing community, including age, gender, professional role, vessel type, seasonality, working schedules and informal or family-based roles connected to fishing activity.
4. Use accessible, inclusive and practical communication, adapted to the local language, working realities and trust dynamics of the fishing community.
5. Invite fishers to validate locations, tools, infrastructure or protocols before implementation.
6. Test any new gear, disposal station or collection system in real operational conditions where possible.
7. Collect structured feedback on usability, effort, safety, economic feasibility and environmental benefit.
8. Document who was consulted, which perspectives were represented, what barriers were identified and whether any groups were missing from the process.
9. Document how fisher feedback will be used to adapt the solution or inform future action.

Source deliverables and supporting evidence used for this case: *D2.3 Plastic litter collection in the sea*, especially Activity 2: Fishing for Litter; *D2.4 Clean-up and valorisation guideline*; relevant fisher engagement

evidence from the MARICES Open Call Associated Region; *D3.2 Biodegradable fishing gear* where fisher feedback on alternative gear is referenced. The Fisher Engagement Checklist in **Annex 4.6** and the Feedback Collection Form in **Annex 2** should be used to document this process.

3.7 Fishing net recovery, recycling and valorisation

Activity overview

Fishing net recovery, recycling and valorisation activities are connected to the Collection & Valorisation pillar and are particularly relevant for addressing abandoned, lost or discarded fishing gear. This type of litter is environmentally harmful because it can continue to damage marine ecosystems through ghost fishing, habitat disturbance and fragmentation into smaller plastic particles. REMEDIIES addresses this issue through sea-based collection, port and marina recovery, fisher engagement, recycling exploration, fishing gear made with biodegradable materials and local cooperation with marine actors.

Several REMEDIIES contexts illustrate this approach. In Sardinia, the Sinis Peninsula Demo Site addresses abandoned fishing gear through cooperation between CNR, the Sinis Marine Protected Area, local NGOs and fishermen groups. The Demo Site responds to a local challenge where plastics wash onto the shore and abandoned fishing nets affect marine ecosystems. Its activities include underwater drone monitoring, beach and seabed clean-ups, testing of REMEDIIES fishing gear with fishermen, and cooperation with protected-area and trade actors.

D2.3 adds two concrete Sardinian examples that strengthen this case. The first is the operational ghost-net removal activity in the Sinis Marine Protected Area, close to Mal di Ventre Island. The operation focused on abandoned, lost or discarded fishing nets that remain trapped in the marine environment and can continue to cause ghost fishing. The activity involved coordinated work between CNR researchers, the Sinis MPA, local fishers and the Coast Guard, with fishers contributing local knowledge and site guidance, and divers and technical teams carrying out the underwater recovery.

The operation followed a structured protocol, including pre-dive briefing, review of target coordinates and safety procedures, assessment of sea state, visibility and currents, underwater documentation of the net location and condition, careful extraction to minimise habitat disturbance, surface processing, weighing, photographic and video documentation, and transfer to designated waste management facilities. On 19 July 2024, the demo operation at Mal di Ventre Island involved 10 people, including fishers, CNR researchers, Sinis MPA and Coast Guard personnel, and removed 100 kg of plastic litter, exclusively fishing nets and gear.

The second example is the recovery of end-of-life fishing gear from port and marina areas. At Torre Grande port facilities, D2.3 documents port-based fishing-net removal as a complementary pathway to sea-based ghost-net recovery. This activity focused on abandoned or accumulated fishing gear in docks and facility areas, involving fishers and the Port Authority. Two operations removed 100 kg on 7 February 2025 and 700 kg on 25 July 2025, contributing to a cumulative total of 1,000 kg of plastic litter, exclusively fishing nets and gear. This demonstrates that port and marina recovery can intercept fishing gear before it becomes marine litter, while also creating clearer conditions for sorting, documentation and possible recycling or safe disposal.

In Porquerolles, France, an abandoned fishing net was identified near the island in November 2025. Port-Cros National Park assessed the site and called on Palana Environnement to support the operation. A mixed team of four Palana divers, two Park divers and one local fisher removed the net, preventing further accidental catches and helping protect gorgonians in the area. Although the net was too damaged to be

recycled, the operation demonstrated how divers, fishers, associations and public authorities can cooperate to protect Mediterranean marine ecosystems. The MARICES Open Call Associated Region in Ulcinj, Montenegro provides the clearest example of an infrastructure-based fishing-net management model. The project installed five dedicated fishing-net disposal stations in locations used by local fishers, after these locations were identified through assessment, workshop discussions, stakeholder input and terrain visits. It also involved the local recycling company Maniplast to test whether collected net materials could be processed with existing equipment and products. They have additionally carried out a legislative review that found no specific Montenegrin regulations for discarded fishing nets.

From an inclusion and diversity perspective, fishing-net recovery and valorisation activities should recognise that the fishing-net management chain involves more than the fishers who use the gear at sea. It may include crew members, port workers, municipal staff, waste handlers, recycling companies, divers, protected-area managers, community organisations, family members involved in fishing-related work, and local authorities. These actors may have different levels of visibility, decision-making power, technical knowledge and access to consultation spaces.

The engagement approach should therefore aim to include the full local ecosystem connected to fishing-net use, disposal, recovery and possible valorisation, ensuring that different stakeholder perspectives and needs are considered in the co-creation process. In line with the REMEDIIES gender dimension approach, this includes promoting equitable participation in decision-making, ensuring that communication and dissemination materials use inclusive language and imagery, and considering whether valorised products or solutions respond to the needs of diverse users. Where relevant, participation patterns in public engagement activities can also be monitored to support balanced and inclusive involvement. Snapshot of the activities can be seen in Figure 8.



Figure 8: Fishing net recovery, recycling and valorisation activities in REMEDIIES, including ghost-net detection and recovery, abandoned fishing nets at port level, and sorting and weighing of recovered fishing-gear material. (Source: REMEDIIES archive)

What engagement channels and methods were used

Engagement happened through a combination of practical recovery, fisher workshops, disposal infrastructure, recycling discussions, study visits and policy dialogue. In Porquerolles, engagement was operational and site-specific. The process moved from the identification of an abandoned net to protected-area assessment, to mobilisation of a qualified diving team and local fisher involvement. This model shows how local knowledge, protected-area management and technical retrieval capacity can be combined around a concrete marine ecosystem threat.

In MARICES, engagement was broader and more systemic. Fishermen and other local actors were first engaged through three educational workshops on the dangers of marine litter and the environmental impact of disposing plastic nets into the sea. The project then moved from awareness to infrastructure by identifying and installing five disposal stations. The disposal points were not selected only by the implementing organisation; local fishermen contributed to the decision through workshop input, later communication and site visits. The project also explored recycling possibilities with Maniplast and organised a study visit to Slovenia with 10 participants, including visits to the National Institute of Chemistry, Aquafil Ljubljana, Snaga Maribor, Rifuzl and a reuse centre. Finally, the legislative dimension was addressed through dialogue with the relevant ministry and the submission of recommendations.

This combination of local infrastructure, fisher involvement, recycling exploration and policy dialogue makes fishing-net recovery a strong example of engagement moving beyond one-off action. It shows how local waste management practices can be connected to circular economy thinking and governance needs.

An inclusion lens is important because different actors may enter the fishing-net management chain at different points. Fishers may know where nets are lost or where disposal stations should be placed. Divers may understand underwater retrieval risks. Waste and recycling actors may understand handling, contamination and processing constraints. Municipalities may understand maintenance responsibilities. Community organisations may help reach groups that do not usually participate in formal consultation. Where possible, engagement should therefore avoid relying only on one stakeholder category and should create accessible spaces for different types of knowledge to be heard.

What was co-created, tested, adapted or validated

The co-creation element differs across the cases. In Porquerolles, the co-created value was the operational response: divers, protected-area managers and a local fisher cooperated to remove an identified net that threatened marine life. The case validated the need for rapid coordination between those who identify the problem, those who manage the protected area, and those with the technical ability to intervene underwater.

In MARICES, co-creation was built into the design of the disposal system. Fishers contributed to selecting disposal station locations, while municipal services supported installation and local ownership. The project also tested whether local recycling capacity could be linked to collected nets. This is important because net recovery without a clear end-of-life route can simply move the problem from the sea to the land. The involvement of Maniplast helped explore whether valorisation could be technically feasible in the local context.

The Sardinia activities validated two complementary recovery models. The first is underwater ghost-net recovery, where fishers, divers, researchers, protected-area managers and authorities cooperate to locate, document, remove and transfer abandoned fishing gear from sensitive marine habitats. The second is port-based fishing-net recovery, where waste management starts from the place where end-of-life gear accumulates: docks, harbours, marina storage areas and port facilities.

The port-based model is especially relevant for recycling and valorisation because it allows materials to be collected before they are dispersed at sea. D2.3 identifies several fishing gear categories that need to be sorted separately: nets, including gillnets, trammel nets, purse seines and trawl nets; lines and cordage, including fishing lines, rope, monofilament and synthetic twine; auxiliary equipment such as floats, sinkers, markers, buoys and corks; and associated materials such as fish boxes, crates, traps, cages and baskets. This confirms that fishing-net valorisation depends not only on collection, but also on material separation, contamination removal, weighing, documentation, storage and connection to appropriate recycling or waste-management pathways.

Fishing-net recovery and valorisation require different operational models depending on where the gear is found. Ghost nets at sea require location intelligence, dive planning, safety procedures, authority coordination, underwater documentation and careful removal to avoid habitat disturbance. End-of-life gear in ports and marinas requires infrastructure, space, port authority cooperation, sorting categories, contamination removal and links with waste-management or recycling operators. Treating both as one generic “net recovery” activity would miss the different logistical and stakeholder conditions required for each route.

The case also shows that recovery is only the first step. Valorisation depends on whether the collected gear can be identified, separated, cleaned, weighed, stored and transferred to appropriate processing routes. For this reason, future replication should document not only kilograms collected, but also gear type, material type, contamination level, collection location, responsible actors, storage conditions and final destination.

The cases validate the importance of designing fishing-net interventions with the people who use, encounter or manage fishing gear. Without fisher input, disposal infrastructure may be poorly located or unused. Without recycling actors, collected nets may remain a waste-management burden. Without public authorities, long-term rules, responsibilities and maintenance may remain unclear.

From an inclusion and diversity perspective, the cases also show the importance of asking who participates in infrastructure and valorisation decisions. Disposal station locations, collection routines and recycling pathways may affect different actors differently depending on their role, work schedule, mobility, access to transport, level of formal organisation or relationship with public authorities. Future activities should document not only the technical decision taken, but also whose input informed that decision and whether any relevant groups were missing from the consultation.

What was learned

The main lesson is that fishing-net recovery and valorisation require a full chain of cooperation. Collection alone is not enough. The process needs identification, access, safety, retrieval, storage, transport, sorting, recycling assessment and, where possible, policy support. The Porquerolles case shows that not every recovered net will be suitable for recycling, especially when it is too damaged. This is an important lesson because valorisation should be explored but not assumed.

The MARICES case shows that accessible disposal infrastructure can support behaviour change when it is combined with awareness, fisher involvement and municipal ownership. It also shows that regulatory gaps can limit long-term management of discarded fishing nets, making policy dialogue part of the engagement process. The project’s finding that Montenegro lacked specific regulation on discarded fishing nets is relevant because technical solutions need an enabling governance framework if they are to continue after the project.

A further lesson is that fishing-net recovery should be linked with prevention. Recovery removes existing material from the environment, but long-term reduction also requires better disposal routes, fisher

awareness, alternative gear, end-of-life management and circular economy solutions. This is where the connection between Collection & Valorisation and Prevention & Zero Waste becomes important.

An additional inclusion-related lesson is that fishing-net recovery activities should be designed around practical access. Infrastructure may exist, but it will not be used if it is poorly located, inconvenient, unclear, unsafe, or not trusted by the people expected to use it. Engagement should therefore consider whether different types of fishers and port users can realistically access disposal points, whether instructions are clear, whether communication reaches informal or less visible actors, and whether responsibilities for maintenance are understood by all relevant parties.

Guideline for replication

Fishing-net recovery and valorisation activities should be planned as a chain, not as a single removal action. The minimum replication sequence should include:

1. Identify the source, location or accumulation point of waste fishing nets.
2. Involve fishers, divers, port users, marine protected area managers and local authorities where relevant.
3. Map the wider local fishing-net management ecosystem, including waste handlers, recycling actors, municipal services, community organisations and less visible actors connected to fishing activity.
4. Assess safety, permissions, access conditions and recovery responsibilities.
5. Define storage, transport, sorting and temporary handling arrangements before collection.
6. Engage recycling or waste-management actors early to assess whether valorisation is technically possible.
7. Where disposal infrastructure is installed, involve fishers and port users in selecting locations and testing usability.
8. Use clear, inclusive and practical communication on what should be disposed of, where, by whom and under what conditions.
9. Document recovered material, barriers, costs, contamination issues and possible follow-up uses.
10. Document who was consulted and whether the engagement process reflected the diversity of actors involved in the fishing-net chain.

Source deliverables and supporting evidence used for this case: *D2.3 Plastic litter collection in the sea*, especially Activity 1: Operational Activities for Fishing Net Removal and Activity 3: Fishing Nets Removal from Ports, Marinas and Waste Management; *D2.4 Clean-up and valorisation guideline*; MARICES Open Call final report for disposal stations and local recycling exploration; relevant Porquerolles and Malta abandoned-net recovery documentation.

The Fisher Engagement Checklist in **Annex 4.6**, Clean-Up Engagement Checklist in **Annex 4.5** and activity documentation notes should be used to support replication.

3.8 Seafloor litter collection with divers

Activity overview

Seafloor litter collection with divers is connected to the Collection & Valorisation pillar and complements beach, river and coastal clean-ups by addressing litter that is no longer visible from the shoreline. This type of activity is technically demanding and requires trained divers, safety planning, local permissions and coordination with marine authorities, protected-area managers or specialised organisations. It is also a strong citizen engagement tool because it reveals the hidden dimension of marine litter and helps communities

understand that plastic pollution affects not only beaches and rivers, but also underwater ecosystems, marine habitats and species.

Several REMEDIES Demo Sites and Associated Region activities provide concrete examples of this approach. In Sardinia, the first clean-up action in the Sinis Peninsula took place on 1 August 2023, when CNR organised a beach and sea-bottom clean-up with CReS, Centro di Recupero del Sinis. The action involved 56 people working across more than 700 meters of beach, while 21 snorkelers carried out the seabed clean-up. In the Cyclades, during the Santorini Plastic Lab programme at Vlychada Fishing Shelter in May 2026, Aegean Rebreath led a seabed clean-up with 20 divers, complementing the shoreline clean-up carried out by young sailing athletes and showing the need for coordinated work across the port area, shoreline and seabed. In Porquerolles, France, an abandoned fishing net was removed near the island in November 2025 by a mixed team of four Palana Environnement divers, two Port-Cros National Park divers and one local fisher, preventing further accidental catches and helping protect gorgonians in the area.

The Island Guardians Open Call activity in Malta provides another strong example of seabed and shore engagement. As part of the project implemented by Esplora Interactive Science Centre, a seabed and shore clean-up at South Quay Ċirkewwa and Paradise Bay involved 47 volunteer divers and snorkelers and removed 919 kg of mixed waste, including 173 kg of plastic litter. Together with the Bugibba Bay clean-up, Island Guardians removed 1,492.5 kg of mixed waste, including 251 kg of plastic litter. These results show the potential of diver-supported clean-ups to mobilise specialised volunteers and generate strong public awareness around underwater pollution.

From a gender, inclusion and diversity perspective, seafloor litter collection requires careful framing and gender sensitive communication because underwater activities are not equally accessible to all citizens. Diving and snorkelling require training, physical capacity, confidence, equipment, safety procedures and, in some cases, certification or previous experience. Inclusive engagement therefore does not mean opening the underwater activity to everyone, but designing complementary participation roles so that non-divers, children, schools, local residents, visitors, community groups and people with different abilities can still engage with the findings and contribute through land-based support, documentation, sorting, storytelling, exhibitions, workshops or public learning activities. Snapshot of the activities can be seen in Figure 9.



Figure 9: Seafloor litter collection and underwater documentation in REMEDIIES, showing diver-based recovery actions, collected marine litter and underwater litter recording. (Source: REMEDIIES archive)

What engagement channels and methods were used

Engagement happened through diver-led field action, public communication, links to clean-up campaigns and integration with broader educational, creative or local mobilisation activities. In Sardinia, beach and seabed teams worked in parallel, making the relationship between shoreline litter and underwater litter visible. The action involved both land-based participants and snorkelers, creating a wider understanding of how litter affects different parts of the coastal and marine environment. In Santorini, the seabed clean-up was integrated into the Plastic Lab programme, which brought together the local community, schools, visitors, fishermen, technical students, young sailing athletes, divers and invited guests. This made the seabed action part of a broader learning process around sorting, processing, upcycling and circular use of plastic waste.

In Porquerolles, engagement was more operational and conservation focused. The abandoned net was identified near the island, assessed by Port-Cros National Park and removed by a specialised team involving divers and a local fisher. This showed how protected-area authorities, associations, divers and fishers can work together when underwater litter poses a direct risk to marine habitats. In Malta, the involvement of volunteer divers and snorkelers created a strong bridge between direct underwater action and public-facing education. The recovered material contributed to wider project outputs, including educational resources, storytelling, video material and a recycled art installation exhibited at Esplora.

The inclusion dimension is particularly important in the design of public engagement around seabed clean-ups. Since diving roles must remain limited to trained or qualified participants, organisers should create parallel roles for wider participation. These may include beach-based sorting, weighing and documentation; public talks by divers after the activity; school workshops using photos and videos from the seabed; exhibitions of recovered items; citizen reflection sessions on underwater pollution; and communication outputs that translate the divers' findings for non-specialist audiences. This allows the activity to remain safe while still being inclusive and educational.

What was co-created, tested, adapted or validated

The co-creation element lies in the combination of technical diving capacity, local knowledge and public learning. Divers and marine field actors contribute practical knowledge about underwater conditions, safety, access, currents, litter locations and retrieval feasibility. Local authorities, protected-area managers, NGOs, fishers and community groups help identify priority areas, secure permissions, communicate the activity and support follow-up. In Santorini, the seabed clean-up validated the idea that underwater litter can become part of a broader local conversation on marine protection, circularity and material reuse when connected to a Plastic Lab and community programme. In Malta, diver participation helped generate both environmental results and educational content, turning recovered waste into a basis for public learning.

These activities also tested how underwater collection can be connected to wider citizen engagement without compromising safety. Seafloor collection cannot be organised as an open volunteer activity in the same way as a beach clean-up. It requires qualified divers or trained snorkelers, clear roles, safety procedures, equipment, insurance, permissions and waste-handling arrangements. The engagement component therefore needs to be designed around the specialised action: who dives, who supports from land, how the results are documented, how the material is handled, and how the wider public learns from what was found.

From an inclusion perspective, the co-creation value also depends on how the knowledge generated underwater is shared. Divers may be the only people who directly see the seabed litter, but the evidence they produce can be used by many others: schools, municipalities, protected-area managers, fishers, artists, educators, residents and visitors. Future seabed clean-ups should therefore document not only the material recovered, but also how the underwater findings were made accessible to those who could not participate in the dive.

What was learned

The main lesson is that seafloor litter collection can make hidden pollution visible, but it must be carefully planned and communicated. The quantitative results from Malta, Sardinia and Santorini show that underwater and mixed clean-up activities can mobilise specialised volunteers and remove significant amounts of waste. However, their wider value depends on how the findings are translated for non-diving audiences. Photos, videos, exhibitions, public events, educational resources and workshops are important because they allow the wider community to understand what divers found and why underwater litter matters.

A second lesson is that underwater litter often requires different follow-up than beach litter. Some materials, such as abandoned fishing nets, may be damaged, contaminated, entangled or difficult to recycle. The Porquerolles case is important because the recovered net was too damaged to be recycled, even though its removal had clear ecological value. This shows that valorisation should be assessed case by case and should not be assumed. In other cases, such as Malta or Santorini, collected material can support educational, artistic or circular experimentation when appropriate partners and facilities are available.

A further lesson is that inclusion in seafloor litter collection is mainly achieved through role design and communication. The underwater operation itself must prioritise safety and technical competence, but the engagement around it can be broad and inclusive. By creating land-based, educational, artistic, documentation and reflection roles, organisers can involve people who are not trained divers while still respecting safety requirements. This is especially important when activities involve schools, families, older participants, visitors or people with limited physical access to marine fieldwork.

The main improvement needed is more consistent documentation of the full post-collection pathway. Future seabed clean-up reports should record not only how much litter was removed and how many divers participated, but also what types of materials were collected, whether they were suitable for reuse or recycling, how they were disposed of, and how the results were communicated to the wider public.

Guideline for replication

Seafloor litter collection should be replicated only with trained divers, qualified snorkelers or specialised underwater teams, clear safety procedures, permissions and coordination with local marine authorities. The activity should include a communication and learning plan so that underwater findings are shared with wider audiences and connected to prevention, awareness, monitoring or circularity. Where possible, collected material should be documented, sorted and assessed for reuse, recycling, educational use, artistic use or safe disposal.

The minimum replication sequence should include:

1. Identify the underwater site and confirm the environmental need.
2. Secure permissions from relevant marine, port or protected-area authorities.
3. Work only with trained divers, qualified snorkelers or specialised underwater teams.
4. Define safety roles, emergency procedures and waste-handling logistics.
5. Involve local actors such as fishers, NGOs, protected-area managers or municipalities where relevant.
6. Design complementary participation roles for non-divers, such as beach-based support, sorting, weighing, documentation, communication, educational activities or public reflection.
7. Document participants, waste quantities, material types and photos before disposal.
8. Assess whether collected material can be reused, recycled, used for education, or safely disposed of.
9. Communicate the findings to the wider public through accessible formats, including visual material, workshops, exhibitions, public events or educational resources.
10. Record whether the activity was accessible to different groups and whether additional inclusion measures are needed in future activities.

Source deliverables and supporting evidence used for this case: D2.3 *Plastic litter collection in the sea*; D1.1 *Methodologies for monitoring plastic macro beach and seafloor marine litter and plastic macro floating riverine litter*; relevant diver-based clean-up and seafloor litter documentation.

The Clean-Up Engagement Checklist in **Annex 4.5**, Activity Planning Template in **Annex 1.1**, Fisher Engagement Checklist in **Annex 4.6** where fishers are involved and activity documentation notes should be used to support implementation and reporting.

3.9 Fishing gear made with biodegradable materials and fisher feedback

Activity overview

Fishing gear made with biodegradable materials is connected to the Prevention & Zero Waste pillar of REMEDIIES and addresses one of the most persistent sources of marine plastic pollution: conventional synthetic fishing gear. Traditional nets and ropes made from fossil-based plastics can remain in the marine environment for long periods, contributing to ghost fishing, microplastic contamination and damage to marine ecosystems when they are lost, abandoned or improperly disposed of. Within REMEDIIES, the fishing gear innovation aims to reduce this long-term environmental pressure by developing fishing nets and related materials that maintain adequate performance during use while supporting more responsible end-of-life management under controlled conditions.

The innovation is linked mainly to the Sardinia and Cyclades Demo Sites. In Sardinia, the Sinis Peninsula Demo Site works with CNR, local NGOs, the Sinis Marine Protected Area and local fishermen groups in an area affected by beach litter, abandoned fishing gear and underwater plastic pollution. The fishing gear solution was developed through the contribution of Cittadini and Next Technology Tecnotessile, with the involvement of CNR, Bio-Mi, ATIIP and the University of Maribor. The test in Sardinia provides a concrete example of how a prevention technology can be assessed in real fishing conditions with the direct involvement of a professional fisherman and CNR researchers.

For the Sardinia test, Cittadini produced eight nets made of monofilament yarn with a diameter of 0.33 mm, 41.6 mm half mesh size, double-knot construction, 50 meshes deep and 1,856 meshes long. Each net had a produced length of approximately 152 meters, corresponding to a total produced length of 1,216 meters. Four nets were sent to CNR, corresponding to approximately 608 meters of produced net length available for the Sardinia test. During preparation for fishing activity, the nets were manually rigged by the fisherman and adapted to the typology of nylon trammel nets normally used during the spring fishing period, from March to June. The working configuration used at sea was shorter than the original produced length, as expected after rigging with floats, weights and the applied hanging ratio. The presentation reports that the fishing configuration made by the fisherman was approximately 250 meters in total, with each of the four nets around 60 meters long and a net wall standing approximately 120 cm high.

The nets were tested in the Sinis area from 22 March 2026 to 21 May 2026. They were deployed and recovered 17 times in fishing spots along the Gulf of Oristano. The average deployment depth was 37.7 meters, with a minimum of 33 meters and a maximum of 42 meters, in sandy areas mixed with pre-coralligenous seabed. The fishing trips generally started from the port around 4:30 a.m., with return in the afternoon at approximately 3:00 p.m. This makes the Sardinia case particularly valuable for D6.5, because the technology was not only presented as an innovation, but tested under real working conditions with fisher input and scientific observation.

From a gender, inclusion and diversity perspective, fishing gear testing should recognise that “fisher feedback” may represent only one part of the wider fishing ecosystem if the testing process involves a limited number of professional users. Fishing gear choices, handling practices, repair, storage, costs and end-of-life decisions may involve vessel owners, crew members, family members, port actors, gear suppliers, repairers, waste handlers and local fishing associations. Although the available evidence does not provide gender-disaggregated or diversity-specific data for this test, future testing should document who provides feedback, whose practical knowledge is represented, and whether the knowledge and user needs of the wider fisher community are adequately captured as well as different types of fishing actors are included where relevant.

This reflects the REMEDIIES gender dimension approach, which promotes consideration of gender where relevant, inclusive practices, diverse user needs, accessibility and broad stakeholder engagement throughout research and innovation processes. Snapshot of the activities can be seen in Figure 10.

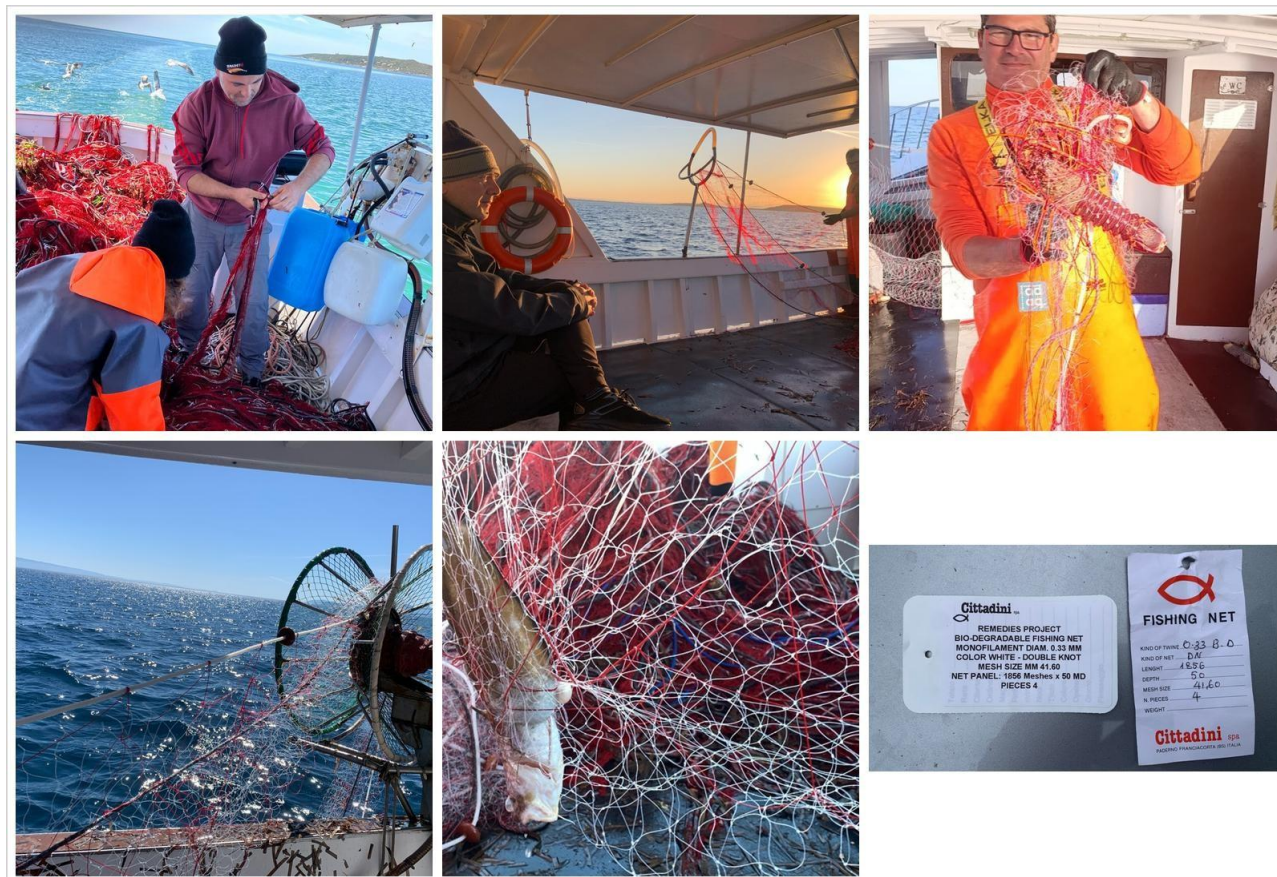


Figure 10: Field testing of fishing gear made with biodegradable materials in REMEDIIES, including net handling, deployment, catch observation and technical documentation from the Sardinia pilot activities. (Source: REMEDIIES archive)

What engagement channels and methods were used

Engagement happened through direct field testing with a professional fisherman, supported by CNR researchers. The fisherman manually rigged the nets and adapted them to the same typology of nylon trammel nets used in his normal fishing practice during spring. This is important because it placed the innovation inside an existing professional routine, instead of testing it only in a laboratory or demonstration setting. The fisherman's role was therefore not symbolic. He contributed operational knowledge on how the nets should be prepared, deployed, hauled and compared with conventional nets.

CNR researchers were on board as observers for almost all fishing trips. Their role was to take pictures and videos, record information about the nets, observe the fishing process, and collect input from the fisherman's perspective. When researchers could not be on board, the fisherman took pictures himself and recorded the number of catches to share with the research team. This created a practical feedback loop between the user and the technical/research partners.

The test also included comparison with conventional nylon nets used in similar conditions. Across the campaign, the four nets developed within REMEDIIES caught 34 commercial fish and crustacean specimens,

while the four nearby nylon nets used for comparison caught 61 commercial specimens. The lower catch level in the project nets was one of the main points of fisher feedback, together with comments on the material characteristics, rigidity, line diameter and hauling process.

An inclusion lens is relevant to how field testing is organised and whose experience is captured. In this case, the engagement was necessarily focused on a professional fisherman using the gear in real operational conditions. For future testing, the same methodology could be strengthened by involving or consulting a broader range of fishing actors where feasible, including fishers using different gear types, younger and older fishers, crew members involved in handling, and actors responsible for repair, storage or disposal. This would help assess whether the innovation is usable across different working practices and not only in one operational setting.

What was co-created, tested, adapted or validated

The co-creation element was the field validation of the fishing gear developed in the project from the perspective of the end user. The fisherman tested whether the nets could be rigged, deployed, recovered and used in normal working conditions. His feedback helped identify the difference between technical material performance and practical fishing suitability. This distinction is important: a net may be durable and resistant, but still require adaptation if its handling, visibility, rigidity or catch efficiency does not correspond to the fisherman's needs.

Several aspects were tested during the Sardinia campaign. The nets were assessed for durability, resistance, damage during use, catch performance, handling during hauling, interaction with seabed conditions and fouling by algae, *Posidonia* and debris. The test also validated the importance of involving fishers before material production and during the design phase. Before the material was built, the fisherman had asked for and suggested a specific diameter for the transparent line forming the central part of the trammel net. The material provided was different from what he expected, being thicker and more rigid. This became one of the critical issues identified during testing.

The rope made from biodegradable material was also tested in practice. It appeared durable, but it was considered too slippery when passing through the winch, making it more difficult to haul the nets on board. This type of feedback is exactly why fisher engagement is necessary. It identifies practical barriers that may not be visible in material testing alone.

From a gender dimension, inclusion and diversity perspective, the co-creation process should also ask whether the testing context captures different user needs and working realities. Gear performance is not only a technical question; it also relates to workload, physical effort, safety, handling confidence, time pressure, income stability and willingness to adopt a new solution. These factors may affect different users differently depending on gender, age, strength, experience, role on board, access to equipment, and economic circumstances may shape users' experience and needs. Future co-creation around fishing gear should therefore include feedback questions that capture usability, physical effort, safety and adoption barriers in a way that reflects both potential gender-related differences and the diversity of user profiles.

What was learned

The Sardinia test produced both positive and critical feedback. On the positive side, the nets made with biodegradable materials showed good tenacity and durability. They appeared strong and resistant, including when they became caught or stuck on rocky seabed. Only two damages were observed on two different days during the whole campaign. Another positive observation was that the developed nets were rarely fouled

with algae, Posidonia and debris compared with the conventional nets. This is relevant because fouling can affect handling, cleaning, fishing performance and user acceptance.

At the same time, the fishermen were not fully satisfied with the overall performance. The catches were generally lower in the nets, approximately half compared with the nearby nylon nets used for comparison, although commercially important species such as lobsters and scorpion fish were recorded. The main critical points concerned the thicker and more rigid monofilament material compared with what the fisherman had requested, and the slippery behaviour of the rope during hauling through the winch. These findings show that environmental performance must be matched with operational performance if alternative fishing gear is to be adopted.

The main methodological lesson is that fishing gear development requires early and structured fisher feedback. Fishers should be involved not only when the gear is ready to test, but also when key material specifications are being defined. Their input on line diameter, flexibility, rigidity, handling, rigging, hauling and fishing method can help avoid mismatches between the technical prototype and the realities of fishing practice. The Sardinia test also shows that field observation by researchers is valuable, because it allows qualitative fisher feedback to be combined with recorded deployment conditions, catches, damages and operational notes.

An additional inclusion-related lesson is that user testing should document the profile and role of those providing feedback. If only one type of user is consulted, the findings remain valuable but may not fully reflect the diversity of fishing practices and working conditions. Future tests should therefore consider whether feedback can be collected from more than one fisher, vessel type, crew role or local fishing context, and whether the practical adoption of gear made with biodegradable materials creates different barriers for different users. This would strengthen both the technical validation and the gender/inclusion dimension of the innovation process.

The next steps identified include organising new test campaigns, including after the end of REMEDIIES, either in the Sinis area or in different areas, and carrying out chemical analysis of the nets used during the first campaign to assess the state of the material after stress from activity at sea. These next steps are important because a single campaign provides useful feedback, but further testing is needed to refine the material, assess durability over time, and understand whether changes can improve catch performance and user acceptance.

Guideline for replication

Fishing gear testing should be designed as a structured co-creation process with fishers.

The minimum replication sequence should include:

1. Consult fishers before production or deployment on gear type, line diameter, flexibility, rigidity, mesh characteristics, rigging method, target species, fishing season, seabed conditions and hauling process.
2. Identify which fishing actors should be involved in feedback, including vessel owners, crew members, gear handlers, repairers or disposal actors where relevant.
3. Consider whether different user profiles, including age, experience, physical capacity, professional role and type of fishing activity, may affect gear handling, safety, adoption and feedback.
4. Define the testing design, including comparison with conventional gear under similar conditions.
5. Record deployment dates, locations, depth, seabed type, number of deployments, catches, damages, fouling, handling issues and fisher comments.
6. Ensure researchers observe field activity where possible, or provide fishers with a simple format for photos, catch numbers and observations.
7. Distinguish clearly between produced net length and working length after rigging.

8. Collect feedback not only on catch and durability, but also on usability, workload, safety, physical effort, handling confidence, repair needs and willingness to adopt.
9. Review feedback jointly with fishers, researchers and material developers.
10. Use the results to define material adaptations, further trials or additional analysis.

Source deliverables and supporting evidence used for this case: D3.2 *Biodegradable fishing gear*; D2.3 *Plastic litter collection in the sea*; relevant Sardinia Demo Site testing and fisher feedback material.

The Fisher Engagement Checklist in **Annex 4.6** and the Feedback Collection Form in **Annex 2** should be used to support this process.

3.10 Zero-waste cosmetics and seaweed coating workshops

Activity overview

The zero-waste cosmetics and seaweed coating activities are connected to the Prevention & Zero Waste pillar of REMEDIIES. They address plastic waste generated by cosmetic products, especially single-use shampoo and shower-gel packaging, by introducing dissolvable seaweed-based coatings as a biodegradable and zero-waste alternative. The innovation is relevant for sectors where small-format cosmetic packaging is widely used or distributed, including tourism, hospitality, hotels, gyms, sports centres, festivals and other high-traffic environments.

This case is one of the strongest REMEDIIES examples of workshop-based citizen science and co-creation. The methodology was developed and implemented by the National Institute of Chemistry Slovenia, with involvement from partners including EXIT and Alchemia-nova Greece. According to the REMEDIIES evidence from D3.3, 19 events were implemented, more than 5,000 citizens made shampoo balls with seaweed zero-waste coating, and more than 500,000 people were reached through events, television and social media. DIY guidelines and surveys were also shared with more than 150 citizens and businesses, while the co-created toolkits were made available as open-access resources.

A concrete Demo Site example comes from the Sea Star Festival in Umag, Croatia. During the zero-waste cosmetics workshops on 24 and 25 May 2024, organised by the National Institute of Chemistry Slovenia and EXIT, more than 40 participants created colourful handmade seaweed-coated shampoo balls, while more than 2,000 shampoo balls were distributed to festival visitors. The Sea Star Festival Demo Site used the festival setting as a real-world environment to test how zero-waste alternatives can be introduced to large audiences through practical, creative and memorable engagement.

The activity is also supported by the Citizen Science Protocol for the implementation of zero-waste seaweed coatings for cosmetics, which defines the workshop as a structured citizen engagement methodology for plastic reduction in cosmetics. The protocol identifies the activity's objectives as raising awareness about plastic waste from cosmetics, introducing zero-waste and circular economy principles, enabling hands-on preparation and testing of seaweed-coated cosmetic formulations, encouraging sustainable consumption habits, collecting baseline and post-workshop insights, and supporting structured reporting within the REMEDIIES framework. The protocol and supporting materials are included in **Annex 3.2**.

From a gender dimension, inclusion and diversity perspective, this case is particularly relevant because cosmetics and self-care products are often socially coded through gendered assumptions, marketing norms and consumer stereotypes. A gender-sensitive approach should therefore avoid presenting cosmetics as relevant only to women or specific groups, and should frame zero-waste cosmetic alternatives as everyday

sustainability solutions for diverse users. The REMEDIIES gender dimension approach highlights the importance of inclusive language, diverse representation, accessibility, user needs and the integration of gender considerations in the innovation processes; these principles are directly relevant for the gender sensitive design, communication and feedback collection of zero-waste cosmetics workshops. Snapshot of the activities can be seen in Figure 11.



Figure 11: Zero-waste seaweed coating workshops and public demonstrations in REMEDIIES, including hands-on preparation, product display, testing and participant engagement. (Source: REMEDIIES archive)

What engagement channels and methods were used

Engagement happened through a four-part workshop structure: awareness, experimentation, reflection and reporting. The first phase builds awareness and collects baseline knowledge. Participants are introduced to zero-waste philosophy, circular economy principles and the environmental relevance of cosmetic formulations. The protocol proposes interactive methods such as word clouds, short quizzes, Menti meter or similar survey tools, QR codes for anonymous participation, visual slides and ingredient illustrations. The examples included in the protocol show that participants are invited to reflect on what zero-waste means to them, discuss why liquid shampoos contain a high percentage of water, and understand the role of ingredients such as surfactants and glycerol.

The second phase is the hands-on workshop, where participants are introduced to the seaweed-based coating technology and the step-by-step preparation of cosmetic balls, such as shampoo or shower-gel balls. Depending on safety and event conditions, participants may prepare the products themselves or follow a demonstration. QR codes and visual guidance can be used so participants can follow the production steps. This part of the workshop is important because it turns plastic prevention into a practical experience. Participants do not only hear about plastic-free cosmetics; they actively see how an alternative can be made and tested.

The third phase harvests learning outcomes and user feedback. Participants are invited to complete post-workshop reflection surveys and, where relevant, at-home testing surveys after using the produced product in real-life settings such as home, travel, gym or daily routines. The protocol specifically encourages collecting feedback on zero-waste awareness, perceived usability of the cosmetic balls, willingness to adopt zero-waste cosmetics, and suggestions for improvement. The fourth phase is reporting. Workshop facilitators are encouraged to report the event through the REMEDIES dashboard, including basic metadata such as date, location, number of participants, activity type, survey links where applicable, and communication outputs.

The gender dimension, inclusion and diversity should be embedded in all four workshop phases. During awareness raising, communication materials, examples and language should avoid gender stereotypes around cosmetics beauty and self-care. During experimentation, the activity should be accessible to participants with different ages, levels of scientific knowledge, manual confidence or sensory preferences. During reflection, surveys should allow different user experiences to emerge, including perceptions of scent, texture, usability, storage, comfort, hygiene, travel, cost and willingness to replace conventionally packaged products. During reporting, organisers should document the diversity of participants reached, apply gender sensitive communication practices and, where appropriate, monitor participation patterns to support equitable and inclusive engagement.

What was co-created, tested, adapted or validated

The co-creation element lies in the way participants engage with the product, the workshop format and the behavioural-change pathway. Participants help test whether the zero-waste concept is understandable, whether the preparation process is accessible, whether the product is attractive and usable, and whether the activity changes perceptions around plastic packaging in cosmetics. This makes participants more than passive recipients of information. They become testers, learners and feedback providers.

The methodology also validates the workshop itself as a replicable citizen science format. Through baseline questions, interactive quizzes, post-workshop surveys and product testing feedback, the activity collects information on knowledge, attitudes, usability and possible adoption. Businesses, hospitality actors and high-traffic venues are particularly important feedback groups because they can assess whether seaweed-coated cosmetics could be integrated into real service environments where single-use cosmetic packaging is common.

The Umag example shows how this co-creation logic can be adapted to a festival environment. Festivalgoers participated in hands-on production, while thousands of shampoo balls were distributed to visitors. This tested not only the product, but also the communication value of the activity in a public, high-energy and non-formal learning setting.

From a gender dimension perspective, the testing process should also examine whether the product and workshop format respond to the needs, expectations and experiences of different genders, rather than assuming a universal user profile. Cosmetic products may be influenced by gender norms, social expectations and different patterns of use, which can affect perceptions of sustainability, acceptability and willingness to adopt sustainable alternatives. The testing process should therefore consider different design preferences, cultural associations, hygiene expectations, accessibility needs, sensory sensitivities, hair and skin care routines, or assumptions about appropriate communication messages. Capturing these differences should be treated as valuable user feedback, because they can help improve the product, the communication strategy and future replications of the workshop format in schools, festivals, hotels, gyms or public events.

What was learned



The main lesson is that zero-waste prevention becomes more engaging when participants can experience the alternative directly. The scale of outreach and participation achieved by the seaweed coating activities shows that a practical and creative format can make plastic prevention accessible to diverse audiences. Participants can connect the environmental problem of single-use plastic packaging with an immediate alternative that they can touch, produce, test and discuss.

A second lesson is that the workshop format supports both learning and evidence collection. The protocol's structure makes it possible to collect baseline knowledge, observe participant engagement, gather post-workshop reflections and receive product-use feedback after the activity. This is important because prevention activities often aim to change behaviour, but behaviour change cannot be assumed. It needs to be supported by feedback, reflection and follow-up.

The Sea Star Festival example shows that festivals can become effective spaces for zero-waste experimentation when the activity is simple, visual and relevant to everyday habits. The wider REMEDIES evidence also shows that the method can reach citizens and businesses beyond a single event through DIY guidelines, surveys and open-access toolkits. The main improvement needed is to ensure that feedback is systematically collected and analysed after each workshop, especially when participants test the product in real-life settings.

A further lesson is that gender-sensitive and inclusive communication matters strongly in this case. Cosmetics may be associated with specific gender identities, beauty standards or consumer behaviours, but the environmental issue of single-use packaging concerns all users and sectors. Future workshops should therefore frame the product as a plastic-prevention and circular economy solution, avoid gender-coded assumptions, use diverse examples and invite feedback from a wide range of participants. This will make the workshop more inclusive and improve the relevance, acceptance and uptake of the product across different contexts, including hotels, festivals, gyms, travel settings, schools and everyday household use.

Guideline for replication

Zero-waste cosmetics workshops should be designed as structured citizen science and co-creation activities, not only as awareness sessions. Partners should introduce the plastic packaging problem, collect baseline knowledge, explain the zero-waste alternative, guide participants through the preparation or demonstration of seaweed-coated cosmetic balls, collect post-workshop feedback, and encourage product testing in real-life settings where possible. Workshop facilitators should then report the event through the REMEDIES dashboard or equivalent reporting system, including date, location, participant number, activity type, survey links and communication outputs.

The minimum replication sequence should include:

1. Define the target group and adapt the workshop format to the audience.
2. Introduce zero-waste and circular economy principles in simple language.
3. Use inclusive, gender-sensitive communication that avoids stereotypes around cosmetics, self-care and sustainable consumption.
4. Collect baseline knowledge through a short interactive tool or survey.
5. Demonstrate or guide the preparation of seaweed-coated cosmetic balls.
6. Explain the material choice, sustainability benefits and plastic-reduction logic.
7. Ensure that the hands-on activity is accessible to participants with different ages, abilities, sensory preferences, manual confidence and prior knowledge.
8. Collect immediate post-workshop reflections through a QR code-based survey.

9. Invite participants to test the product at home, during travel, at the gym or in another real-life setting.
10. Collect usability and adoption feedback after testing, including feedback on scent, texture, comfort, storage, hygiene, practicality, cost and willingness to adopt.
11. Document whether the activity reached diverse users and whether any barriers to participation or adoption were identified.
12. Report the activity through the REMEDIIES dashboard or equivalent reporting tool.
13. Share follow-up materials, such as DIY guidelines or workshop resources.

Source deliverables and supporting evidence used for this case: D3.3 *Zero-waste cosmetics*; D3.4 *Benefits of zero-waste micro-supply chains*; relevant zero-waste cosmetics workshop, survey, DIY guideline and event documentation.

The Workshop and Plastic Lab Checklist in **Annex 4.7**, the Feedback Collection Form in **Annex 2** and the activity documentation notes should be used to support replication.

3.11 Regenerative local value chains as alternatives to plastic

Activity overview

Regenerative local value chains are connected to the Prevention & Zero Waste pillar of REMEDIIES. They focus on preventing plastic waste at source by identifying, documenting and promoting local alternatives to single-use plastics, especially in sectors such as tourism, hospitality, events, food services, cosmetics, drinking water provision and everyday consumption. This case is important because it shifts engagement from litter removal to upstream prevention. Instead of asking only how plastic waste can be collected or recycled, it asks how local communities, businesses, producers and public authorities can reduce the need for plastic in the first place.

The REMEDIIES publication *Regenerative Zero Waste Local Value Chains* was developed by SMILO as a practical guide to support Mediterranean stakeholders in developing local alternatives to plastic. A public link to this guide will be added once available. The guide defines zero-waste regenerative local value chains as territorially rooted systems of production and consumption designed to prevent waste at source and replace single-use plastics, particularly in packaging and everyday products. Rather than focusing only on material substitution, these value chains address the full cycle: sourcing of raw materials, production, distribution, use and end-of-life. Their aim is to generate positive environmental, economic and social outcomes at the local level.

The guide presents ten demonstrative regenerative zero-waste local value chains. These include Provence giant reed objects, edible cutlery biscuits, handcrafted objects made from palm branches, zero-waste shampoo and cosmetic containers made from seaweed-based biopolymer, PLUG-AND-PLAY 2 ZERO-WASTE reusable systems, atmospheric water generators, organic rye drinking straws, edible drinking straws, mushroom mycelium and agricultural waste-based materials, and natural wheat-stem straws. These solutions show that prevention can and should be linked to local resources, traditional knowledge, circular production, small-scale entrepreneurship, social inclusion and behavioural change.

The Porquerolles Demo Site provides one of the clearest REMEDIIES examples of this logic. Located in Port-Cros National Park, Porquerolles combines high ecological value with strong seasonal tourism pressure, including around 200 inhabitants, approximately 1 million tourists per year and a high-season visitor cap of 6,000 people per day. As a REMEDIIES Demo Site, Porquerolles is testing a local zero-waste model that

includes bio-waste management, refill water fountains, additional sorting containers, reduction of single-use plastic items, studies for improved plastic waste management, training and awareness campaigns, and support for a micro-industry line producing alternatives from local waste, especially giant reed. The site aims to design and test reusable and sustainable items for the island's shops, restaurants and hotels.

From a gender dimension, inclusion and diversity perspective, regenerative local value chains are relevant because they can either reproduce existing inequalities in local economies or create opportunities for equitable participation in local economies. Local production systems may involve artisans, small businesses, women-led initiatives, informal producers, migrants, young entrepreneurs, older knowledge holders, tourism workers, cooperatives and community groups. The engagement approach should therefore consider equal access to production, recognise adequate (local) knowledge and perspectives, and respond to an array of needs from diverse users. This ensures that regenerative solutions are accessible, culturally appropriate and economically viable for diverse stakeholder groups. This is aligned with the REMEDIES gender dimension approach, which promotes consideration of gender where relevant alongside inclusive language and practices, accessibility, diverse user needs and broad stakeholder engagement throughout innovation development and project activities. Snapshot of the activities can be seen in Figure 12.

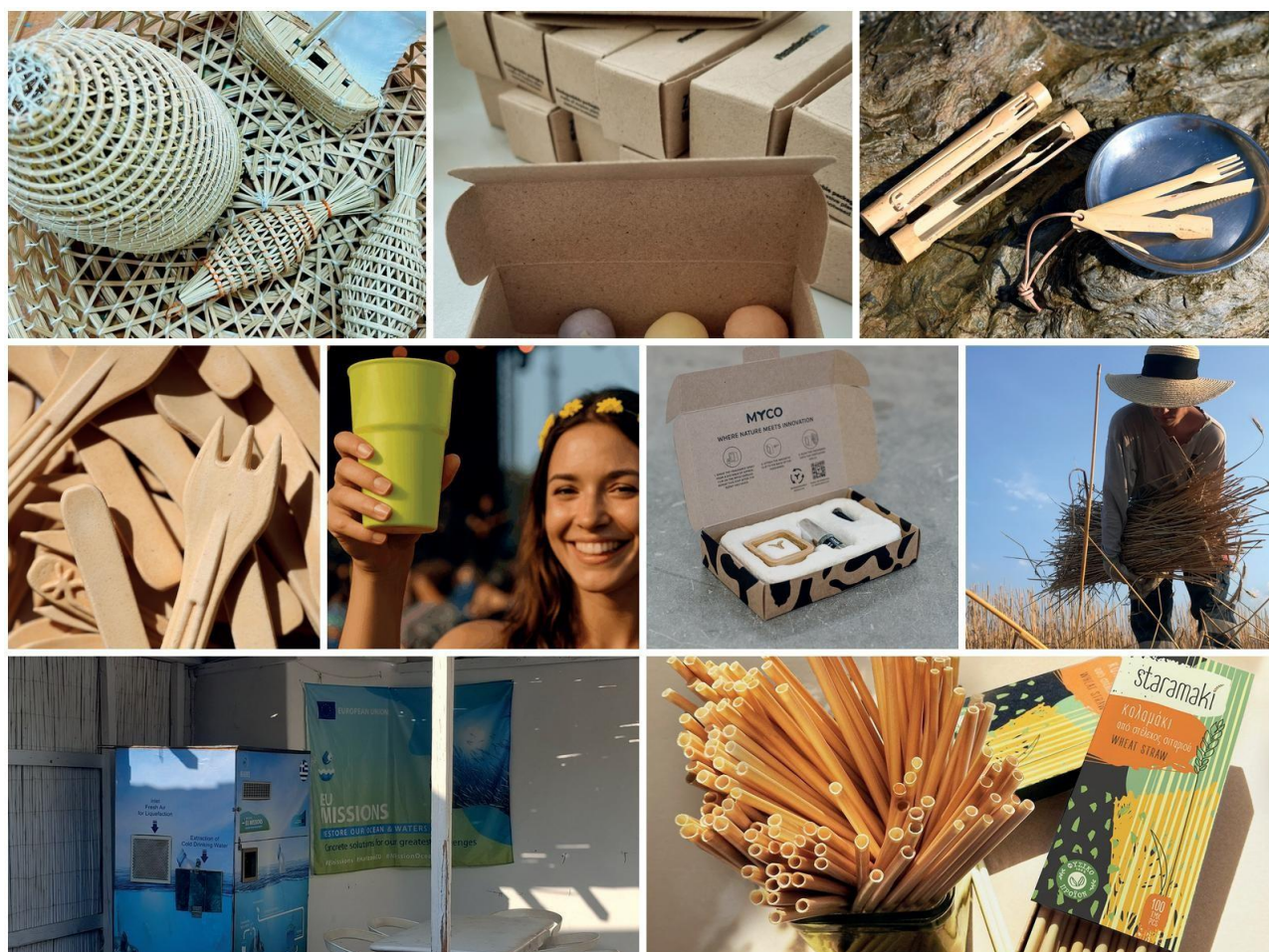


Figure 12: Regenerative zero-waste local value chains in REMEDIES, showing locally rooted alternatives to single-use plastics, including date-palm craft products, seaweed-based cosmetic containers, reusable bio-based cups, mycelium packaging and natural straw-bas. (Source: REMEDIES archive)

What engagement channels and methods were used

Engagement happened through a combination of Demo Site implementation, stakeholder dialogue, fieldwork, interviews, practical examples and policy learning. The methodology behind the guide combined desk research, stakeholder engagement, structured interviews and fieldwork. Solutions were identified through REMEDIIES partners, SMILO's island network, regional partners in Provence-Alpes-Côte d'Azur, and local actors connected to Mediterranean and island territories. Data collection included direct exchanges with solution providers, founders or project leads, while interviews followed a structured template covering what the solution is, why it is needed, who is involved, when and where it is implemented, how it works, budget, key results, next steps and challenges.

In Porquerolles, engagement is place-based and directly connected to the everyday pressures of island life: tourism flows, local businesses, limited waste-management capacity, protected natural areas and the need to reduce single-use items at source. Residents, visitors, shopkeepers, restaurants, hotels, local authorities, environmental organisations, artisans and producers are all relevant stakeholders because they influence how alternatives are produced, distributed and adopted. The Provence giant reed example is particularly relevant: since 2021, the initiative has supported shopkeepers and restaurant owners on Porquerolles, Port-Cros and Levant, and later Frioul, to replace single-use items such as straws, ice cream spoons, stirrers and cutlery kits with locally produced, reusable and biodegradable alternatives made from Provence giant reed offcuts.

The 4th REMEDIIES Policy Workshop on local value chains as alternatives to plastic expanded this engagement beyond one Demo Site. Organised by SMILO in collaboration with MedWaves and Beyond Plastic Med on 8 April 2026, the workshop brought together Mediterranean island stakeholders to explore how local resources, unused waste streams, traditional skills and low-impact materials can become practical alternatives to plastic products. It connected policy frameworks with concrete examples from REMEDIIES and related initiatives, including seaweed-based capsules, closed-loop reusable systems, atmospheric water generation, straw-based alternatives from France and Greece, and objects made from date palm residues.

An inclusion lens is important in this type of engagement because local value chains are shaped by access to resources, networks, skills, finance, time and market visibility. Stakeholder dialogue should therefore not only involve formal businesses or public institutions, but also small-scale producers, informal craft actors, women and youth groups, community associations, cooperatives and other local actors who may hold relevant knowledge but have less visibility in formal innovation spaces. This can help ensure that prevention solutions are not only environmentally sound, but also socially inclusive and locally beneficial.

What was co-created, tested, adapted or validated

The co-creation element lies in identifying alternatives that are not only technically possible, but locally meaningful and operationally realistic. Local stakeholders help validate whether a proposed alternative fits the place, whether the raw material is available, whether production can be organised locally, whether businesses can use the product, whether consumers understand it, and whether the solution reduces waste without creating new burdens. In Porquerolles, the local value chain based on Provence giant reed demonstrates this logic. Waste from the musical reed industry is repurposed into reusable catering items, produced and distributed locally, and tested with businesses that operate in tourism-heavy island contexts.

The broader guide also validates a structured co-creation and documentation method. Draft case descriptions were shared with solution providers for review and validation, reducing the risk of misinterpretation and ensuring that the documented solutions reflected the experience of the people implementing them. This is relevant for D6.5 because co-creation is not only about workshops with citizens. It can also include the structured involvement of solution providers, local producers, businesses, public authorities and territorial networks in documenting, testing and improving local alternatives.

The 4th Policy Workshop contributed to co-creation by translating practical experience into shared recommendations. Participants explored how local value chains can be supported through procurement, regulation, visibility, networking, collaboration between innovators and artisans, and stronger support for small producers, cooperatives and local businesses. The workshop validated the idea that prevention requires a systemic approach. A product alternative is not enough on its own. It needs production capacity, user acceptance, distribution channels, supportive policy, financing, communication and long-term local ownership.

From a gender dimension perspective, the co-creation process should also examine whether women and men have equitable opportunities to participate in local production and benefit from the value created. Where relevant, it should consider whether gender related roles, responsibilities or social norms influence participation in the design, production, testing, and adoption of regenerative alternatives, as well as access to resources, decision-making and economic opportunities. For example, craft-based or nature-based alternatives may open opportunities for women, youth, older knowledge holders, small local producers or community groups, but this should not be assumed. Future activities should document whether different groups are represented throughout the innovation process from the design, production, testing to adoption of alternatives, and assess whether barriers such as cost, certification, time, access to equipment, market visibility or mobility limit participation, acceptance, usability or uptake of the proposed solutions.

What was learned

The main lesson is that plastic prevention becomes stronger when it is connected to local identity, local resources and local economic opportunities. Communities are more likely to engage with alternatives when they see them not only as substitutes for plastic, but as part of a wider local value chain. The examples documented in the guide show that local alternatives can minimise plastic leakage, reduce microplastics, conserve resources, support small-scale enterprises, create jobs, preserve traditional crafts, strengthen community engagement and promote sustainable consumption.

A second lesson is that local value chains are especially relevant for islands and remote coastal territories. These areas often face geographic isolation, limited waste management infrastructure, dependence on imported goods and strong seasonal tourism pressure. Local and decentralised value chains can reduce dependence on external supply chains, shorten transport distances, strengthen territorial resilience and create more locally controlled systems of production and consumption.

A third lesson is that prevention works better when it is not reduced to simple substitution. Replacing one disposable item with another is not always enough. The strongest solutions are those that reduce waste at source through reuse, refill, packaging-free formats, compostable or biodegradable materials, edible products, local production and circular end-of-life pathways. The guide also identifies common barriers, including higher cost compared with conventional plastics, difficulties in scaling while remaining local, regulatory and certification constraints, behavioural resistance, limited visibility and fragmented support networks.

A further lesson is that inclusive local value chains require attention to social and economic participation. A solution may be locally produced but still not inclusive if only a narrow group can access the benefits or decision-making spaces. Future work should therefore consider affordability for users, fair opportunities for small producers, accessibility for different consumer groups, recognition of traditional and community knowledge, and the inclusion of less visible actors in discussions about production, distribution and adoption.

The main improvement needed is stronger documentation of adoption pathways. Future activities should record which alternatives were presented or tested, who was involved, what feedback businesses and

citizens provided, what barriers were identified, and whether any local uptake, procurement, partnership or business model followed. This is important because the success of regenerative value chains depends not only on the existence of the product, but on whether it can be adopted and sustained within a real local economy.

Guideline for replication

Local value chain activities should begin with a clear mapping of local plastic-use problems and potential local alternatives. Partners should identify which single-use items are most relevant in the territory, what local materials or waste streams exist, which artisans, producers or businesses could be involved, which users or clients could adopt the alternative, and what regulatory or logistical barriers may appear. The process should include citizens and end users, but also municipalities, tourism actors, small producers, retailers, hospitality businesses, waste-management actors, researchers and funders.

The minimum replication sequence should include:

1. Identify the plastic item or consumption pattern to be reduced.
2. Map local resources, unused materials, waste streams, skills and producers.
3. Identify potential adopters, such as shops, hotels, restaurants, events or public facilities.
4. Map whether women, youth, small producers, artisans, cooperatives, informal actors, community groups or other less visible stakeholders are connected to the value chain.
5. Review whether the solution prevents waste at source, rather than only replacing one disposable item with another.
6. Test or demonstrate the alternative in a real local context.
7. Collect feedback from users, businesses, producers and public authorities.
8. Assess cost, usability, supply capacity, maintenance, regulatory requirements and end-of-life implications.
9. Assess whether the solution is affordable, accessible and culturally appropriate for different user groups.
10. Identify policy, procurement, funding or partnership support needed for uptake.
11. Communicate the local value of the solution, including environmental, economic, social and cultural benefits.
12. Document the case using the structure of the Regenerative Zero Waste Local Value Chains guide and update the public link once available.

Source deliverables and supporting evidence used for this case: D3.4 *Benefits of zero-waste micro-supply chains*; D3.3 *Zero-waste cosmetics* where relevant for the seaweed-based cosmetics value chain; Open Call final reports where local value-chain examples are documented, including NMPK Kerkennah and Up-FreeCoasts Mersin.

The Co-Creation Design Canvas in **Annex 1.3**, the Feedback Collection Form in **Annex 2**, the activity documentation notes and the public guide *Regenerative Zero Waste Local Value Chains*³ should be used to support replication.

3.12 Santorini plastic lab

Activity overview

The Santorini Plastic Lab is connected to both the Collection & Valorisation pillar and the Prevention & Zero Waste pillar of REMEDIES. It was launched within the Cyclades Demo Site as the main activity of the four-day Santorini Blue Loop Living Lab programme, hosted at the Vlychada Fishing Shelter from 14 to 17 May 2026. The activity was co-organised by the Impact Hub Athens, Aegean Rebreath, the Municipality of Thira, the Thira Municipal Port Fund, SYN FAB LAB and the Blue Municipalities Network, in close connection with the PHAROS project and the kick-off of the Santorini Blue Loop Living Lab.

The Living Lab brought together education, environmental action, innovation, local stakeholders, professionals, schools and residents around the shared objective of supporting a more sustainable and resilient island. Within this broader framework, the REMEDIES Plastic Lab operated as a hands-on plastic valorisation workshop, where plastic waste collected from the local environment was used as a material for learning, awareness, experimentation, design and circular action. Its purpose was not to present recycling as the only solution to plastic pollution, but to help participants understand the full challenge: how plastic is produced and used, why it becomes a problem, how recyclable plastic can be better collected and reused, and why reducing or avoiding plastic use remains essential.

The Plastic Lab was designed as an educational and participatory format for children, young people, adults, residents and visitors. The practical module developed for Santorini introduces children aged 6 to 9 to plastic use, pollution, recycling, upcycling, sustainable making and creative design. Through guided participation, children learn about different types of plastic, recycling categories, the lifecycle of plastic and the possibilities of transforming recyclable material into new objects. The module can last between two and four hours and combines sustainability, design thinking, circular economy and fabrication literacy.

During the Santorini activation, the Plastic Lab was connected to several other activities. On 16 May 2026, young sailing athletes from the Nautical Club of Santorini joined a clean-up at Vlychada Fishing Shelter, collecting 62 kg of plastic and 20 kg of mixed waste before engaging with the Plastic Lab process. Aegean Rebreath also led a seabed clean-up with 20 divers, complementing the shoreline and port-based action and highlighting the need for coordinated interventions across the coastline, port area and seabed. The programme also included discussions with local fishermen on the sources and impacts of marine litter, a screening of “Ocean with David Attenborough” in collaboration with the Cyclades Preservation Fund and the Revive Our Ocean Greece initiative, and the launch of an artistic residency and mural process with artist Taxis through the Craft the Future workshop.

From a gender, inclusion and diversity perspective, the Santorini Plastic Lab, led by a female engineer, is one of the strongest cases for embedding inclusive engagement because it involved multiple participant groups and age profiles, including children, young people, schools, technical students, local stakeholders, fishers, divers, residents and visitors. Since the format combines environmental education, making, technical equipment, artistic expression and local dialogue, inclusion should be addressed through age-appropriate facilitation, accessible language, safe participation roles, gender-neutral examples, diverse representation

³ https://remedies-for-ocean.eu/wp-content/uploads/2026/07/EXE_LEAFLET_SMILO-print.pdf (accessed 7.8.2026)

and careful attention to who can participate in hands-on making activities. This is particularly relevant because technical and fabrication spaces can sometimes be perceived as expert-led or male-coded, so facilitation should actively support the participation and confidence of all children and participants. Snapshot of the activities can be seen in Figure 13.



*Figure 13: Santorini Plastic Lab in action, showing children and participants engaging in hands-on upcycling activities, material education, creative reuse exercises and Plastic Lab equipment used for small-scale plastic valorisation.
(Source: REMEDIIES archive)*

What engagement channels and methods were used

Engagement happened through a multi-day programme combining clean-up action, material education, technical demonstration, upcycling workshops, school engagement, public participation, fisher dialogue, seabed action, film screening, artistic practice and international learning exchange. The Plastic Lab was open to school groups and wider public participation during the weekend activities. Children, adults, residents and visitors were invited to engage directly with collected plastic materials and to explore how discarded plastic can be sorted, processed and creatively reused into useful or symbolic objects.

The workshop journey followed three main steps. First, participants were introduced to the REMEDIIES project, the Santorini Blue Loop Living Lab and the wider environmental challenge of plastic pollution. The presentation material used in Santorini explained that plastics are synthetic materials mostly derived from petroleum, with advantages such as easy production, low cost and a wide range of uses, but also serious disadvantages linked to overproduction, environmental impacts and long decomposition times. The

presentation also introduced the difference between thermoset plastics and thermoplastics, the role of RIC numbering for identifying plastic types, and specific recyclable materials such as HDPE and PP.

Second, participants explored the material and technical process. The workshop introduced the basic logic of Precious Plastics equipment and showed how plastic can be transformed through shredding, heating and moulding. Participants learned that recyclable plastics need to be separated by type in order to maintain their properties and allow reuse. The practical learning focused not only on what can be made from recycled plastic, but also on why sorting, material responsibility and safe processing are important.

Third, participants moved into reflection and design. They discussed what happens to plastic after it is thrown away, how plastic affects marine life and local ecosystems, and what can be done locally to reduce plastic use. Children and other participants were encouraged to generate ideas, draw possible products, imagine future uses for recycled material and understand how drawings can become digital designs, moulds and fabricated objects. The workshop therefore connected environmental awareness with creativity, making and design thinking.

The Plastic Lab also welcomed a visiting group of technical students from Florida, who joined the activities as part of a case study visit from the United States to Santorini. Their participation added an international learning dimension to the programme and connected local environmental action with broader educational exchange, technical learning and applied sustainability practice.

The inclusion dimension should be reflected in how the Plastic Lab journey is facilitated. Children and participants may differ in age, confidence, language, manual skills, previous exposure to science or technology, and comfort around machinery. Facilitators should therefore use simple explanations, visual examples, group-based activities and multiple forms of participation, including observation, drawing, sorting, discussion, storytelling and design. This allows participants who may not feel confident with machines or technical vocabulary to still contribute meaningfully to the learning and co-creation process.

Equipment and technical setup

The Plastic Lab used the logic of the Precious Plastics open-source recycling approach, adapted for educational and community workshop settings. The equipment considered for the Plastic Lab included four main machine types: a shredder, an injector, an extruder and an oven/compression moulding machine. Each machine supports a different stage of small-scale plastic valorisation.

The shredder is the entry point of the recycling process. It breaks collected plastic waste into flakes that can then be used in other machines. In an educational workshop, the shredder helps participants understand that plastic must first be sorted and prepared before it can be transformed. The injector heats plastic flakes and injects them into a mould, making it suitable for creating small objects. The extruder heats plastic flakes and pushes them through a nozzle to create continuous plastic forms, such as filaments or other raw materials for creative reuse. The compression moulding machine heats plastic inside an oven and presses it into a mould, making it suitable for creating larger and more solid objects, sheets, tiles or plates.

The equipment proposal also compared different options. Precious Plastics equipment was considered useful because it is open source, has many vendors, is relatively easy to maintain, and has accessible designs and specifications. However, it can be heavy, less visually polished and not automatically adapted for children. For educational purposes, an adjusted Precious Plastics setup was considered more suitable because it can be smaller, lighter, transportable, more economical and better adapted to school and workshop environments. The suggested equipment package included an injector, an extruder, an oven and compressor, a shredder, and standard moulds for compression and injection, including plate moulds, carabiner moulds, hexagonal tile moulds and different extruder nozzles.

Health and safety were a central part of the workshop design. The module notes that machines can reach 230°C, which means that children and non-expert participants should not operate equipment independently. Machine operation must be facilitator-led, with age-appropriate observation boundaries, protective practices and supervised involvement. Temperature-resistant gloves are essential, and the practical notes highlight that glove sizing matters, especially when working with children. The injection moulding machine also needs to be prepared shortly before use: it should be switched on and ready around 10 minutes before use, while leaving it on for too long can lead to overheating and poor material results.

From an inclusion perspective, the equipment setup should also consider different body sizes, ages, mobility needs, sensory sensitivities and levels of technical confidence. Safety equipment, including gloves and observation distances, should be appropriate for children and non-expert participants. Facilitators should avoid creating a hierarchy where only technically confident participants engage with the machines, while others remain passive. Instead, the workshop should provide different participation roles around the equipment, such as material sorting, colour selection, design drawing, mould discussion, safety observation, documentation and reflection.

What was co-created, tested, adapted or validated

The Santorini Plastic Lab tested a local circular learning model. The activity explored whether plastic waste collected from a specific place can become the starting point for education, technical experimentation, artistic expression and local dialogue. Participants helped validate the engagement format by moving through a full sequence: understanding the problem, collecting plastic, sorting it, learning about material types, observing or joining processing activities, imagining new objects and reflecting on local prevention.

The co-creation element was also visible in the multi-actor organisation of the activity. Impact Hub Athens contributed to coordination and engagement design. Aegean Rebreath contributed marine litter and seabed clean-up expertise. The Municipality of Thira and the Thira Municipal Port Fund connected the activity to local governance and the port context. SYN FAB LAB contributed fabrication, making and creative reuse expertise. The Blue Municipalities Network connected the activity with wider municipal learning. PHAROS provided the broader Living Lab framework for collaboration and entrepreneurship around marine pollution reduction. This multi-actor structure is part of the co-creation value, because a Plastic Lab depends on both community mobilisation and technical capacity.

The activity also tested how different types of local and external participants could engage with the same environmental issue. Young sailing athletes approached the issue through clean-up action and marine sport. Fishermen contributed local knowledge on marine litter sources and practical handling considerations. Divers revealed the underwater dimension of the problem. Children and students engaged through learning and making. Visitors and international technical students added wider educational exchange. Artists and cultural partners translated the issue into public storytelling. Together, these layers created a shared local narrative around plastic pollution and circular action.

From a gender dimension, inclusion and diversity perspective, the Plastic Lab also tested how different participants engage with circular making as an inclusive learning space rather than a purely technical demonstration. The co-creation value depends on whether participants with diverse levels of technical confidence, experience and backgrounds feel able to ask questions, propose ideas, design objects, understand machine processes and reflect on prevention solutions. Where relevant, the activity should consider whether gender related roles, expectations or stereotypes influence participation or contributions in co-creation processes. At the same time, inclusive facilitation shall help reduce barriers related to age, prior knowledge, accessibility needs or familiarity with technical tools, ensuring that diverse participants can contribute meaningfully. Future Plastic Labs should therefore document not only what objects were created,

but also whether different age groups, genders and participant profiles were able to participate actively and whether facilitation helped reduce barriers to technical learning.

What was learned

The main lesson is that plastic valorisation activities become more meaningful when they are connected to locally collected material and local stakeholders. Participants can better understand circularity when the material comes from a place they know and when they can follow its journey from collection to sorting, processing and creative reuse. The Santorini Plastic Lab showed that clean-ups can become the beginning of a learning process, rather than the end of an activity.

A second lesson is that Plastic Labs can help participants understand the limits of recycling. The workshop does not present recycling as permission to continue using plastic without reconsideration. Its dual purpose is to explore better ways of collecting and reusing recyclable plastic, while also opening discussion on reducing and ultimately avoiding plastic use in the future. This distinction is important for REMEDIIES because valorisation must remain connected to prevention.

A third lesson is that Plastic Labs require strong preparation and facilitation. The format involves materials, machines, safety risks, sorting requirements, design activities, public communication, different age groups and different levels of technical knowledge. It therefore needs clear roles between engagement facilitators, technical experts, local authorities, clean-up organisers and community groups. The activity also requires preparation before the workshop, including prior contact with participants where possible, so they can understand the project, collect appropriate plastic and begin developing ideas that may later become designs or objects.

A further lesson is that inclusion should be planned into the workshop design from the beginning. Because Plastic Labs combine technical equipment, environmental education and creative design, they can unintentionally exclude participants, who are less confident with technology, younger children, people with limited mobility, people with different learning styles or those who do not see themselves represented in maker spaces. The Santorini Plastic Lab demonstrates the value of combining multiple engagement modes: clean-up, discussion, drawing, observation, making, artistic expression and public storytelling so that participation is not limited to machine operation.

The main improvement needed is systematic documentation of participant feedback, material pathways and outputs. Future Plastic Lab reporting should record which stakeholder groups participated, what materials were collected and processed, what machines and moulds were used, what objects were created, what participants learned, what safety or technical challenges appeared, and whether any follow-up action was agreed with local actors.

Guideline for replication

A Plastic Lab should be replicated as a structured engagement process combining collection, sorting, material education, technical demonstration, making, reflection and prevention. Partners should first define the local purpose: education, valorisation, awareness, prototyping, artistic output, community mobilisation or local circular innovation. They should then identify the clean-up source of material, the technical partner, the venue, equipment needs, safety requirements, local stakeholders and post-activity use of the material or outputs.

The minimum replication sequence should include:

1. Define the local plastic pollution issue and the purpose of the Plastic Lab.
2. Identify the source of plastic material, ideally through a linked clean-up activity.
3. Prepare participants before the workshop where possible, including guidance on which plastic types to collect.
4. Sort and prepare the material safely before any processing.
5. Use appropriate equipment, such as shredder, injector, extruder and compression moulding machine, only under trained facilitator supervision.
6. Explain the lifecycle of plastic, plastic types, recycling categories and limits of recycling.
7. Design age-appropriate learning activities, including drawing, brainstorming, observation and making.
8. Use inclusive facilitation methods that support different ages, genders, learning styles, technical confidence levels and physical capacities.
9. Ensure strong health and safety procedures, especially around heated and moving machinery.
10. Provide different participation roles, including sorting, design, observation, documentation, discussion, making and reflection.
11. Connect the activity with local stakeholders such as municipalities, schools, fishers, divers, artists, makers or community groups.
12. Document material quantities, participant numbers, machines used, objects created and lessons learned.
13. Collect feedback from participants and organisers, including feedback on accessibility, safety, clarity and confidence in technical participation.
14. Define what happens next to the produced objects, learning materials or partnerships.
15. Link the discussion back to prevention, reduction of plastic use and alternative material choices.

Source deliverables and supporting evidence used for this case: D2.4 *Clean-up and valorisation guideline*, where relevant for plastic sorting, preparation and small-scale valorisation links.

The Workshop and Plastic Lab Checklist in **Annex 4.7**, the Activity Planning Template in **Annex 1.1**, the Feedback Collection Form in **Annex 2** and activity documentation notes should be used to support replication, together with the Santorini Plastic Lab Handbook, Equipment and Presentation for Schools in **Annex 5**.

3.13 REMEDIES anti-litter campaigns and open days

Activity overview

The REMEDIES anti-litter campaigns and demo sites open days are cross-pillar engagement formats connecting Detection & Monitoring, Collection & Valorisation, and Prevention & Zero Waste. They also connect all three engagement categories: Raising Awareness, Action, and Learning & Upscaling. Within the project, the campaigns were designed to mobilise local communities, support citizen science, reduce plastic pollution, promote behavioural change and increase the uptake of REMEDIES innovations across Demo Sites. The Open Days complemented this campaign logic by creating public demonstration moments where Demo Sites and Associated Regions could present project innovations, engage stakeholders, and connect technical solutions with citizens, local institutions and wider audiences.

The Anti-Litter Campaigns support the REMEDIES target to organise at least eight campaigns by the end of the project. By Month 36, seven campaigns had already been implemented across Greece, France, Albania,

Morocco, Spain, Italy and Slovenia. These campaigns were not designed as one-off communication actions. They functioned as local engagement umbrellas, bringing together clean-ups, educational activities, plastic identification sessions, citizen science, local workshops, communication actions and demonstrations of REMEDIIES technologies.

The Anti-Litter Campaigns were also closely linked to the PLASTIC FANTASTIC Webinar Series, which supported learning and field readiness across Demo Sites. In total, seven PLASTIC FANTASTIC webinars/seminars were organised across the campaign and Demo Site learning pathway: Greece, Italy/Sardinia, France, Albania, Morocco Beach Litter Monitoring, Morocco Plastic Identification / Drone & AI, and Slovenia. These sessions helped participants understand plastic identification, recyclability, beach litter monitoring, citizen science methodologies and REMEDIIES technologies before or alongside field activities. The webinar series is described in more detail in Section 3.15.

The Open Days / Info Days added a second layer of public engagement and technology demonstration. Based on the Open Day participation table, REMEDIIES implemented eight Open Days across Morocco, Croatia, Malta, France, Türkiye, Germany and Slovenia. The reported participation/reach figures amount to at least 50,546 people involved, excluding the Marina Izola Open Day where no number was provided in the table. These events included the Saïdia 3-day Open Day in Morocco, zero-waste seaweed cosmetics activities at Sea Star Festival in Croatia, the Island Guardians Open Day in Malta, the Porquerolles Solutions Forum and clean-up/monitoring session, the Mersin Open Day for the Up-FreeCoasts project, the Wasser 3.0 Open House in Landau, the Marina Izola Open Day in Slovenia, and the Umag 2026 Open Day presenting bio-based reusable cups and the Plug-and-Play 2 Zero-Waste system. The REMEDIIES Open Days article confirms that these events were hosted at Demo Sites and Associated Regions to showcase progress, demonstrate innovations, and invite citizens, stakeholders and institutions to take part in hands-on environmental action.

Across the campaigns and Open Days, partners showcased and tested different REMEDIIES tools and innovations, including the REMEDIIES Shoreline Marine Litter App, AI-supported aerial drone detection, underwater drone monitoring, river-cleaning systems, zero-waste seaweed cosmetics, bio-based reusable cups, fishing nets made with biodegradable polymers, microplastic filtration systems and local zero-waste solutions. These activities helped translate technical project outputs into public-facing, locally relevant actions.

From an inclusion and diversity perspective, Anti-Litter Campaigns and Open Days are important because they are often the most visible entry points into REMEDIIES. They can reach volunteers, schools, families, young people, local authorities, NGOs, fishers, businesses, researchers, entrepreneurs, visitors, local residents, industry actors, policy stakeholders and technology providers. Inclusive campaign and Open Day design should therefore consider who is being reached, which communication channels are used, whether language and visuals are accessible, whether different age and social groups can participate, and whether the activity creates roles for people with different capacities and levels of experience. This is aligned with the REMEDIIES gender dimension approach, which highlights inclusive language, accessibility, diversity awareness, user needs and participation conditions as quality considerations across engagement and innovation activities. Snapshot of the activities can be seen in Figure 14.



Figure 14: REMEDIES Anti-Litter Campaigns and Open Days across Demo Sites and Associated Regions, showing citizen clean-up actions, public engagement, collected marine litter, technology demonstrations and stakeholder exchange for plastic pollution prevention. (Source: REMEDIES archive)

What engagement channels and methods were used

Engagement happened through locally adapted campaign and Open Day packages rather than one standard format. Each campaign combined different methods depending on the Demo Site, local partners, target groups and available technologies. Together, the campaigns created a practical bridge between project communication and project implementation. They helped local actors understand what REMEDIES is doing in each Demo Site, how plastic pollution affects their area, what tools are being tested, and how citizens, schools, volunteers, local authorities, businesses, researchers and environmental organisations can participate.

In Greece, two Anti-Litter Campaigns were implemented under the REMEDIES #20TonnesChallenge. The first was led by Impact Hub Athens and WWF Hellas through WWF Greece's Adopt a Beach initiative. From May to early October 2024, it mobilised more than 177 volunteers across beaches in Mykonos, Preveza, Poros, Crete, Rinia Island, Athens, Thessaloniki, Patra, Kalamata and Chios. It included 14 beach clean-ups, removed more than 322 kg of plastic litter and 235 kg of other waste, reached more than 1,000 people, and included a PLASTIC FANTASTIC Webinar on plastic identification with more than 30 participants.

The second Greek Anti-Litter Campaign was led by All For Blue, Marine Conservation Greece and Impact Hub Athens. It focused on direct coastal action, education and community mobilisation across Thessaloniki, Oinousses, Rhodes, Crete and Attica. It organised five beach clean-ups, engaged 200 volunteers, cleaned 681 meters of beach, and removed 82.4 kg of plastic waste and 140.3 kg of other waste. Together, the two Greek campaigns show how clean-ups, volunteer mobilisation, citizen science, awareness and plastic identification training can be combined under one national engagement framework.

In France, the Anti-Litter Campaign was led by SMILO, the Demo Site Leader for Porquerolles Island, in collaboration with Explore & Preserve. It focused on reducing plastic pollution in coastal environments, educating local communities and promoting circular solutions for island and marine protection. The campaign included beach clean-ups on Porquerolles Island, educational sessions, technology showcases, the 5th REMEDIES Cluster Meeting and the PLASTIC FANTASTIC Webinar on plastic identification. The campaign addressed local and regional authorities, NGOs, tourism operators, marina managers, coastal businesses, researchers, technology providers, policymakers and investors.

In Albania, the campaign was led by the Environmental & Territorial Management Institute and Milieukontakt Albania. It focused on reducing plastic pollution in rivers before it reaches coastal and marine ecosystems. Its activities included river clean-ups, monitoring activities, educational sessions, technology showcases and the presentation of the REMEDIES River Cleaning system, designed to continuously collect floating plastic waste from rivers while operating autonomously with renewable energy. It also included a PLASTIC FANTASTIC Webinar on plastic identification, organised with ETMI, the University of Maribor, Venice Lagoon Plastic Free and Impact Hub Athens. The campaign was designed to engage local and regional authorities, freshwater and marine conservation organisations, businesses near riverbanks, researchers, technology providers, policymakers and investors.

In Morocco, the campaign was led by Mohammed Premier University in partnership with Ecoloplatform du Maroc du Nord at the Saïdia Demo Site. It focused on plastic pollution monitoring, local engagement and demonstration of innovative environmental technologies. The campaign showcased the Aerial Drone & AI Solution developed by Mohammed Premier University and the REMEDIES Shoreline Marine Litter App v1.0 developed by Infordata. These tools support real-time litter detection, dynamic plastic pollution mapping and standardised citizen science data collection. The Moroccan campaign also included two PLASTIC FANTASTIC webinars: one on Beach Litter Monitoring and one on Plastic Identification, with contributions from Venice Lagoon Plastic Free, the University of Maribor, Infordata and VITO.

In Spain, the campaign was led by Aitiip Technology Centre and focused on the Zaragoza Demo Site. Running through September and October 2025, it connected students, young entrepreneurs, local stakeholders, businesses, NGOs and related EU projects around innovation and zero-waste solutions. Its main activities included the "Remedies for the Future: Workshop for Entrepreneurs" at Ceste Business School, a hands-on waste collection activity at the Zaragoza Canal, collaboration with the ATRIUM, UPSTREAM, ECOSISTEMA GO and REDOL projects, and three promotional videos presenting the Zaragoza Demo Site, Aitiip's role in REMEDIES and workshop highlights.

In Italy, the campaign was led by the National Research Council of Italy in collaboration with the Sea Scout Group NGO across Sardinia and Southern Italy. It combined scientific knowledge, citizen engagement and

innovation to reduce plastic waste and promote circular solutions for Mediterranean ecosystems. The campaign included the 6th REMEDIES Cluster Meeting, “Protected areas and citizens against plastic pollution,” in Oristano, Sardinia, the International Conference “MicroMed” in Ischia, Naples, and presentation of the Sardinia Demo Site video. It also showcased the fishing nets made with biodegradable materials innovation, connecting the Anti-Litter Campaign with prevention, circular materials and fisher engagement.

In Slovenia, the campaign was led by the University of Maribor and co-organised by CLERA, the National Institute of Chemistry Slovenia and Infordata, with a focus on the Koper Demo Site and Marina Izola. The campaign brought together monitoring, data generation, technology demonstration and prevention of plastic pollution at source. Its central milestone was the REMEDIES Open Day at Marina Izola on 18 March 2026, which launched the campaign and combined an in-person seminar on plastic identification and marine litter science, presentations of Koper pilot activities, live technology demonstrations, underwater drone monitoring for seafloor mapping, and a pilot microplastic filtration system for wastewater generated during boat washing and antifouling paint rinsing. The campaign also featured the PLASTIC FANTASTIC Seminar: Slovenia Edition.

The Open Days / Info Days expanded this engagement logic by creating public demonstration moments around REMEDIES innovations. In Saïdia, the first Open Day unfolded over a 3-day event and included the General Assembly, Cluster Meeting, Monitoring Workshop, technology presentations and a large-scale Beach Clean-up and Monitoring Campaign that collected over 360 kg of litter. In Umag, the 2024 Open Day combined zero-waste seaweed cosmetics workshops with festival engagement, involving over 40 workshop participants and distributing more than 2,000 shampoo balls. In Malta, the Island Guardians Open Day celebrated community empowerment and local solutions. In Porquerolles, the Open Day included the 5th Cluster Meeting, solutions forums, the 6th General Assembly and a clean-up and monitoring session at La Courtade Beach. In Landau, the Wasser 3.0 Open House showcased microplastic removal technologies, citizen science tools and expert dialogue. In Mersin, the Open Day for the Up-FreeCoasts project brought together 76 participants, including decision-makers, civil society, universities and EU representatives. In Marina Izola, the Open Day linked the Slovenian Anti-Litter Campaign with underwater drone monitoring, microplastic filtration and plastic identification. In Umag 2026, the Open Day presented bio-based reusable cups and the Plug-and-Play 2 Zero-Waste system to festival visitors and industry professionals.

The inclusion dimension should be considered across the campaign and Open Day package, not only in individual activities. Since each campaign combined different formats, partners had opportunities to create multiple entry points for participation: public clean-ups, school sessions, webinars, technology demonstrations, workshops, seminars, local communication, stakeholder meetings, open innovation formats and public demonstration events. This diversity of formats can support inclusion when it allows different groups to participate according to their interests, availability, digital access, physical capacity and level of prior knowledge. Future campaigns and Open Days should therefore intentionally map which audiences each format reaches and whether additional outreach is needed to include underrepresented or less visible groups.

What was co-created, tested, adapted or validated

The Anti-Litter Campaigns and Open Days co-created value by adapting REMEDIES engagement methods to different Demo Site realities. Each campaign used a shared project logic but applied it through local actors, local environmental challenges and local technologies. In Greece, the campaigns validated the connection between volunteer clean-ups, Adopt a Beach, plastic identification training and citizen science. In France, the campaign connected island protection, tourism, circular solutions and local stakeholder mobilisation. In Albania, the campaign tested how riverine pollution and river interception technology can be communicated

to local communities and authorities. In Morocco, the campaign validated the use of app-based citizen science and AI-supported drone detection as public-facing monitoring tools. In Spain, the campaign linked anti-litter action with entrepreneurship and zero-waste innovation. In Italy, the campaign connected protected areas, scientific dialogue, fishing gear made with biodegradable materials and citizen engagement. In Slovenia, the campaign demonstrated how marina-based technologies can be communicated through an Open Day, seminar and live demonstrations.

The campaigns also helped validate the need for preparatory learning tools. Volunteers and local actors needed accessible information before participating in clean-ups and field activities. This need supported the development and expansion of the PLASTIC FANTASTIC Webinar Series and the REMEDIIES Flag on the Different Types of Plastics, which helped participants understand plastic categories, recyclability and field identification. In this sense, the Anti-Litter Campaigns did not only disseminate existing tools; they generated learning on what tools and formats were needed to support better participation.

The Open Days validated the role of public demonstration in co-creation and uptake. Technologies such as Aerial Drone & AI, the Shoreline Marine Litter App, underwater drone monitoring, microplastic filtration, zero-waste seaweed cosmetics, bio-based reusable cups and Plug-and-Play 2 Zero-Waste systems became more understandable when presented in real places and connected to local stakeholders. These events allowed citizens, municipalities, researchers, businesses, innovators, civil society organisations and policy actors to see how REMEDIIES innovations work, ask questions, discuss implementation conditions and connect technical solutions with local needs.

From an inclusion and diversity perspective, the campaigns and Open Days also tested how REMEDIIES messages and tools could be adapted to different audiences and local contexts. A campaign for students, a campaign involving fishers, a campaign in a tourism-heavy island, a campaign around river pollution, a campaign in a marina environment and a festival-based Open Day do not require the same language, imagery, timing or facilitation. Future campaign design should therefore treat audience diversity and accessibility as part of the co-creation process, documenting which groups were reached, which groups were missing, and how communication or activity formats were adapted to improve participation.

What was learned

The main lesson is that Anti-Litter Campaigns and Open Days work best when they combine several engagement methods under one coherent local narrative. A campaign can include clean-ups, workshops, webinars, technology demonstrations, school engagement, innovation showcases, communication actions, stakeholder meetings and Open Days, but these elements need to be connected. Participants should understand how the activities relate to the local pollution problem and to the wider REMEDIIES objective.

A second lesson is that campaigns and Open Days can make technologies more accessible. Tools such as drones, apps, river-cleaning systems, microplastic filtration systems, biodegradable materials, seaweed-based coatings and reusable zero-waste systems can remain too technical if presented only in scientific or engineering contexts. Campaigns and Open Days provide public-facing formats through which local actors can see, discuss and understand how these technologies respond to plastic pollution.

A third lesson is that campaigns are useful for connecting local engagement with project-level KPIs. The campaigns generated measurable outputs, such as volunteers mobilised, clean-ups organised, waste collected, people reached, webinars delivered, Open Days implemented, technologies showcased, and stakeholders involved. At the same time, they created qualitative value by building local visibility, strengthening partnerships, preparing citizens for further participation and creating public legitimacy for REMEDIIES innovations.

A fourth lesson is that Anti-Litter Campaigns and Open Days should be documented as integrated engagement processes, not as lists of separate events. Future reporting should record the campaign purpose, target groups, activity mix, tools used, technologies presented, citizens engaged, waste collected, webinars delivered, Open Days implemented, educational outputs, feedback received, communication reach and follow-up actions.

A fifth lesson is that inclusive campaigns need intentional outreach and role design. An open campaign may still fail to reach certain groups if the communication channels, language, venue, timing or activity format are not accessible to them. Anti-Litter Campaigns and Open Days should therefore consider whether they are reaching different ages, genders, community groups, schools, local businesses, professional users, visitors and people with different levels of mobility, confidence or digital access. Documentation should capture not only the number of participants or people reached, but also whether the activity created meaningful and accessible participation opportunities for diverse audiences.

A sixth lesson is that diversity and inclusion an integral part of campaign quality. Campaigns and Open Days can help broaden participation and raise awareness when they use inclusive language, diverse images, accessible explanations, safe participation roles and multiple entry points into the activity. This is particularly important for technical demonstrations, innovation showcases, field clean-ups, school activities, fisher engagement, webinars and public events, where participation can be shaped by confidence, technical knowledge, professional role, age, gender, availability, language and access to networks.

Guideline for replication

An Anti-Litter Campaign and Open Day package should be designed as a local engagement framework that combines awareness, action, citizen science, innovation and public demonstration. It should not be limited to a clean-up or a communication campaign. The starting point should be the local plastic pollution challenge and the role that citizens and stakeholders can play in addressing it.

The minimum replication sequence should include:

1. Define the local campaign objective and the REMEDIIES pillar or pillars it supports.
2. Identify the target groups, such as volunteers, schools, local authorities, NGOs, fishers, businesses, students, entrepreneurs, coastal users, technology providers or policy stakeholders.
3. Map which groups may face barriers to participation because of language, timing, mobility, digital access, age, confidence, lack of information or limited connection to formal networks.
4. Select the activity mix, combining clean-ups, workshops, webinars, citizen science, technology demonstrations, educational actions, stakeholder meetings or Open Days.
5. Identify which REMEDIIES tools, protocols or technologies will be presented or used.
6. Prepare participants before field activities, especially where plastic identification, sorting, app use or monitoring is required.
7. Use accessible visual tools, such as the REMEDIIES Flag on the Different Types of Plastics, where relevant.
8. Coordinate with local authorities and waste operators for clean-up logistics.
9. Involve scientific or technical partners when presenting innovations.
10. Design Open Days as public demonstration moments where citizens and stakeholders can see, discuss and understand REMEDIIES technologies in real contexts.
11. Use inclusive communication, gender-sensitive language and diverse visual representation where possible.
12. Document quantitative outputs, including number of campaign activities, clean-ups, volunteers, plastic litter collected, other litter collected, webinars, Open Days, technologies showcased, and people involved or reached.

13. Collect feedback from participants and organisers, including feedback on accessibility, clarity and barriers to participation.
14. Communicate the campaign and Open Day results publicly.
15. Define the follow-up pathway, such as further clean-ups, monitoring, workshops, policy dialogue, Open Call replication, technology testing or local adoption of solutions.

Source deliverables and supporting evidence used for this case: D2.4 *Clean-up and valorisation guideline*; REMEDIES clean-up database; Anti-Litter Campaign reporting material; Open Day / Info Day participation table; D3.3 *Zero-waste cosmetics* for Sea Star Festival and zero-waste cosmetics activities; relevant REMEDIES website articles and Demo Site updates.

The Activity Planning Template in **Annex 1.1**, Stakeholder Mapping Template in **Annex 1.2**, Co-Creation Design Canvas in **Annex 1.3**, Feedback Collection Form in **Annex 2**, Citizen Science Protocols and Supporting Educational Materials in **Annex 3**, Clean-Up Engagement Checklist in **Annex 4.5**, Communication and Visibility Checklist in **Annex 4.10**, and REMEDIES Anti-litter Campaign Guideline in **Annex 6** should be used to support implementation and reporting.

3.14 PLASTIC FANTASTIC hackathon

Activity overview

The PLASTIC FANTASTIC Hackathon is connected mainly to the Learning & Upscaling engagement category, while also supporting all three REMEDIES pillars: Detection & Monitoring, Collection & Valorisation, and Prevention & Zero Waste. It was the international online hackathon of the REMEDIES programme, created to mobilise creative, entrepreneurial and science-based solutions against plastic pollution in oceans and waters.

The Hackathon brought together innovators, environmental experts, entrepreneurs, researchers, activists and citizens working on solutions for plastic litter detection, monitoring, collection, valorisation, prevention and reuse. Its purpose was to create a structured pathway from open participation to solution development, pitching, selection, recognition and acceleration support.

The process began with an international open call inviting teams and initiatives to submit ideas for tackling plastic pollution. From this process, 24 successful projects were selected to join the PLASTIC FANTASTIC Bootcamp and Hackathon. The official announcement highlighted that applications came from 18 different countries, working across Europe, Africa, North America and Asia, and that 30% of applicants were women. The selected projects included a wide range of concepts, such as plastic upcycling, microplastic monitoring, biotechnological innovation for plastic valorisation, edible biofilms, sustainable sailing, community empowerment models, and water-related monitoring or treatment solutions.

Following the Bootcamp, 15 finalist teams were selected from the initial 24 participating projects. These finalists represented a wide range of solutions and geographies, addressing different aspects of plastic pollution, from prevention and monitoring to reuse, valorisation and circular business models. The 15 finalists included Green Oasis from Tunisia, Sustainable Sailing from Greece, Captoplastic from Spain, Microplastics from Albania and Italy, BioRise from Greece, Plastic Pixel from Germany, Volatile Moments from Austria and Portugal, Ekodaska.me from Montenegro, DropliNet from Estonia, COFFEECO from Greece, TRASH TALK HACKERS from Italy and Kenya, OCEANPLASTIK from the Czech Republic, Plastic Upcycle from Greece, Polymerch from the USA, and BioFlocean from Turkey.

The final pitching and award ceremony took place on 18 April 2024. The event included a keynote speech by the Deputy Director-General of the European Commission, the introduction of the Hackathon Jury and their “Impact Plastic Promise,” and a final pitching process where the 15 finalist teams presented their solutions. At the end of the process, four winning teams were selected for their potential to create impact and further develop their solutions: Captoplastic, BioFlocean, BioRise and DropliNet. The winners received prizes and acceleration support, including cash grants, hardware prizes and three months of acceleration support. Snapshot of the activities can be seen in Figure 15.



Figure 15: PLASTIC FANTASTIC Hackathon journey in REMEDIES, showing the progression from open call and Bootcamp to finalist selection, final pitching, jury process and winning teams (Source: REMEDIES archive)

From an inclusion and diversity perspective, the Hackathon is particularly relevant because it was an open innovation format that reached applicants from multiple countries and continents, and because the available evidence records that 30% of applicants were women. In addition, two of the winning teams are explicitly described as women-led or founded and led by women innovators: BioFlocean and DropliNet. This gives the Hackathon a concrete gender dimension within the REMEDIES engagement portfolio, while also showing the need to continue strengthening gender balance, accessibility and diversity in future innovation formats.

What engagement channels and methods were used

Engagement happened through an online innovation pathway that moved from open call to Bootcamp, mentoring, inspirational talks, finalist selection, final pitching, awards and follow-up acceleration. The Hackathon followed a different engagement logic from field-based activities. It invited participants to move from learning and awareness to solution development. Instead of only preparing volunteers for clean-ups or monitoring, it created a space where citizens, entrepreneurs, researchers, innovators and environmental practitioners could propose and develop new solutions to marine plastic pollution.

The Bootcamp opened with the session “PLASTIC FANTASTIC Hackathon - Bootcamp Kick Off & Meet the projects,” where Impact Hub Athens introduced the 24 participating projects and officially launched the Hackathon process. This opening helped make the diversity of teams, ideas and approaches visible, while setting the collaborative framework for the programme.

As part of the Bootcamp, participants also had the opportunity to learn from pioneering organisations and programmes already working on environmental sustainability and circular solutions. Inspirational talks from RAMONES, EcoBrixx and Plasticpreneur connected the Hackathon ideas with real-life examples of innovation, circularity and environmental impact. The 15 finalists were later selected after a 3-day Bootcamp that included masterclasses on business modelling and pitching by Relevant Ventures and Uni.Fund, as well as inspirational talks from organisations and programmes such as RAMONES, Plasticpreneur, EcoBrixx and Climate-KIC.

The final pitching and award ceremony created a focused moment of public recognition and structured feedback. The 15 finalists were invited to present their ideas through short pitches, followed by questions from the jury. The process helped teams explain not only their solution, but also the expected chain of environmental impact and their business model. The four winning teams were selected because of their positive impact potential and acceleration readiness.

The inclusion dimension should be considered as part of the Hackathon design and delivery. Open online formats can reach geographically dispersed participants, but they can also create barriers for people with limited digital access, limited English or technical vocabulary, low confidence in pitching, caring responsibilities, or limited familiarity with entrepreneurial formats. For this reason, the Hackathon should be documented not only as an innovation competition, but also as an inclusive learning and capacity-building pathway. The Bootcamp, inspirational talks, business modelling sessions, pitching support and acceleration offer are important because they help participants move from ideas to structured proposals, even when they do not all enter the process with the same entrepreneurial experience.

What was co-created, tested, adapted or validated

The Hackathon co-created value by inviting participants to work on solutions rather than only receive information. The process supported problem framing, team-based learning, idea development, feedback, pitching and acceleration. It brought REMEDIIES into contact with wider innovation ecosystems and created a structured pathway for early-stage solutions related to detection, monitoring, collection, valorisation, prevention and reuse.

The co-creation process was visible in several stages. First, the open call invited external innovators to bring their own ideas into the REMEDIIES ecosystem. Second, the Bootcamp provided a shared learning environment where participants could refine their ideas, hear from experts and connect with other teams. Third, the finalist selection process created a more focused innovation cohort. Fourth, the final pitching event allowed teams to receive jury questions and communicate their impact logic. Finally, the winners received acceleration support to continue developing their ideas beyond the event.

The four winning teams demonstrate the breadth of innovation pathways supported through the Hackathon. Captoplastic proposed a technology for controlling and capturing microplastics from water bodies, with potential application in wastewater treatment, drinking water treatment, bottling plants, plastic industry facilities, textile dyeing wastewater, recycling plants and personal care industry settings. BioFlocean presented a bioplastic approach based on microalgae, connecting waste treatment, carbon capture and environmental protection. BioRise proposed a biotechnology-based approach to transforming plastic waste into high-value bio-products using microbial cell factories. DropliNet developed a user-friendly and sensitive

approach for micro- and nano-plastic monitoring in environmental water samples through receptor- and droplet microfluidics-based technology.

From the diversity perspective, the Hackathon also tested whether open innovation formats can surface diverse ideas, geographies and leadership profiles. The 24 selected projects came from 18 countries across different regions, and 30% of applicants were women. The presence of women-led winning teams also shows that innovation spaces can support gender representation when outreach, selection and support mechanisms are open and accessible. Future editions should build on this by documenting applicant and participant diversity more systematically and by identifying whether additional outreach or support is needed for women, young innovators, underrepresented regions, early-stage teams or non-traditional entrepreneurs.

What was learned

The main lesson is that learning and innovation need to be connected. Webinars and visual tools help participants understand the problem and prepare for action, while Hackathons and Bootcamps help participants develop solutions and imagine how ideas can become practical interventions. The PLASTIC FANTASTIC Hackathon created a pathway from awareness to informed action, and from informed action to innovation and upscaling.

A second lesson is that open innovation can extend the reach of REMEDIES beyond the Demo Sites. The Hackathon attracted projects from 18 countries across different continents, showing that the challenge of plastic pollution can mobilise innovators beyond the immediate project geographies. This is important for replication because it shows that REMEDIES engagement can create a wider “plastic-preneurial” community around marine litter reduction, circular solutions, monitoring, prevention and valorisation.

A third lesson is that early-stage innovators need more than a competition format. The Bootcamp, masterclasses, inspirational talks, jury feedback, awards and acceleration support were important because they helped teams strengthen the quality, clarity and feasibility of their ideas. The final article also highlights that all finalists would still have opportunities to network and be referred to potential collaborators, donors and sponsors, showing that the value of the Hackathon extended beyond the four winners.

A fourth lesson is that gender balance and diversity should be treated as part of innovation quality. The available evidence that 30% of applicants were women, together with the recognition of women-led winning teams, provides a concrete gender dimension for this case. However, future Hackathons should go further by documenting gender balance, geographical diversity, age, disciplinary diversity and barriers to participation more systematically, where appropriate and proportionate. This would make it easier to understand who accesses innovation opportunities and how the format could become more inclusive.

A fifth lesson is that inclusive innovation requires support for participants who may have strong ideas or local knowledge but less experience in entrepreneurship, pitching or technical solution development. Future Hackathons should therefore collect feedback on clarity, accessibility, confidence, mentoring quality, pitching support, digital participation and barriers to involvement, alongside standard indicators such as number of applicants, selected teams, finalists, winners and prizes awarded.

Guideline for replication

A Hackathon should be replicated as a structured innovation and capacity-building pathway, not only as a competition. It should begin with a clear challenge linked to plastic litter detection, monitoring, collection, valorisation, prevention or reuse. It should then move through open call, selection, Bootcamp, expert input, mentoring, pitching, awards and follow-up support.

The minimum replication sequence should include:

1. Define the innovation challenge and its connection to the REMEDIIES pillars.
2. Design an open call that is clear, accessible and understandable to both technical and non-technical applicants.
3. Conduct targeted outreach to reach diverse applicants, including women, young innovators, researchers, social entrepreneurs, citizen initiatives, local innovators and underrepresented regions.
4. Document applicant diversity where appropriate and proportionate, including gender balance and geographical spread.
5. Select a first cohort of promising projects based on clear criteria.
6. Organise a Bootcamp with project introductions, expert input, business modelling, pitching support and practical mentoring.
7. Include inspirational talks from organisations or initiatives already working on circularity, ocean protection, monitoring or plastic pollution solutions.
8. Select finalists through a transparent process.
9. Organise a final pitching and award session with a balanced jury and clear evaluation criteria.
10. Provide feedback to finalists, including feedback on environmental impact, feasibility, business model, scalability and implementation needs.
11. Award winning teams with financial, technical or acceleration support where possible.
12. Keep networking and referral opportunities open for all finalists, not only winners.
13. Collect feedback on accessibility, clarity, confidence, mentoring support and barriers to participation.
14. Document the full journey: applicants, selected projects, finalists, winners, jury, awards, mentoring process, gender/diversity information where available, and follow-up support.

Source deliverables and supporting evidence used for this case: D5.3 *Open call documents kit & third-party financing rules* and the project's wider scaling and replication framework.

The Activity Planning Template in **Annex 1.1**, Stakeholder Mapping Template in **Annex 1.2**, Co-Creation Design Canvas in **Annex 1.3**, Feedback Collection Form in **Annex 2** and activity documentation notes should be used to support implementation and reporting.

3.15 PLASTIC FANTASTIC webinars

Activity overview

The PLASTIC FANTASTIC Webinar Series is connected mainly to the Learning & Upscaling engagement category, while also supporting all three REMEDIIES pillars: Detection & Monitoring, Collection & Valorisation, and Prevention & Zero Waste. The series was developed to respond to a practical engagement need identified during the REMEDIIES Anti-Litter Campaigns and clean-up activities: volunteers, local organisations and community participants needed accessible information before going into the field, especially on how to recognise different types of plastic, understand recyclability, separate materials and connect clean-up action with citizen science and monitoring.

The PLASTIC FANTASTIC Webinar Series is a structured educational initiative under the REMEDIIES for Ocean programme, designed to support citizens, environmental practitioners and local stakeholders in understanding and addressing marine plastic pollution across the Mediterranean. The series combines scientific training, citizen science methodologies and real-world innovation demonstrations, with a strong emphasis on practical engagement during coastal clean-ups and environmental monitoring activities.

Developed as part of the REMEDIIES Anti-Litter Campaign, the webinars form a connected learning pathway that gradually builds knowledge on plastic identification, recycling systems, monitoring methodologies and technological solutions for marine litter detection and management. The Plastic Fantastic webinar series therefore emerged as a learning pathway to prepare citizens, volunteers, NGOs, educators, students, local authorities and environmental practitioners for more informed participation in beach clean-ups, monitoring activities and local anti-litter campaigns. It helped move engagement from general awareness to field readiness.

Each session was co-developed and delivered by a consortium of partners, including Impact Hub Athens for programme coordination, outreach and engagement, the University of Maribor for plastic science, recyclability and conscious consumption, Venice Lagoon Plastic Free for beach litter monitoring methodologies, and local Demo Site actors such as universities, municipalities, NGOs and environmental organisations. Across the series, innovation partners from the REMEDIIES ecosystem introduced applied technologies such as mobile apps, AI systems, river-cleaning technologies, underwater drones and microplastic filtration systems.

In parallel, the REMEDIIES Flag on the Different Types of Plastics was created as a simple visual tool to support this learning need. The flag presents the main plastic categories using the RIC numbering system and gives participants practical information on recyclability and behaviour in seawater. It includes PET, HDPE, PVC, LDPE, PP, PS and other plastics, with visual examples and short notes on whether the material mostly sinks or floats in seawater and whether its recyclability is high, medium or low. The flag was designed to be used during clean-ups, workshops, Plastic Labs and educational sessions, helping participants identify plastic types more easily in the field. Its scientific content was provided by the University of Maribor, with local partner space included so it could be adapted across Demo Sites.

From an inclusion and diversity perspective, the webinars are relevant because they operate as open learning spaces. Their accessibility depends on language, digital access, timing, clarity of scientific content, confidence in participating online, availability of recordings or follow-up resources, and the way technical information is communicated to non-expert audiences. The REMEDIIES gender dimension approach highlights the importance of inclusive language, accessibility, diversity awareness, user needs and capacity-building; these principles are directly relevant to the design of webinar content, visual learning tools, Q&A formats, field guidance and post-webinar resources. Snapshot of the activities can be seen in Figure 16.



Figure 16: *PLASTIC FANTASTIC* Webinar Series in REMEDIES, showing online and hybrid learning activities on plastic identification, beach litter monitoring, Demo Site updates and REMEDIES innovation presentations. (Source: REMEDIES archive)

What engagement channels and methods were used

Engagement happened through a connected sequence of educational webinars, visual field tools, local Demo Site examples, technology showcases and clean-up preparation. The webinars acted as pre-field learning sessions. They gave volunteers and local actors the knowledge needed to participate more effectively in clean-ups and monitoring activities, especially where participants were expected to identify plastics, separate materials, understand recyclability or support citizen science documentation.

Each webinar combined common REMEDIES learning content with local Demo Site relevance. The University of Maribor contributed scientific knowledge on plastic types, material properties, recyclability and conscious consumption. Venice Lagoon Plastic Free contributed beach litter monitoring methodologies and citizen science practice. Impact Hub Athens supported programme coordination, outreach and engagement. Local Demo Site partners grounded each session in the environmental realities of their territory, such as the Cyclades, Sardinia, Porquerolles, Durrës and Tirana, Saïdia and Koper. Innovation partners introduced applied technologies where relevant, including the Shoreline Marine Litter App, River Cleaning technology, Aerial Drone & AI Solution, underwater drone monitoring and microplastic filtration.

The 1st webinar in Greece was hosted by Impact Hub Athens under the REMEDIES Anti-Litter Campaign, in collaboration with Marine Conservation Greece and All For Blue, linking to national initiatives such as coastal clean-up programmes and the #20TonnesChallenge. The educational content was delivered by the University of Maribor on plastic types, recyclability and environmental impacts, complemented by Venice Lagoon Plastic Free introducing foundational beach litter monitoring methodologies. The Demo Site component focused on

Greek Cyclades coastal realities and citizen-led clean-up practices, and the session attracted citizens, NGOs, students and environmental volunteers engaged in coastal protection activities.

The 2nd webinar in Italy, Sardinia, was hosted by the National Research Council of Italy within the REMEDIIES Anti-Litter Campaign and supported by local Sardinian coastal stakeholders working on marine litter monitoring. The University of Maribor provided scientific training on plastic identification and material properties, while Venice Lagoon Plastic Free delivered structured guidance on beach litter monitoring protocols adapted to island ecosystems. The Sardinia Demo Site highlighted seasonal tourism-driven litter pressures and island coastal dynamics, and the webinar engaged environmental practitioners, NGOs, students and local stakeholders involved in coastal sustainability.

The 3rd webinar in France was hosted by SMILO under the REMEDIIES Anti-Litter Campaign with participation from island and coastal stakeholders engaged in small-island environmental management. The University of Maribor focused on plastic classification and environmental persistence, while Venice Lagoon Plastic Free worked on harmonising monitoring methodologies for cross-country comparability. The Demo Site reflected SMILO-supported island contexts and coastal monitoring systems, with emphasis on methodological standardisation, and the audience included NGOs, environmental managers, researchers and local authorities working on island sustainability.

The 4th webinar in Albania was hosted by Environmental & Territorial Management Institute together with Milieukontakt Albania under the REMEDIIES Anti-Litter Campaign within the Albanian Demo Site framework addressing coastal and riverine pollution. The University of Maribor and Venice Lagoon Plastic Free delivered training on plastic identification and citizen science monitoring adapted to local contexts. The Demo Site presented Albanian coastal and river system activities and introduced the River Cleaning technology as a floating barrier technology for riverine plastic interception before marine entry. The session engaged NGOs, local authorities, students and environmental practitioners working on pollution prevention.

The 5th webinar in Morocco was hosted by Mohammed Premier University and Ecoloplatform du Maroc du Nord under the REMEDIIES Anti-Litter Campaign within the Saïdia Demo Site. Venice Lagoon Plastic Free led training on structured beach litter monitoring methodologies, while the University of Maribor provided scientific framing on plastic identification and environmental impacts. The Demo Site presented operational monitoring activities and introduced the Shoreline Marine Litter App developed by Infordata and VITO for structured citizen science data collection and real-time reporting aligned with European standards. The session attracted citizens, NGOs, students and environmental stakeholders involved in coastal monitoring.

The 6th webinar in Morocco was again hosted by Mohammed Premier University within the Saïdia Demo Site under the REMEDIIES Anti-Litter Campaign. The University of Maribor delivered advanced training on plastic identification, recyclability and consumption patterns, while Venice Lagoon Plastic Free supported methodological continuity across the series. The Demo Site showcased scaled monitoring activities and introduced an AI-powered drone-based coastal monitoring system developed by Mohammed Premier University for aerial detection, mapping and classification of marine litter hotspots using AI analysis. The webinar engaged researchers, innovation actors, NGOs, students and coastal management stakeholders focused on environmental monitoring and digital solutions.

The 7th webinar in Slovenia was hosted as a live seminar by the University of Maribor under the REMEDIIES Anti-Litter Campaign within the Koper Demo Site framework, with the support of You(r)Sea Institute, ZRS Koper, Marina Izola, CLERA, INFOR and the NIC. The session combined training on plastic identification and marine litter science with the presentation of pilot activities at Marina Izola, showing how monitoring and prevention approaches are applied in a real coastal and marina context. The Demo Site introduced innovative REMEDIIES technologies, including an underwater drone monitoring system used to map the seafloor and identify large plastic items, as well as a microplastic filtration system for wastewater generated through boat

maintenance activities, designed to prevent microplastics from entering the marine environment. The session engaged local authorities, marina operators, researchers, NGOs, citizens and other stakeholders working on marine litter prevention, coastal management and evidence-based environmental action.

The REMEDIES flag supported this engagement by translating technical information into a visual, field-friendly format. It could be used during briefings before a clean-up, as part of Plastic Fantastic webinars, in Plastic Labs, in school activities and during public events. By showing examples of common plastic items and linking them to RIC categories, recyclability and floating or sinking behaviour, the flag helped participants understand why separating and identifying plastics matters. It also made the training more practical: participants could connect what they learned online with what they would later see on the beach, by the river or in a workshop.

The inclusion dimension should be considered throughout the webinar pathway. This means using accessible language, clear visual material, recordings or follow-up resources where possible, and examples that are understandable to non-experts. Because the series includes technical topics such as plastic chemistry, citizen science protocols, mobile apps, AI-based drone monitoring, river interception systems and microplastic filtration, facilitators should avoid assuming prior knowledge. The webinars should help participants build confidence to ask questions, understand core concepts and connect the knowledge to practical field action.

What was co-created, tested, adapted or validated

The co-creation element in the Plastic Fantastic webinars lies in the adaptation of educational content to real field needs. The series was not designed as a generic awareness campaign. It was created because volunteers and local actors needed practical preparation before participating in clean-ups and monitoring activities. This need shaped the content: plastic identification, recyclability, beach litter monitoring, citizen science tools, app-based documentation and local technologies. The webinars therefore tested how REMEDIES scientific and technical knowledge could be translated into formats that non-expert participants could understand and use.

The REMEDIES plastic identification flag is also a co-created educational output. It responds to the feedback and practical need for a simple tool that can support volunteers, schools and local partners in identifying plastics during field activities. Its value lies in its portability and accessibility. It can be displayed at a clean-up meeting point, used during a school or Plastic Lab session, included in a webinar, or adapted with local partner details. In this way, the flag connects the knowledge-transfer function of the webinars with the hands-on reality of clean-ups and workshops.

The webinar series also validated a replicable educational model. Each edition kept a common REMEDIES structure while adapting content to local Demo Site conditions. Greece focused on Cyclades clean-up practices and volunteer engagement. Sardinia focused on island litter pressures and monitoring. France focused on small-island methodologies and standardisation. Albania connected plastic identification with riverine pollution and the River Cleaning system. Morocco connected beach monitoring with the Shoreline Marine Litter App and Aerial Drone & AI technology. Slovenia connected marine litter science with underwater drone monitoring and microplastic filtration in a marina context.

From an inclusion and diversity perspective, the co-creation process should also examine who is able to access learning opportunities. Webinars can reach geographically dispersed participants, but they may also exclude people with limited digital access, limited English or technical vocabulary, low confidence in online participation, caring responsibilities, or limited familiarity with scientific and monitoring language. Future editions should therefore document participant profiles where possible, review barriers to participation, and adapt communication, facilitation and feedback formats so that diverse participants can contribute meaningfully.

What was learned

The main lesson is that citizen engagement becomes stronger when learning happens before action. Clean-up volunteers are more effective when they understand what they are collecting, why plastic types matter, how recyclability differs, and how field observations can support citizen science and monitoring. The Plastic Fantastic webinar series addressed this need by providing practical training before field activities, while the plastic identification flag gave participants a visual reference that could be used during implementation.

A second lesson is that repeated educational formats create consistency across Demo Sites while still allowing local adaptation. The Plastic Fantastic format provided a common REMEDIIES learning identity, but each edition was tailored to local realities. This makes the format useful for replication because partners can keep the same basic learning pathway while adapting local examples, technologies, speakers and target groups.

A third lesson is that technical content becomes more accessible when it is connected to concrete action. Plastic chemistry, recyclability, beach litter monitoring protocols, app-based reporting, AI-supported drone monitoring and microplastic filtration can all be difficult topics for non-specialists. The webinars made these topics more practical by linking them to clean-ups, Demo Site activities, technology demonstrations and citizen science actions.

A further lesson is that inclusive learning requires more than making resources publicly available. Participants need materials that are understandable, practical and confidence-building. Future Plastic Fantastic webinars should therefore collect feedback on clarity, accessibility, confidence, usefulness of resources, language needs, digital access and barriers to participation, alongside standard participation numbers and outputs.

The main improvement needed is more systematic tracking of participant learning and follow-up. Future webinars should document participant numbers, participant profiles where appropriate, feedback, knowledge gained, resources used in the field, follow-up actions and whether participants later joined clean-ups, monitoring activities, Plastic Labs, campaigns or other REMEDIIES engagement formats.

Guideline for replication

Plastic Fantastic-type webinar activities should be designed around a clear field learning need. If participants are expected to join a clean-up, the session should prepare them to recognise plastic types, separate materials, understand recyclability, follow safety rules and document results. If participants are expected to join monitoring activities, the session should introduce the relevant protocol, tools and data pathway. If participants are expected to understand a technology, the session should explain what the technology does, why it matters, what its limits are and how it connects to local action.

The minimum replication sequence should include:

1. Identify the practical knowledge gap before the field activity or campaign.
2. Define the target audience, such as volunteers, students, NGOs, municipalities, educators, environmental practitioners, local authorities or innovation actors.
3. Prepare accessible content on plastic types, recyclability, monitoring methods and local pollution challenges.
4. Use inclusive language, clear visuals and non-technical explanations where possible.
5. Consider barriers to participation, including language, digital access, timing, technical confidence, caring responsibilities or lack of previous experience with scientific content.
6. Use visual tools such as the REMEDIIES Flag on the Different Types of Plastics to support field understanding.

7. Connect the session to a concrete next step, such as a clean-up, monitoring campaign, Plastic Lab, technology demonstration or local anti-litter campaign.
8. Involve both scientific partners and local Demo Site actors.
9. Include local examples and technologies where relevant.
10. Allow space for questions and interaction, especially for non-expert participants.
11. Collect participant feedback and learning insights, including feedback on accessibility, clarity and confidence.
12. Share recordings, slides, flags or practical resources after the activity.
13. Document how the webinar supported later field action, citizen science, clean-ups, monitoring or local engagement.

Source deliverables and supporting evidence used for this case: D2.4 *Clean-up and valorisation guideline*, especially the clean-up training and knowledge exchange material; D1.1 and D1.2 where webinars addressed beach litter monitoring, citizen science protocols, app-based reporting and technology-supported monitoring.

The Activity Planning Template in **Annex 1.1**, the Feedback Collection Form in **Annex 2**, activity documentation notes, and the Workshop and Plastic Lab Checklist in **Annex 4.7** should be used to support implementation.

3.16 REMEDIIES open calls for regional and local public authorities in associated regions

Activity overview

The REMEDIIES Open Calls for regional and local public authorities in associated regions are connected to the Learning & Upscaling category because they show how REMEDIIES methods, tools and objectives can be adapted beyond the initially defined Demo Sites and lighthouse. The selected projects activities from the REMEDIIES open calls also contribute directly to the three REMEDIIES pillars: Detection & Monitoring, Collection & Valorisation, and Prevention & Zero Waste, with each one of the Open Calls focusing on projects that address these two topics. Through the Open Calls local and regional authorities have engaged stakeholders of all kinds, namely public organisations, NGOs, science centres, municipal services and community actors, leading the plan to locally adapt in a more bottom-up way to tackle plastic pollution in different Mediterranean and European territories. Five different Associated Regions were onboarded into REMEDIIES mission and supported the project goals, mainly by demonstrating potential innovative solutions to address local needs.

These cases are important for D6.5 because it shows co-creation at replication level. The cases in Associated Regions did not simply copy REMEDIIES actions. They adapted the project's logic to their own local needs, governance conditions, communities, infrastructure and cultural contexts. The cases include CLEANUP4Guimarães in Portugal, Island Guardians in Malta, No More Plastic in Kerkennah in Tunisia, Unite for Plastic-Free Mersin Coasts in Türkiye, and MARICES in Montenegro. Together, they show how citizen engagement can be translated into several complementary methods: clean-ups and monitoring, education and youth engagement, public infrastructure, fisher engagement, plastic-free market practices, local craftsmanship, recycling and valorisation, art-based awareness, and policy dialogue. It's widespread and different focuses have proven that it is possible and desirable to address the problem in different ways, as the regions and its stakeholders will have different views, needs, cultures and expectations.

Therefore, across the Associated Regions, the main value was not only the number of activities implemented, but the way local actors adapted REMEDIES objectives into practical territorial solutions. Municipalities supported public infrastructure and continuity. NGOs and local associations supported mobilisation and trust. Schools and science centres created learning pathways. Fishers, merchants, artisans, divers and volunteers contributed practical knowledge and participation. Recycling companies, waste operators and public authorities helped connect local action with material management and governance.

From an inclusion and diversity perspective, the Open Call for regional and local public authorities in associated regions show how REMEDIES innovations, practices and methods can be moulded to different communities, social structures and local participation needs. The activities implemented were very inclusive, children, young adults and seniors, volunteers, involved schools, as well as merchants, fishers, artisans, divers women and youth groups, municipal actors, science centres, NGOs and public authorities. These actions were an important step inclusive practice, especially where activities combine education, public infrastructure, local craftsmanship, merchant commitments, fisher engagement and community mobilisation. These actions combined the good practices with innovation and boosted the existing measures by reinforcing them with REMEDIES support and the implementation of the several actions of the plan proposed by the Associated Regions that benefited from financial support, as well as capacity building and mentoring, for a sustainable impact. Snapshot of the activities can be seen in Figure 17.



Figure 17: REMEDIES Open Call promoted Associated Region activities showing local replication through community workshops, circular design outputs, recycled material prototypes and public engagement. (Source: REMEDIES archive)

What engagement channels and methods were used

Engagement happened through different but inter-connected methods. The first method was **clean-up action combined with documentation and public learning**. In Guimarães, Portugal, CLEANUP4Guimarães organised river clean-up campaigns linked to the Selho River and identified six plastic accumulation hotspots. One clean-up with scouts collected more than 233 kg of waste, while another mobilised 28 volunteers, mostly from the Green Brigades and the Portuguese Red Cross. In Malta, Island Guardians organised clean-ups with Żibel, including a Bugibba Bay action where 69 volunteers collected 78 kg of plastic and 573.5 kg of other waste, and a seabed and shore clean-up at South Quay Ċirkewwa and Paradise Bay where 47 volunteer divers and snorkelers removed 919 kg of mixed waste, including 173 kg of plastic. In Mersin, Türkiye, six coastal clean-ups mobilised 182 volunteers from 11 institutions. These examples show how clean-ups were used not only to remove litter, but also to create public visibility, local ownership and evidence of the scale of plastic pollution.

The second method was **education and youth engagement**. Island Guardians developed a website, a clean-up and resource repository, two educational packs for children and teenagers, five videos with local heroes and four storybooks for young children. It also organised an Open Day at Explora, engaging students through storytelling, interactive stands and educational resources. In Mersin, the MERCAN Climate and Environmental Science Centre trained 1,318 young people aged 6 to 18 from 35 schools on waste separation, recycling, composting and zero-waste practices. In Kerkennah, school-based action was linked to plastic-free drinking water through filtration units, reusable steel bottles and awareness activities. Education was therefore not treated as a separate communication activity, but as a method for building long-term behavioural change.

The third method was **public infrastructure for plastic reduction and behaviour change**. Mersin installed six custom-designed plastic collection bins, six public drinking water fountains, a photovoltaic Smart Waste Vending Machine, an electric waste collection vehicle and a Caretta caretta-themed plastic bottle collection cage. Kerkennah installed two Kumulus atmospheric water generators in public spaces, distributed 1,000 reusable steel bottles and supported filtration units in schools. Guimarães installed two eco-barriers made mainly of cork in the Selho River. MARICES installed five dedicated fishing-net disposal stations in locations selected with input from fishers and local stakeholders. These examples show that infrastructure can support engagement when it is visible, locally relevant and accompanied by communication, training or stakeholder consultation.

The fourth method was **fisher engagement and fishing-net management**. MARICES in Ulcinj, Montenegro focused on the proper management and recycling of waste fishing nets. The project organised three workshops that trained at least 45 representatives from the fishing sector and other relevant groups, selected five net disposal station locations through assessment and stakeholder feedback, and involved local fishers in validating the locations. It also engaged the local recycling company Maniplast to explore whether collected net materials could be processed. This method is particularly relevant for REMEDIIES because it shows how engagement with professional sea users can move from awareness to practical infrastructure and possible valorisation.

The fifth method was **plastic-free market practices and local commitments**. In Kerkennah, the project mobilised 50 vendors and secured commitment charters from 35 merchants to stop using single-use plastic bags once alternatives were available. It also ordered 570,000 kraft paper bags and distributed the first 100,000 as part of the transition towards plastic-free shopping. This method shows how engagement can target everyday consumption systems, not only environmental volunteering. Merchants became actors in prevention, while public alternatives made behaviour change more feasible.

The sixth method was **local craftsmanship and nature-based alternatives**. Kerkennah organised palm-weaving workshops with 35 participants, mostly women and youth, to produce reusable bags and baskets from palm leaves. This method connected plastic prevention with local skills, cultural heritage and potential income generation. Instead of importing a ready-made solution, the project used local materials and knowledge to create alternatives to plastic bags and storage items. This approach is strongly aligned with the REMEDIIES logic of regenerative local value chains.

The seventh method was **valorisation, art and circular education**. Guimarães connected collected plastics with an art installation, recycling kits for seven Green Brigades and furniture for environmental education. Malta used recovered plastic waste for the recycled art installation “Bebbux”, exhibited at Esplora. These activities extended the life of clean-up actions by turning waste into a public learning object. They also helped participants and visitors understand that plastic pollution is not only an environmental problem, but also a material, educational and cultural issue that can trigger reflection and behaviour change.

The eighth method was **policy dialogue and governance learning**. MARICES reviewed the legal context for discarded fishing nets in Montenegro and found no specific regulation on the issue. The project discussed recommendations with the relevant ministry and expressed willingness to contribute to a bylaw working group. This shows how local implementation can generate governance learning. Associated Regions are not only demonstration sites for activities; they can also reveal gaps in regulation, responsibility, financing and long-term management.

The inclusion dimension is particularly visible in the diversity of methods used across the Associated Regions. Education activities reached children and teenagers; clean-ups mobilised volunteers and divers; infrastructure targeted everyday public use; merchant commitments addressed local consumption practices; fisher workshops engaged professional sea users; and palm-weaving workshops created a pathway for women and youth to participate through local craft and cultural knowledge. This confirms that replication can become more inclusive when it offers several types of participation instead of relying on one standard activity format.

What was co-created, tested, adapted or validated

The main co-creation element across the Associated Regions was local adaptation. Each region translated REMEDIIES objectives into methods that matched its own context. In Guimarães, the method combined river clean-ups, cork eco-barriers, art, recycling kits and environmental education. In Malta, a science centre model connected clean-ups, divers, storytelling, education and public exhibition. In Kerkennah, prevention was adapted through drinking-water alternatives, merchant commitments and palm-weaving workshops. In Mersin, municipal infrastructure, school education and public recycling tools were combined with coastal volunteer action. In MARICES, fisher workshops, disposal stations, recycling exploration and policy dialogue were integrated into one fishing-net management pathway.

These cases show that replication is not the mechanical transfer of a method. It is a co-creation process in which the receiving territory identifies its own actors, barriers, resources and opportunities. The same REMEDIIES logic can produce different local solutions: a cork eco-barrier in Portugal, a science education programme in Malta, palm-leaf baskets and merchant charters in Tunisia, smart recycling infrastructure in Türkiye, or fishing-net disposal stations in Montenegro.

The Associated Regions also tested how measurable outputs can support engagement reporting. Across the cases, partners recorded participant numbers, waste collected, infrastructure installed, students trained, merchants mobilised, commitments signed, videos and educational resources produced, stations installed,

and policy recommendations developed. This makes the Open Call cases useful not only as communication stories, but as practical examples of how local engagement can produce evidence and replication learning.

From an inclusion and diversity perspective, the Associated Regions also demonstrate that co-creation should be assessed by asking whose local knowledge shaped the adaptation. In Kerkennah, the involvement of women and youth in palm-weaving linked plastic prevention with cultural knowledge and possible local livelihood pathways. In Mersin, the focus on children and schools supported long-term behavioural change. In MARICES, fisher input shaped practical infrastructure. In Malta, divers, schoolchildren and science-centre audiences were involved through different formats. These examples show that inclusive replication is stronger when different community groups are invited to contribute through roles that match their knowledge, availability and capacities.

What was learned

The main lesson is that Associated Region activities work best when they combine more than one engagement method. Clean-ups become stronger when they are connected to education, art, monitoring or valorisation. Infrastructure becomes more useful when communities understand how and why to use it. Fisher engagement becomes more effective when it leads to disposal stations or recycling pathways. Plastic-free commitments become more realistic when alternatives are available. Local craftsmanship becomes more impactful when connected to prevention and community empowerment.

A second lesson is that local ownership is essential for replication. Associated Regions were strongest when the activity was grounded in a clear local problem and supported by actors who could mobilise the community. Municipalities helped secure public infrastructure and continuity. NGOs and local associations helped build trust. Schools and science centres created learning pathways. Fishers, merchants, artisans and divers brought practical knowledge. Recycling companies and waste operators helped connect action with material pathways.

A third lesson is that infrastructure alone is not enough. Bins, fountains, vending machines, eco-barriers, filtration units and disposal stations require communication, maintenance, clear responsibilities and user engagement. The same applies to educational tools and art installations: they need to be embedded in a wider engagement strategy if they are to produce lasting behaviour change.

The cases also reveal recurring challenges. These include administrative delays, procurement and import procedures, limited initial stakeholder trust, volunteer availability, vandalism or misuse of public infrastructure, technical approval processes, and the need for earlier exchange between beneficiaries. These challenges are important because they show that replication requires realistic timelines, local authority coordination, maintenance planning, stakeholder trust-building and flexible implementation.

A further lesson is that inclusion is easier to achieve when replication is locally designed rather than copied. Each Associated Region adapted REMEDIES to its own social and cultural context, which allowed different groups to become involved: children through schools, fishers through disposal infrastructure, merchants through plastic-free commitments, women and youth through craft-based alternatives, divers through underwater clean-ups, and municipalities through public infrastructure. Future replication should therefore document not only what was implemented, but also who was reached, who contributed, who benefited and which groups may still have been excluded.

Guideline for replication

Associated Region activities should be replicated through local adaptation and method combination, not standardised duplication. Each new territory should begin by identifying the local plastic pollution problem, the actors who can influence it, the available infrastructure, the behavioural change needed, and the partners required for implementation. The activity should then combine the methods most relevant to the local context, such as clean-up action, education, public infrastructure, fisher engagement, plastic-free market commitments, local craftsmanship, valorisation, art or policy dialogue.

The minimum replication sequence should include:

1. Identify the local plastic pollution challenge and its main sources.
2. Map the stakeholders who can influence the problem, including citizens, schools, municipalities, fishers, merchants, NGOs, artisans, divers, waste operators or businesses.
3. Identify which groups may be underrepresented or harder to reach, including women, youth, informal workers, small producers, people with disabilities, older people, migrant groups, less organised fishers or remote communities, depending on the local context.
4. Select the relevant engagement methods, rather than copying a single activity.
5. Co-design the activity with local actors before implementation.
6. Define measurable outputs, such as participants, waste collected, infrastructure installed, vendors mobilised, students trained, commitments signed, materials reused or recommendations produced.
7. Prepare communication and visibility actions that explain the local purpose in accessible and inclusive language.
8. Pair infrastructure with education, guidance and maintenance planning.
9. Collect feedback from participants, organisers and users of the infrastructure or tools.
10. Document barriers, delays and adaptations.
11. Document whether the activity reached diverse groups and whether additional inclusion measures are needed.
12. Identify how the activity can continue after the initial implementation period.
13. Share the model with other Demo Sites or Associated Regions.

Source deliverables and supporting evidence used for this case: Open Call Associated Region final reports, including Up-FreeCoasts Mersin, MARICES Montenegro, Island Guardians Malta, No More Plastic in Kerkennah and CLEANUP4Guimarães; D2.4 *Clean-up and valorisation guideline*; D3.4 *Benefits of zero-waste micro-supply chains*; relevant Open Call reporting and replication material.

The Activity Planning Template in **Annex 1.1**, the Stakeholder Mapping Template in **Annex 1.2**, the Feedback Collection Form in **Annex 2**, activity documentation notes and the Open Call Updates should be used to support replication.

3.17 Policy Workshops

Activity overview

The REMEDIES Policy Workshops are connected mainly to the Learning & Upscaling category. They complement the citizen engagement and field activities by translating project evidence, local experience, stakeholder knowledge and implementation challenges into policy learning. While clean-ups, Plastic Labs, monitoring activities and Open Call actions focus on direct participation and local implementation, the policy workshops create structured spaces where researchers, public authorities, civil society organisations,

entrepreneurs, innovators, EU Mission projects, local stakeholders and policy actors can discuss what needs to change at governance, funding, regulatory and implementation level.

By June 2026, REMEDIIES had implemented five Policy Alignment Workshops, reaching a total of 200 participants. These workshops were designed to link REMEDIIES Demo Sites and active replicators with other relevant EU Mission, Green Deal, Horizon and related initiatives, exchange lessons learned, and produce recommendations for future use. The five workshops were implemented as follows: the 1st Policy Workshop in Athens on 23 November 2023, organised by Impact Hub Athens, with 28 participants; the 2nd Policy Workshop in Athens on 22 January 2025, organised by NTUA, with 76 participants and focused on remedial measures to address marine pollution and European Directive (EU) 2024/3019 on urban wastewater in Greece; the 3rd Policy Workshop in Brussels on 6 March 2026, organised by VITO, with 26 participants and focused on measuring plastic pollution to drive real-world solutions; the 4th Policy Workshop online on 8 April 2026, organised by SMILO, with 40 participants and focused on local value chains as alternatives to plastic; and the 5th Policy Workshop in Athens and online on 5 June 2026, organised by Impact Hub Athens, with 30 participants and focused on scaling local action, participatory governance and policy uptake.

Within D6.5, the policy workshops are treated as co-creation spaces because they did not only disseminate project information. They used facilitated discussion, thematic roundtables, stakeholder exchange and recommendation-building to generate shared conclusions and policy-oriented outputs. They are therefore relevant to citizen engagement because they show how lessons from local action, citizen science, monitoring, prevention and circular economy can be translated into wider systemic change.

The policy workshop series covered several complementary themes. The 1st Policy Workshop in Athens, held in November 2023, focused on research and social entrepreneurship, asking how European programme interventions and financial tools can be adopted sustainably by local communities, how research outcomes can be translated into local environmental and social businesses, and how citizen science and public awareness can promote sustainability-oriented enterprises. The 2nd Policy Workshop in Athens, held in January 2025, focused on remedial measures to address marine pollution from microplastics and chemical pollutants in the context of the implementation of the new European Directive 2024/3019 on urban wastewater in Greece. The 3rd Policy Workshop in Brussels, held on 6 March 2026, focused on measuring plastic pollution to drive real-world solutions, connecting monitoring, indicators and policy implementation. The 4th Policy Workshop, held online on 8 April 2026 and organised by SMILO with MedWaves and Beyond Plastic Med, focused on local value chains as alternatives to plastic. The 5th Policy Workshop in Athens, held on 6 May 2026, focused on moving from local action to systemic change, with particular attention to scalability, participatory governance, citizen science, finance and decision-making.

From an inclusion and diversity perspective, policy workshops are critical because they shape which lessons are translated into recommendations and whose experience is recognised as policy-relevant. If policy dialogue is limited to technical or institutional actors, it may miss barriers experienced by citizens, local communities, women, youth, fishers, small producers, people with disabilities, informal actors or other groups affected by plastic pollution and environmental transition. Policy workshops should therefore consider participant diversity, inclusive facilitation, accessible language and the representation of different types of knowledge. Snapshot of the activities can be seen in Figure 18.



Figure 18: REMEDIIES Policy Workshops as co-creation spaces, showing stakeholder dialogue, expert presentations, roundtable discussions and collaborative reflection on policy recommendations for ocean restoration and marine litter prevention. (Source: REMEDIIES archive)

What engagement channels and methods were used

Engagement happened through structured policy dialogue rather than open public participation. The workshops brought together actors with different roles in the marine litter ecosystem: researchers producing data and methodologies, public authorities responsible for implementation and governance, civil society organisations working with communities, entrepreneurs and innovators developing solutions, local stakeholders affected by plastic pollution, and EU Mission projects working on related objectives. This mix was important because marine litter reduction cannot be solved only by scientific evidence, citizen action or technology. It requires coordination between data, policy, funding, local capacity and implementation pathways.

The 1st Policy Workshop facilitated co-creation in small groups. Participants discussed opportunities, challenges, do's and don'ts, then clustered and prioritised ideas before developing a roadmap around actors, resources and actions. This format helped move the discussion from general reflections to more operational recommendations. One of its key messages was that local actors should be involved from the needs assessment and proposal design stage, not only during implementation. This is directly relevant to the D6.5 engagement methodology, because it confirms that meaningful participation must start early.

The 2nd Policy Workshop took place in Athens on 22 January 2025 and was organised by the National Technical University of Athens. It focused on remedial measures to address marine pollution, with specific reference to European Directive (EU) 2024/3019 on urban wastewater in Greece. The workshop engaged 76 participants, including environmental and water-related NGOs, municipalities and regions, local

entrepreneurs, scientific and educational institutions, EU-related projects, waste and water management utilities, ministry representatives and policy advisors. This workshop strengthened the connection between REMEDIIES pollution-prevention work, water governance, regulatory developments and implementation needs in Greece.

The 3rd Policy Workshop in Brussels used presentations, a policy roundtable, breakout discussions and a reporting session. The workshop focused on how plastic pollution monitoring can be translated into policy indicators, measurable targets and implementation mechanisms. It connected REMEDIIES with other projects and frameworks, including INSPIRE, UPSTREAM, PHAROS and European policy instruments such as the Marine Strategy Framework Directive, Water Framework Directive, Zero Pollution Action Plan and EU Plastics Strategy. The engagement method here was science-policy exchange: participants explored what kind of monitoring data are useful for policy, how to harmonise protocols, how to distinguish research monitoring from regulatory monitoring, and how to connect data with action.

The 4th Policy Workshop used a thematic webinar and discussion format to explore local value chains as alternatives to plastic. It brought together regulatory framing, technical and entrepreneurial examples, and practical discussion on local resources, traditional skills, residues and circular alternatives. The workshop connected Mediterranean policy frameworks with concrete solutions such as seaweed-based capsules, reusable systems, atmospheric water generation, rye and wheat-stem straws, palm-branch objects and other local alternatives. The engagement method was policy-to-practice translation: participants discussed how regulatory pressure to reduce single-use plastics can be connected to local production, artisanship, small enterprises, procurement and island resilience.

The 5th Policy Workshop in Athens used a two-roundtable format. One group focused on scalability from local pilots to cross-regional implementation, while the other focused on participatory governance, from participation to decision-making and policy adaptation. The workshop brought together REMEDIIES, NURISH, TASC-RestoreMed and other actors to discuss why local pilots often fail to scale, how community-based initiatives can influence governance, and how citizen science can become recognised as evidence. This workshop is particularly relevant for D6.5 because it directly addressed the transition from engagement to systemic change.

An inclusion lens is important in policy workshop design because participation in policy dialogue is often shaped by professional status, language, confidence, availability, institutional networks and familiarity with policy terminology. Facilitated formats such as small groups, roundtables and recommendation-building sessions can reduce some of these barriers by giving different participants clearer roles and more opportunities to contribute. Future policy workshops should also consider whether local community voices, frontline practitioners, youth, women, social economy actors, small businesses or less formally represented groups are present, or whether their perspectives are indirectly represented through evidence from field activities.

What was co-created, tested, adapted or validated

The co-creation element of the policy workshops lies in the production of shared recommendations. Participants were not only asked to listen to presentations. They were invited to interpret evidence, identify barriers, propose enabling conditions and formulate practical recommendations. The workshops therefore tested how REMEDIIES knowledge can be processed collectively by different actors and translated into guidance for future implementation.

Several co-created recommendations are directly relevant to D6.5. The 1st Policy Workshop validated the need to involve local organisations and communities from the design phase of interventions. It also

highlighted the importance of reducing the discontinuity between European-funded projects and local implementation, so that research results can be translated into long-term community benefit. The 3rd Policy Workshop validated the need for harmonised monitoring protocols, minimum common parameters, transparent reporting, demo sites as testbeds, and better links between monitoring data, indicators and policy targets. The 4th Policy Workshop validated the need to support local value chains, small producers, artisans, cooperatives, reuse systems and procurement pathways for alternatives to single-use plastics. The 5th Policy Workshop validated the need for scalability protocols, multi-stakeholder governance platforms, open data dashboards, trusted local intermediaries and feedback loops.

These outputs are co-created because they emerge from interaction between different knowledge holders. Researchers contribute evidence and methods. Local actors contribute practical implementation experience. Public authorities identify governance constraints. Entrepreneurs and innovators bring market and scaling perspectives. Civil society organisations bring community trust and participation knowledge. The resulting recommendations are therefore broader than what any single actor could produce alone.

From an inclusion and diversity perspective, policy co-creation should also test whether recommendations reflect the needs of different stakeholders and not only institutional or technical priorities. For example, recommendations on monitoring should consider whether citizen-generated data systems are accessible and trusted. Recommendations on local value chains should consider whether small producers, women, youth or community actors can participate. Recommendations on scaling should consider whether funding, procurement or governance mechanisms are accessible to smaller and less formal organisations. This helps ensure that policy outputs support inclusive implementation rather than only technical efficiency.

What was learned

The main lesson is that engagement needs a policy pathway. Citizen science, clean-ups, monitoring, Plastic Labs and local prevention actions generate valuable experience, but their long-term impact depends on whether this experience informs governance, funding, procurement, regulation and replication. The policy workshops helped create this bridge by turning local and technical learning into recommendations for systemic change.

A second lesson is that participation should not remain symbolic or late-stage. The 5th Policy Workshop highlighted that communities are often involved too late, after problems and solutions have already been defined. This creates mistrust and limits ownership. For REMEDIES, this reinforces the need to involve citizens and local stakeholders from the problem-framing stage, especially in activities that affect local environments, livelihoods or public infrastructure.

A third lesson is that citizen science requires recognition and quality pathways. Monitoring data generated with citizen participation can support policy only if protocols, quality assurance, data systems and reporting pathways are clear. The 3rd and 5th Policy Workshops both point to this need. Citizen science should not be treated only as engagement; it should be connected to evidence systems, dashboards, indicators and decision-making processes where appropriate.

A fourth lesson is that scaling requires more than a successful pilot. Local activities often fail to scale because of gaps in finance, procurement, governance, maintenance, market access or institutional ownership. The 5th Policy Workshop therefore proposed the idea of a scalability protocol linking local problems with data, social engagement, open innovation, finance, procurement and policy. This is relevant for all REMEDIES engagement activities that aim to be replicated beyond their original site.

A fifth lesson is that inclusive policy learning requires deliberate attention to power and representation. Stakeholders do not enter policy discussions with the same authority, vocabulary or access to decision-

making. Facilitators should therefore create conditions where practical experience, local knowledge, community needs and lived implementation barriers are treated as valid evidence alongside scientific and policy expertise. Future policy workshop reports should document recommendations as well as the process, including how inclusion and diversity related considerations were reflected in the discussion.

A further lesson is that policy engagement becomes stronger when it is repeated across the project lifecycle rather than concentrated in one final event. The five REMEDIES Policy Alignment Workshops created a cumulative policy-learning pathway, moving from early exchange with Mission-related projects, to regulatory discussion on wastewater and marine pollution, to monitoring and plastic pollution measurement, to local value chains, and finally to scaling, participatory governance and policy uptake. This sequence helped connect technical evidence, local implementation and policy recommendations over time.

Guideline for replication

Policy workshops should be designed as structured co-creation processes, not only dissemination events. Partners should define the policy question clearly, invite a balanced mix of actors, prepare evidence from project activities, use facilitated discussion formats, and produce concrete outputs that can inform future implementation. The workshop should connect field experience with systemic questions: what prevents uptake, what support is needed, who needs to act, what evidence is missing, and how can local action influence policy or funding mechanisms?

The minimum replication sequence should include:

1. Define the policy or governance question to be addressed.
2. Select participants from research, public authorities, civil society, local communities, innovators, entrepreneurs and relevant EU or regional projects.
3. Review whether the participant mix includes diverse perspectives, including community actors, smaller organisations, youth, women, social economy actors, local practitioners or groups affected by the policy question where relevant.
4. Prepare short evidence inputs from field activities, Demo Sites, Associated Regions or technical deliverables.
5. Use accessible language and avoid overly technical or institutional framing where possible.
6. Use facilitated formats such as roundtables, small groups, problem-framing exercises or recommendation-building sessions.
7. Ask participants to identify barriers, enabling conditions, responsibilities and practical next steps.
8. Translate the discussion into clear recommendations.
9. Check whether recommendations reflect inclusion, accessibility, gender/diversity considerations and the needs of different stakeholder groups.
10. Validate the recommendations with participants where possible.
11. Connect the outputs to communication, reporting, policy briefs, replication plans or future project design.
12. Document who participated, what was discussed, what was recommended and how the recommendations will be used.
13. Follow up with participants to maintain the policy-learning loop.
14. Document the cumulative policy pathway across workshops, including number of workshops, participant numbers, stakeholder categories, themes addressed, recommendations produced and links with other EU Mission or related projects.

Source deliverables and supporting evidence used for this case: Policy Workshop documentation and participation records; policy recommendation material; D3.4 *Benefits of zero-waste micro-supply chains* for

the workshop on local value chains as alternatives to plastic; D1.1, D1.2, D2.4 and D3.3 where relevant to workshop themes on monitoring, citizen science, clean-ups, zero-waste solutions and implementation pathways.

The Activity Planning Template in **Annex 1.1**, Stakeholder Mapping Template in **Annex 1.2**, Feedback Collection Form in **Annex 2** and activity documentation notes should be used to support this process.

4. Cumulative impact of REMEDIIES citizen engagement and co-creation

Across the 17 case studies presented in Section 3, REMEDIIES demonstrates a cumulative engagement impact that goes beyond isolated events or one-off communication activities. The cases show how citizen engagement, citizen science, co-creation, local demonstration, innovation support and policy dialogue were combined across the three project pillars: Detection & Monitoring, Collection & Valorisation, and Prevention & Zero Waste. Together, these activities created a multi-level engagement ecosystem involving citizens, volunteers, schools, students, fishers, divers, researchers, municipalities, NGOs, local businesses, innovators, entrepreneurs, public authorities, Associated Regions and policy actors.

The most visible environmental impact is connected to clean-ups and field-based litter removal. Between 8 March 2023 and 26 June 2026, REMEDIIES clean-up actions mobilised **5,487 participants across 187 reported clean-ups**, collecting **8,864.49 kg of plastic litter** and **14,937.38 kg of other litter, representing a total of 23,8 tons of marine litter** (for recent number see the [REMEDIIES dashboard](#)). In total, these actions removed approximately **23.8 tonnes of litter** from beaches, rivers, coastlines, seabeds and related environments. These figures show that clean-ups functioned not only as awareness activities, but also as structured environmental interventions that generated measurable removal, monitoring and engagement outputs.

The Detection & Monitoring cases also produced cumulative technical and public engagement value. The REMEDIIES Shoreline ML App and Portal created a digital infrastructure for monitoring, clean-up reporting, device monitoring, aerial and underwater drone data, buoy tracking and EMODnet-compatible reporting. The GPS buoy case deployed **200 GPS-tracked floating devices** across the Aegean Sea including key river mouths in Northern Greece, and involved **more than 100 individuals and institutions**, including volunteers, fishers, municipalities, ministries and national media. These actions helped translate complex monitoring processes into visible public engagement, while supporting hotspot identification, data generation and better understanding of floating litter movement.

The Collection & Valorisation cases show that REMEDIIES engagement with fishers, divers and port actors produced both environmental and operational learning. In Sardinia, the Torregrande Fishing for Litter activity engaged **12 local fishers** across **12 events** between July 2024 and August 2025, recovering **30.3 kg of plastic litter** from fishing gear during routine fishing operations. This result is modest in terms of weight, but important methodologically: it demonstrates how fisher engagement can be embedded into daily work without creating a separate clean-up activity, while generating information on litter encountered at sea.

Fishing-net recovery activities created an additional impact pathway by addressing abandoned, lost, discarded and end-of-life fishing gear. In the Sinis Marine Protected Area, a coordinated ghost-net removal operation near Mal di Ventre Island involved fishers, CNR researchers, Sinis MPA and Coast Guard personnel, and removed **100 kg of plastic litter**, exclusively fishing nets and gear. Port and marina recovery activities at Torre Grande then complemented the underwater recovery model by removing end-of-life gear from docks and facility areas. Two operations recovered **100 kg** and **700 kg**, contributing to a cumulative total of **1,000 kg of plastic litter**, exclusively fishing nets and gear. These results show that fishing-net valorisation requires more than removal: it depends on sorting, documentation, storage, material categorisation and connection to appropriate waste management or recycling pathways.

The Prevention & Zero Waste cases significantly expanded the project's social reach. The zero-waste cosmetics work documented **19 events** between 2023 and 2026, reaching **more than 500,000 people** through in-person events, TV shows and social media engagement. It also reports that **more than 5,000**

citizens made shampoo balls with seaweed zero-waste coating, while do-it-yourself guidelines and surveys were shared with **more than 150 citizens and businesses** as replication material. The Sea Star Festival activities alone reached around **500 people**, involved around **50 participants** per workshops, and supported the participants' self-made production of more than **2,000 shampoo balls with zero-waste seaweed coatings**.

The learning and innovation pathway was reinforced through the **PLASTIC FANTASTIC Webinar Series** and **PLASTIC FANTASTIC Hackathon**. Seven Plastic Fantastic webinars/seminars were organised across the Demo Site learning pathway, covering Greece, Italy/Sardinia, France, Albania, Morocco and Slovenia. These sessions supported field readiness around plastic identification, recyclability, beach litter monitoring, citizen science methodologies and REMEDIIES technologies. The Hackathon then moved from learning to solution development: **24 projects** from **18 countries** were selected for the Bootcamp, **15 finalist teams** pitched their solutions, and **4 winners** received prizes and acceleration support. The Hackathon also contributed to the gender dimension of the programme, as **30% of applicants were women**, and two winning teams were described as women-led or founded and led by women innovators.

The Anti-Litter Campaigns and Open Days created high-visibility entry points into REMEDIIES. By Month 36, seven Anti-Litter Campaigns had already been implemented across Greece, France, Albania, Morocco, Spain, Italy and Slovenia, bringing the project close to its KPI target of eight campaigns. In parallel, eight Open Days / Info Days were implemented or planned across Morocco, Croatia, Malta, France, Türkiye, Germany, Slovenia and Umag/Croatia 2026. Based on the Open Day participation table, these activities involved or reached **at least 50,546 people**, excluding the Marina Izola Open Day where no participation number was provided. These events helped showcase REMEDIIES innovations, including drones, apps, microplastic filtration, river-cleaning technologies, zero-waste cosmetics, bio-based reusable cups, fishing gear made with biodegradable materials and local zero-waste solutions.

The Open Call Associated Regions further demonstrate how REMEDIIES methods were transferred beyond the original Demo Sites. In Mersin (Republic of Türkiye), the Up-FreeCoasts project trained **1,318 young people aged 6–18**, organised clean-ups across **6 beaches** with **182 participants**, installed **6 water fountains**, **6 plastic collection bins** and **1 smart reverse vending machine**, and directly reached at least **14,202 people** through communication actions. In Kerkennah (Tunisia), the No More Plastic for Kerkennah project installed **2 Kumulus atmospheric water generators**, distributed **1,000 reusable stainless-steel bottles**, mobilised **50 vendors**, secured **35 merchant commitment charters**, ordered **570,000 kraft paper bags**, distributed an initial **100,000 bags**, and trained **35 participants**, mostly women and youth, in palm-weaving alternatives. In Ulcinj (Montenegro), MARICES trained at least **45 representatives** through three workshops and installed **5 fishing-net disposal stations**. In la Valetta (Malta), Island Guardians produced **2 educational packs**, **5 local hero videos**, **4 storybooks**, and coordinated clean-ups that collected **1,492.5 kg of mixed waste**, including **251 kg of plastic**. In Guimarães, the project identified **6 plastic accumulation sites**, carried out **2 clean-up campaigns**, installed eco-barriers and transformed collected plastic into educational products and public awareness material.

Finally, the policy and replication cases show that REMEDIIES engagement also produced governance and scaling value. Across the project, five Policy Alignment Workshops were organised, reaching a total of **200 participants**. These workshops took place in Athens, Brussels and online, and connected REMEDIIES Demo Sites and active replicators with other EU Mission, Green Deal and Horizon-related initiatives. The workshops addressed research and social entrepreneurship, remedial measures for marine pollution and the Urban Wastewater Treatment Directive, plastic pollution measurement, local value chains as alternatives to plastic, scalability, participatory governance and citizen science. They involved environmental and water-related NGOs, municipalities and regions, local entrepreneurs, scientific and educational institutions, innovators, industry actors, EU institutions, local and national authorities, waste and water management utilities,

ministries, policy makers and research communities. This confirms that REMEDIIES policy engagement did not function only as dissemination, but as a structured policy-learning pathway linking field evidence, technical innovation, local implementation and recommendations for future use.

Alongside this, D3.4 documented **10 regenerative zero-waste local value chain solutions**, including seaweed-based cosmetics, reusable systems, atmospheric water generators, palm-branch craft products, mycelium materials and natural straw alternatives. These outputs show that REMEDIIES did not only mobilise participants, but also generated replicable models, educational tools, policy recommendations, circular products, local infrastructure and innovation pathways.

Overall, the cumulative impact of the D6.5 cases lies in the combination of measurable environmental action, public participation, fisher engagement, technical testing, learning, innovation and policy translation. The numbers show substantial reach: thousands of citizens and volunteers engaged directly, tens of thousands reached through Open Days, hundreds of thousands reached through zero-waste cosmetics communication, nearly **24 tonnes of beach litter removed**, hundreds of clean-up and monitoring actions reported, multiple technologies demonstrated, and several replication models tested through Associated Regions. In addition, **200 participants** were engaged through five policy workshops, strengthening the link between local demonstration, citizen-generated evidence, technical monitoring, circular solutions and policy uptake. The cases therefore confirm that REMEDIIES citizen engagement is not only a dissemination activity, but an operational mechanism for generating evidence, testing solutions, strengthening local ownership and supporting the transition towards plastic litter-free seas and waters.

5. REMEDIIES co-creation guidelines

The case studies show that citizen engagement in REMEDIIES was strongest when activities were designed as structured participation processes, not as isolated communication events. Across monitoring, clean-ups, Plastic Labs, fisher engagement, zero-waste workshops, actions in associated regions and policy workshops, the most effective activities had a clear purpose, involved the right local actors, used appropriate tools, documented results, collected feedback and created a next step for participants. This section translates those lessons into practical guidelines that can be used by REMEDIIES partners, Associated Regions and external actors who want to replicate or adapt similar activities.

The guidelines are organised around the main engagement needs identified in the case studies: designing an engagement activity, involving citizens in monitoring, organising clean-ups, working with fishers, running hands-on workshops and Plastic Labs, co-creating local prevention solutions, translating engagement into policy learning, collecting feedback, documenting lessons and replicating activities in new locations. Each guideline should be read together with the templates and checklists included in **Annex 1** to **Annex 6**.

Across all guidelines, gender dimension, inclusion and diversity should be treated as practical design and documentation considerations. This means that partners should not only ask what will be implemented, but also whether sex and gender are relevant to the activity or innovation, whether gender related roles, norms or expectations could influence engagement, usability or the uptake of solutions, whether needs of participants differ. At the same time, partners should consider who may face barriers, whose knowledge is recognised, how accessible the format is, and whether different participant groups can contribute safely and meaningfully. For this reason, inclusive engagement should be reflected through stakeholder mapping, accessible communication, role distribution, facilitation, feedback collection and documentation. This is particularly important in activities involving technical tools, fieldwork, fishers, children, schools, workshops, public infrastructure, innovation formats and policy dialogue, where participation opportunities may differ depending on gender, age, disability, professional role, language, digital skills, physical capacity, local knowledge or social background.

5.1 Guideline 1: How to design a citizen engagement activity

A citizen engagement activity should start with a clear purpose. REMEDIIES activities were more effective when organisers knew whether the objective was to raise awareness, collect litter, generate monitoring data, test a tool, collect feedback, introduce a zero-waste solution, engage fishers, support local behaviour change, or produce policy recommendations. Without this clarity, engagement risks becoming generic and difficult to document.

The first planning question should therefore be: what should participation produce? In some activities, the output may be a direct action, such as litter removed from a beach or river. In others, it may be data, such as app-based reporting or monitoring results. In workshops, the output may be learning, feedback, prototype ideas or product testing. In policy workshops, the output may be recommendations. In Associated Regions, the output may include public infrastructure, commitments, educational resources or local adaptation of a REMEDIIES method.

A good engagement design should define:

- the purpose of the activity
- the REMEDIIES pillar it supports
- the primary engagement category



- the target group and their expected role
- the local partners needed
- the tools or protocols to be used
- the co-creation element
- the outputs to be documented
- the feedback to be collected
- the next engagement step
- potential barriers to participation and accessibility needs
- how gender dimension, inclusion and diversity considerations will be addressed
- whether different participant groups have meaningful roles in the activity

The cases show that engagement works better when participants understand their role from the beginning. A clean-up volunteer should know whether they are only collecting waste or also separating, weighing and documenting it. A workshop participant should know whether they are only learning or also testing a product and providing feedback. A fisher should know whether they are being consulted, asked to validate infrastructure, or involved in gear testing. A policy workshop participant should know whether the expected output is discussion, recommendations or a roadmap.

Inclusive design should be considered from the planning stage, not added at the end. This means reviewing whether the activity timing, location, language, format, safety conditions, digital tools and expected tasks are realistic for the intended participants. Where possible, organisers should also consider whether less visible groups or knowledge holders need targeted outreach or adapted participation roles.

The Activity Planning Template in **Annex 1.1** and Stakeholder Mapping Template in **Annex 1.2** should be used before implementation.

5.2 Guideline 2: How to involve citizens in monitoring and citizen science

Citizen science activities require more preparation than general awareness activities because participants contribute to evidence generation. The REMEDIIES cases show that monitoring activities are strongest when they combine simple explanations, clear protocols, accessible tools and quality assurance. This applies to beach litter monitoring, app-based reporting, clean-up documentation, awareness of sea currents and plastic pollution with GPS buoy, drone with AI demonstrations, plastic identification tools, plastic waste valorization tools and zero-waste citizen science protocols.

Before involving citizens in monitoring, organisers should define whether the activity is expert-led monitoring, citizen-supported monitoring or protocol-based citizen science. This distinction matters. In expert-led monitoring, citizens may mainly observe and learn. In citizen-supported monitoring, citizens may contribute under guidance from researchers, technical partners or trained facilitators. In protocol-based citizen science, citizens collect, categorise or report data using an agreed protocol, app or reporting tool. The level of training, supervision and quality control should match the level of citizen contribution.

The cases from Saïdia, Albania, Koper and the Cyclades show that citizen science works better when participants are introduced to the reason behind the method. Participants should understand why a 100-meter beach section is used, why plastic and non-plastic waste are recorded separately, why litter categories matter, how app-based reporting supports data harmonisation, and how results can be connected to wider

databases or policy needs. When this explanation is missing, monitoring can feel like a technical burden. When it is present, participants understand that their contribution has value beyond the local activity.

For monitoring and citizen science activities, organisers should:

- explain the monitoring purpose in simple language
- introduce the protocol or tool before the field activity
- clarify participant roles and expected accuracy
- provide visual support where useful, such as the REMEDIIES Flag on the Different Types of Plastics
- assign trained facilitators or coordinators
- check safety, access and environmental sensitivity
- record participant numbers, location, date and outputs
- collect feedback on tool usability and protocol clarity
- share results back with participants where possible
- assess whether participants need support because of language, digital literacy, age, physical access or previous fieldwork experience
- provide alternative roles where monitoring tasks are physically demanding or technically complex
- document whether different participant groups were able to understand and apply the protocol

Inclusive monitoring means that scientific quality and accessibility should be designed together. Participants should not be expected to understand protocols, apps or technical categories without explanation. However, clear visual instructions, facilitator support, simple language and feedback opportunities help ensure that citizen science is not limited to already confident or technically skilled participants.

The Citizen Science Readiness Checklist in **Annex 4.4**, Feedback Collection Form in **Annex 2** and Activity Planning Template in **Annex 1.1** should be used to prepare and review monitoring activities.

5.3 Guideline 3: How to organise clean-ups as learning and co-creation activities

Clean-ups are often treated as simple volunteering actions, but the REMEDIIES cases show that they can become stronger when they are designed as learning, documentation and co-creation activities. A clean-up can raise awareness, remove litter, generate basic citizen science data, reveal local pollution patterns, connect people with a Demo Site, and create material for education, art or valorisation. The value of the activity depends on how it is planned, facilitated and followed up.

The REMEDIIES Citizen Science Protocol for Beach Litter Clean-Ups provides the basic structure for implementation. It defines clean-ups as practical, visible and inclusive citizen science actions where citizens participate in removing litter, separating materials and documenting results. The minimum data to be recorded should include the number of participants, total weight of plastics collected, total weight of non-plastics collected and photos of the collected waste. Where possible, results should be recorded through the REMEDIIES Citizen Science App or web portal.

Clean-ups should be planned in three stages: preparation, implementation and follow-up. During preparation, organisers should select a safe and accessible site, coordinate with local authorities and waste management bodies, assess environmental sensitivity, prepare equipment, communicate clearly with participants, and define whether the clean-up will include monitoring, plastic identification or simple collection. During implementation, participants should receive a short briefing on safety, the area to be

cleaned, plastic separation, wildlife protection and waste collection points. During follow-up, organisers should document results, share them publicly and invite participants to a next step.

The case studies show that clean-ups become more meaningful when linked to a local story. In Saïdia, the clean-up was linked to the first Moroccan monitoring campaign. In Koper, community clean-up was connected to scientific monitoring and technology testing. In Porquerolles, clean-ups were linked to small-island zero-waste transition. In Santorini, clean-up material entered the Plastic Lab process. In Malta and Guimarães, collected materials supported art, education and public awareness. These examples show that clean-ups should not end when the bags are removed.

For replication, organisers should:

- select the site with local knowledge
- clarify whether the activity includes monitoring or only collection
- coordinate with authorities and waste operators
- prepare gloves, bags, scales, first aid and documentation tools
- brief participants on safety and plastic separation
- separate plastic and non-plastic waste
- weigh and photograph collected material before removal
- record participant numbers and partner organisations
- use the REMEDIIES Citizen Science App where possible
- collect participant feedback
- communicate results and next steps
- assess site accessibility, physical demands and safety risks before confirming the activity
- distribute roles inclusively, including collection, sorting, weighing, photographing, recording, logistics, child support, communication or reflection
- document whether any groups faced barriers to participation

Clean-ups should be open and practical, but not all participants can contribute in the same way. Inclusive clean-up design creates different roles so that children, older participants, people with limited mobility, inexperienced volunteers, schools, visitors and local residents can all contribute safely and meaningfully.

The Clean-Up Engagement Checklist in **Annex 4.5**, Activity Planning Template in **Annex 1.1**, Feedback Collection Form in **Annex 2** and activity documentation notes should be used to support implementation and reporting.

5.4 Guideline 4: How to work with fishers and maritime professionals

Fishers and maritime professionals should be treated as knowledge holders and implementation partners, not only as target groups. The REMEDIIES cases show that fishers can contribute to marine litter reduction through Fishing for Litter, fishing-net disposal, abandoned-net identification, gear made with biodegradable materials testing, local knowledge on litter accumulation, and practical feedback on infrastructure or materials. Their participation is especially important because they work directly in the marine environment and understand operational realities that external actors may miss.

Effective fisher engagement requires trust and practical relevance. The MARICES case showed that initial fisher engagement can be limited by scepticism or low awareness of the environmental and economic value of recycling waste fishing nets. This was addressed through targeted workshops, local trust-building and

practical infrastructure. In Sardinia, fisher engagement was essential for testing fishing gear made with biodegradable materials in real conditions. In Porquerolles, a local fisher contributed to the abandoned-net removal operation. In Santorini, conversations with local fishermen helped connect the Plastic Lab with the everyday realities of working at sea.

The starting point should always be a practical question. Where should disposal stations be placed? What type of gear is actually used? What material properties matter? What makes a collection system inconvenient? Where are nets lost or abandoned? What would make fishers willing to participate? These questions should be asked before designing the solution, not after it has already been finalised.

An inclusive approach to fisher engagement should also recognise that fishing communities are diverse. Practical knowledge may be held by vessel owners, crew members, small-scale fishers, younger and older workers, port users, family members involved in fishing-related work, gear repair actors, waste handlers and local associations. Engagement should therefore avoid relying only on the most visible or formally organised actors, especially when decisions concern disposal infrastructure, gear testing or collection systems.

For fisher and maritime engagement, organisers should:

- identify trusted local intermediaries
- approach fishers early, before decisions are fixed
- avoid framing fishers only as contributors to pollution
- recognise professional knowledge and time constraints
- use simple and practical language
- connect engagement to concrete action or infrastructure
- ask fishers to validate locations, tools or protocols
- collect feedback on usability, cost, effort and safety
- document barriers and suggestions
- communicate how feedback will be used
- consider diversity within the fishing community, including gender, age, role, vessel type, seasonality and work schedule
- document whose feedback was collected and whether any relevant perspectives were missing

When testing fishing gear made with biodegradable materials, feedback should cover performance, durability, handling, catch efficiency, safety, rigging, hauling, fouling, damage, end-of-life management and willingness to adopt. When installing disposal stations or collection infrastructure, fishers should help validate locations and practical use conditions. The Fisher Engagement Checklist in **Annex 4.6** and Feedback Collection Form in **Annex 2** should be used to structure this process.

5.5 Guideline 5: How to run hands-on workshops and plastic labs

Hands-on workshops and Plastic Labs are effective when they allow participants to experience the issue directly and participate in a practical solution. The REMEDIIES examples include zero-waste cosmetics workshops, the Santorini Plastic Lab, plastic identification sessions, upcycling workshops and educational activities linked to clean-ups or festivals. These formats are especially useful because they move participants from passive awareness to experimentation, reflection and feedback.

A hands-on workshop should have a clear learning flow. The zero-waste cosmetics protocol uses the pathway awareness → experimentation → reflection → reporting. This is a useful model for other workshops as well. Participants first understand the problem, then engage with a material or solution, then reflect on what they

learned, and finally provide feedback or contribute to reporting. This structure helps avoid workshops becoming only demonstrations without learning or feedback.

Plastic Labs require additional preparation because they involve equipment, materials, safety considerations and technical facilitation. The Santorini Plastic Lab used the logic of Precious Plastics equipment, including shredder, injector, extruder and compression moulding machine. These tools can help participants understand how collected plastic may be sorted, processed and transformed. However, the equipment can involve heat, moving parts and technical risks, so operation must be facilitator-led and adapted to the age and experience of participants. Workshops with children require clear safety boundaries, protective equipment, age-appropriate explanations and strong supervision.

Inclusion is especially important in hands-on and maker-based activities because technical equipment, fabrication spaces and scientific terminology can unintentionally discourage some participants. Facilitators should use simple language, visual examples, gender-neutral examples, age-appropriate guidance and multiple participation roles. Participants should be able to contribute through observing, sorting, drawing, discussing, documenting, testing, designing or reflecting, not only through direct machine operation.

Hands-on workshops should also avoid presenting recycling as the full answer to plastic pollution. The Santorini Plastic Lab made this distinction clear: the aim was to explore how recyclable plastic can be better collected and reused, while also discussing how plastic use can be reduced or avoided in the future. This balance is important for REMEDIIES because Collection & Valorisation should remain connected to Prevention & Zero Waste.

For hands-on workshops and Plastic Labs, organisers should:

- define the learning objective
- adapt the activity to the target group
- prepare materials and equipment in advance
- explain the environmental issue clearly
- include a practical activity or demonstration
- connect the activity to prevention, not only recycling
- ensure safety and facilitator-led machine operation
- collect participant feedback
- document outputs, materials used and lessons learned
- use inclusive and gender-sensitive language and examples
- provide different participation roles according to age, ability, confidence and learning style
- collect feedback on accessibility, safety, clarity and confidence in participation

provide follow-up resources where relevant

For zero-waste cosmetics workshops, organisers should collect baseline knowledge, guide participants through preparation or demonstration, collect post-workshop feedback and invite product testing in real-life settings where possible. For Plastic Labs, organisers should document the source of collected plastic, quantities processed, machines used, objects created, participants involved and follow-up use of outputs.

The Workshop and Plastic Lab Checklist in **Annex 4.7**, Feedback Collection Form in **Annex 2**, activity documentation notes and Activity Planning Template in **Annex 1.1** should be used to support implementation.

5.6 Guideline 6: How to co-create local prevention and zero-waste solutions

Prevention and zero-waste activities should start from the question of what plastic use can be avoided, reduced or replaced at source. The REMEDIIES cases show that prevention is strongest when it is connected to real local consumption patterns, available resources, business needs, user behaviour and territorial constraints. This is especially relevant for islands, tourism destinations, festivals, marinas, schools, public spaces and coastal communities where single-use plastic use is high and waste management capacity is often limited.

Local prevention solutions should not be designed only as technical substitutions. Replacing one disposable product with another may reduce some impacts, but it does not necessarily create a circular or regenerative system. The strongest REMEDIIES examples use a broader value-chain approach: they look at where materials come from, who produces them, how they are used, whether they are reusable or compostable, what happens at end of life, and whether the solution creates local environmental, economic or social value.

The regenerative local value chain cases show that prevention can be connected to local materials and skills, such as Provence giant reed, date palm branches, wheat stems, rye stems, seaweed-based biopolymers, atmospheric water generation or reusable cup systems. These examples show that plastic prevention can also support local employment, traditional knowledge, small-scale entrepreneurship, social inclusion and territorial resilience. However, they also show that adoption depends on cost, user habits, certification, logistics, supply capacity and public or business support.

Local prevention and zero-waste solutions should also be assessed for social inclusion. A local alternative is stronger when it creates environmental value while also recognising local skills, small producers, women and youth groups, artisans, informal actors, cooperatives and community knowledge. Co-creation should therefore examine who can produce, access, afford, use and benefit from the alternative, and whether any barriers exist in terms of cost, certification, visibility, equipment, mobility or market access.

For local prevention and zero-waste activities, organisers should:

- identify the plastic item or behaviour to be reduced
- map local resources, materials, skills and producers
- identify users and adopters, such as shops, restaurants, hotels, schools, festivals or municipalities
- check whether the solution prevents waste at source or only substitutes one disposable item with another
- test the solution in a real local context
- collect feedback from users, businesses and producers
- assess cost, usability, logistics, hygiene, regulation and end-of-life
- identify public procurement, funding or partnership opportunities
- communicate both the environmental and local economic value
- document barriers and adoption conditions
- map who is involved in the local value chain and who may be excluded
- assess whether the solution is affordable, culturally appropriate and accessible to different users
- document whether the solution creates local social value, not only environmental benefit

Co-creation is essential in prevention because a solution that works technically may still fail if users do not adopt it. Businesses should be involved early to assess feasibility. Citizens and consumers should be involved to assess usability and acceptance. Producers and artisans should be involved to assess production capacity. Municipalities and public authorities should be involved to identify procurement, public-space or regulatory

opportunities. The Co-Creation Design Canvas in **Annex 1.3**, Feedback Collection Form in **Annex 2**, activity documentation notes and the forthcoming Regenerative Zero Waste Local Value Chains guide should be used to support this process.

5.7 Guideline 7: How to translate engagement into policy learning

Engagement activities generate useful learning, but this learning only creates systemic value if it is translated into policy, governance or implementation pathways. The REMEDIIES Policy Workshops show how field experience, citizen science, monitoring data, local value chains, Open Call activities and Demo Site lessons can be processed collectively and turned into recommendations. This is important because many barriers to marine litter reduction cannot be solved by citizens or local organisers alone. They require changes in funding, procurement, regulation, infrastructure, data systems, public administration and governance.

A policy-learning activity should begin with a clear policy or governance question. The question may concern how citizen science data can inform policy, how local pilots can scale, how communities can be involved earlier in decision-making, how zero-waste alternatives can be supported by procurement, or how monitoring can be connected to measurable targets. The discussion should not remain general. It should identify barriers, responsibilities, enabling conditions and next steps.

The REMEDIIES Policy Workshops show several useful methods. Small-group discussions can help participants move from general opinions to concrete recommendations. Roundtables can bring different stakeholder perspectives into direct dialogue. Evidence inputs from Demo Sites can ground the conversation in practice. Recommendation-building exercises can transform discussion into usable outputs. Validation with participants can strengthen ownership and accuracy.

Policy learning should include attention to representation and power. Stakeholders do not enter policy discussions with equal authority, vocabulary, institutional access or confidence. Facilitated policy workshops should therefore create space for different forms of knowledge, including local practice, community experience, youth perspectives, fisher knowledge, social economy experience, small producer needs and implementation barriers faced by less formal actors.

For policy workshops and policy-learning activities, organisers should:

- define the policy or governance question clearly
- invite a balanced mix of actors
- include evidence from field activities, Demo Sites or Associated Regions
- avoid long presentation-only formats
- use facilitated discussion or roundtables
- ask participants to identify barriers and enabling conditions
- produce concrete recommendations
- document who participated and what was recommended
- connect outputs to policy briefs, reports, replication plans or future project design
- follow up with participants where possible
- review whether the participant mix includes diverse and less visible perspectives
- use accessible and gender-sensitive language and avoid overly technical or institutional framing
- check whether recommendations reflect inclusion, gender/diversity and accessibility considerations

Policy workshops should also connect back to citizens and local stakeholders. If local communities provided data, feedback or implementation experience, the policy outputs should recognise that contribution. Citizen science should be linked to quality assurance, data systems and decision-making pathways. Local

engagement should be linked to governance mechanisms that allow communities to move from participation to influence. The Policy Recommendations and Stakeholder Mapping Template in **Annex 1.2** should be used to support this process.

5.8 Guideline 8: How to collect and use feedback

Feedback is a core element of co-creation. Without feedback, participation remains incomplete because organisers do not know what participants understood, what worked, what created barriers, or what should change. The REMEDIATION cases show that feedback is relevant across all activity types: app-based monitoring, clean-ups, fisher engagement, fishing gear made with biodegradable materials testing, zero-waste workshops, Plastic Labs, Open Call activities and policy workshops.

Feedback collection should also be used to understand whether the activity was inclusive and accessible. In addition to asking what participants learned or whether the tool worked, organisers should ask whether instructions were clear, whether the format was accessible, whether participants felt able to contribute, whether any barriers appeared, and whether different perspectives were represented. This does not require complex personal data collection; it can be done through simple, proportionate questions about accessibility, clarity, safety, confidence and participation conditions.

Feedback should be planned before the activity, not added at the end as an afterthought. Organisers should decide what they need to learn from participants and choose the simplest appropriate method. In some cases, this can be a short survey. In others, it can be a facilitated discussion, observation notes, interviews, a feedback wall, a digital form, a QR-based questionnaire, or a structured debrief with partners. The method should match the audience and the activity. Children, fishers, volunteers, entrepreneurs, public authorities and policy actors will not all respond well to the same feedback format.

Feedback should cover both the participant experience and the usefulness of the activity. For example, in a clean-up, organisers may ask whether instructions were clear, whether participants understood plastic separation, and whether they want to join another activity. In app-based monitoring, feedback should cover tool usability and data-entry difficulties. In fisher engagement, feedback should cover operational feasibility, time, safety, cost and practical barriers. In zero-waste cosmetics workshops, feedback should cover knowledge change, product usability and willingness to adopt. In Plastic Labs, feedback should cover learning, safety, material understanding and interest in further activities.

Organisers should collect feedback on:

- participant understanding of the activity purpose
- clarity of instructions
- usability of tools or protocols
- safety and accessibility
- what participants learned
- what participants found difficult
- suggestions for improvement
- willingness to participate again
- perceived relevance to local needs
- gender-related differences when relevant
- possible follow-up actions

Feedback must then be used. It should inform future activity design, tool improvements, workshop adaptation, communication material, policy recommendations or replication guidance. If feedback is

collected but not reviewed, it does not support co-creation. The Feedback Collection Form in **Annex 2** should be used as a basic template and adapted to the specific activity type.

5.9 Guideline 9: How to document lessons learned

Lessons learned should be documented in a structured and honest way. REMEDIATION activities generated strong results, but they also faced practical challenges such as administrative delays, procurement constraints, tool usability issues, stakeholder scepticism, data quality needs, safety considerations, volunteer availability, equipment requirements, cost barriers and regulatory gaps. These challenges should not be hidden. They are important for replication because they help other actors avoid repeating the same mistakes.

Lessons learned should explain what worked, what did not work, why it happened, and what should be changed next time. It should not only list success stories. For example, a clean-up report should not only state how many kilos were collected. It should also record whether the site was suitable, whether waste removal logistics worked, whether participants understood sorting, and whether feedback was collected. A Plastic Lab report should not only describe the workshop. It should record what equipment was used, what safety issues appeared, whether the workshop duration was realistic, and what improvements are needed. A fisher engagement report should record both participation and scepticism, because trust-building is part of the learning.

A useful lessons learned record should include:

- activity title, date and location
- organising partners and stakeholders involved
- participant number and profile
- activity purpose and engagement category
- tools, protocols or equipment used
- outputs achieved
- what worked well
- what did not work or created barriers
- feedback received
- adaptations made during implementation
- recommendations for future replication
- evidence available, such as photos, forms, reports or links
- inclusion and accessibility observations
- participant diversity, where known and appropriate
- barriers to participation
- adaptations made during implementation
- recommendations for more inclusive replication

Lessons learned should include gender dimension, inclusion and diversity observations, where relevant. Documentation should not only report what happened and what outputs were produced, but also whether the activity reached the intended participant groups, whether barriers appeared, whether different forms of knowledge were included, and whether adaptations were needed. This will help future replication avoid repeating exclusionary formats and make engagement quality more visible.

Documentation should be proportionate. A small workshop does not need a long report, but it should still record the essential information. Larger activities, such as Open Days, Plastic Labs, policy workshops or Associated Region projects, should produce more detailed documentation because they generate learning

for future territories.

5.10 Guideline 10: How to do replication of the activities

Replication should not mean copying an activity exactly. The REMEDIIES cases show that successful replication depends on adapting the method to the local context while preserving the core logic. A clean-up protocol can be used in many places, but the site, partners, safety conditions, waste logistics and communication approach must be local. A Plastic Lab can be replicated, but the equipment, participant age, venue, material source and technical support must be adapted. A fisher engagement activity can be transferred, but only if local fishing practices, trust relationships and infrastructure needs are understood.

Replication should not mean copying an activity exactly from one place to another. It should include local adaptation to social, cultural, economic and accessibility conditions. This means reviewing who the relevant local actors are, which groups may be harder to reach, what language and communication channels are appropriate, whether the site is accessible, whether the format fits local working schedules or school calendars, and whether local knowledge is represented in the adaptation process.

Before replicating an activity, partners should identify what is essential and what can change. The essential elements are the purpose, safety standards, engagement logic, documentation requirements and feedback process. The adaptable elements are the location, partners, format, language, materials, timing, communication style and follow-up pathway. This distinction helps maintain quality while allowing local ownership.

The Open Call Associated Regions provide the clearest replication lesson. Each region adapted REMEDIIES objectives to its own conditions: river eco-barriers in Portugal, science education and diver clean-ups in Malta, merchant commitments and palm weaving in Tunisia, municipal infrastructure and school education in Türkiye, and fishing-net disposal stations in Montenegro. None of these cases copied a Demo Site exactly. They translated the REMEDIIES approach into local practice.

For replication, partners should follow a simple sequence:

1. Define which REMEDIIES method is being replicated.
2. Identify the local problem it will address.
3. Map local stakeholders and implementation partners.
4. Check local permissions, risks, logistics and resource needs.
5. Adapt the activity format to the audience and territory.
6. Use the relevant REMEDIIES protocol, checklist or template.
7. Define measurable outputs before implementation.
8. Collect feedback during or after the activity.
9. Document lessons learned.
10. Share results with participants and relevant partners.
11. Identify whether the activity can continue or scale locally.
12. Map underrepresented or harder-to-reach groups in the new location
13. Adapt language, timing, venue, safety measures and participation roles
14. Involve local intermediaries who can support trust and access
15. Document which inclusion adaptations were made during replication

Replication should also include a feedback loop with the original method owners where possible. For example, if a partner replicates the seaweed cosmetics workshop, feedback should inform future versions of

the protocol. If an Associated Region uses the clean-up protocol, lessons should feed into the REMEDIES toolkit. If a municipality tests a new local value chain, barriers should inform policy recommendations. In this way, replication becomes part of co-creation rather than simple transfer.

The Replication Readiness Checklist in **Annex 4.11**, Activity Planning Template in **Annex 1.1**, Stakeholder Mapping Template in **Annex 1.2**, Feedback Collection Form in **Annex 2** and activity documentation notes should be used before and after replication.

6. Cross-cutting lessons learned

The REMEDIIES case studies show that citizen engagement and co-creation worked best when they were connected to concrete action, local relevance, practical tools and follow-up. Across the Demo Sites, Associated Regions, Plastic Fantastic activities, Plastic Labs, policy workshops and citizen science protocols, engagement became meaningful when participants had a clear role and when their contribution produced something visible: data, waste removal, feedback, local knowledge, a tested product, an adapted method, a public commitment, a policy recommendation or a learning output.

This section summarises the main cross-cutting lessons emerging from the cases represented in Section 3. It is organised around what worked, what needs improvement, lessons by stakeholder groups, lessons by engagement category and lessons by REMEDIIES pillar.

6.1 What worked across REMEDIIES

One of the strongest lessons is that engagement works when it is **place-based**. Activities were more effective when they were connected to a specific beach, river, island, marina, port, festival, school, fishing shelter, local business area or protected site. In Saïdia, Koper, Albania, Porquerolles, Sardinia, the Cyclades and the Associated Regions, participants were not asked to engage with plastic pollution as an abstract global issue. They engaged with plastic pollution in places they knew, used, lived in, visited or managed. This strengthened local ownership and made the environmental challenge easier to understand.

A second success factor was the **combination of action and learning**. Clean-ups, for example, became more valuable when they were linked to plastic identification, app-based documentation, monitoring protocols, school activities, Plastic Labs or public communication. The Plastic Fantastic webinars were effective because they responded to a real need: volunteers and local actors needed practical information before entering the field. The REMEDIIES Flag on the Different Types of Plastics also worked as a simple bridge between technical knowledge and field application.

A third success factor was the use of **trusted local partners**. Engagement activities depended heavily on organisations that already had local credibility or operational capacity. Municipalities supported access, infrastructure and continuity. NGOs and community organisations mobilised volunteers and built trust. Research partners provided scientific validity and protocols. Schools and science centres supported youth engagement. Fishers, divers, marina operators, artisans and local businesses contributed practical knowledge. Without these intermediaries, many activities would have remained either too technical or too disconnected from local realities.

A fourth success factor was the use of **hands-on methods**. Participants responded well to formats where they could act, make, test, observe or discuss something concrete. This was visible in clean-ups, zero-waste cosmetics workshops, the Santorini Plastic Lab, fisher gear testing, palm-weaving workshops, diver clean-ups and local value chain demonstrations. Hands-on methods helped participants move from awareness to experience, and from experience to reflection.

A fifth success factor was the integration of **quantitative documentation**. REMEDIIES clean-up actions recorded participants, plastic weights, non-plastic weights, locations and photos. Open Call Associated Regions documented students trained, volunteers mobilised, infrastructure installed, merchants engaged, commitments signed, workshops delivered and waste collected. This made engagement more credible and easier to report. Quantitative evidence does not replace qualitative learning, but it strengthens the visibility and accountability of engagement activities.

A sixth success factor was the connection between **local action and wider context**. Several activities moved beyond local implementation and contributed to wider learning. Monitoring activities connected local data with European reporting systems. Policy workshops connected field experience with recommendations. Open Call Associated Regions showed how REMEDIIES methods can be adapted beyond original Demo Sites. The Plastic Fantastic Hackathon connected the project with innovation and entrepreneurship ecosystems. This helped REMEDIIES avoid treating engagement as a set of isolated events.

6.2 What needs improvement

The main improvement needed is **more systematic feedback collection**. Many activities generated strong participation and outputs, but the evidence is sometimes stronger on what happened than on what participants learned, what they found difficult, what they suggested, or how their feedback changed the activity. For D6.5 and future replication, feedback should be planned before each activity and collected in a format that matches the target group.

A second improvement area is **documentation of the co-creation element**. In some cases, it is clear that citizens and stakeholders participated, but less clear what exactly they influenced. Future reporting should distinguish between participation, consultation, testing, validation and co-design. For example, a volunteer clean-up is participation. A clean-up where citizens help identify hotspots and reflect on local sources includes co-creation. A fisher who tests fishing gear made with biodegradable materials and provides operational feedback contributes to validation. A policy workshop where stakeholders jointly formulate recommendations is policy co-creation.

A third improvement area is the **documentation of participating partner roles**. Several activities involved multiple partners, local authorities, NGOs and community actors. Future reports should clearly record who organised, who facilitated, who provided scientific input, who mobilised participants, who managed logistics, who handled waste, who collected data and who followed up. This is important for replication because future organisers need to understand the roles required, not only the activity format.

A fourth improvement area is **follow-up with participants**. Engagement should not end when the activity ends. Clean-up participants should receive results. Workshop participants should receive resources or feedback links. Fishers should hear how their input was used. Policy workshop participants should receive recommendations. Associated Regions should exchange lessons earlier and more systematically. Follow-up helps prevent engagement from feeling extractive and strengthens long-term relationships.

A fifth improvement area is **clarity on the limits of certain approaches**. Recycling and valorisation activities are useful, but they should not be presented as sufficient solutions to plastic pollution. The Santorini Plastic Lab addressed this correctly by combining reuse and making with discussion on reducing and avoiding plastic use. This balance should be maintained across all Collection & Valorisation activities. Similarly, citizen science is valuable, but data quality, protocols and reporting pathways must be clear if results are to inform policy or research.

A sixth improvement area is **early risk planning**. Several Associated Region activities faced administrative delays, procurement and import issues, stakeholder scepticism, infrastructure misuse, technical approval processes or volunteer availability challenges. These are not failures, but they show that engagement activities need realistic timelines, contingency planning, local authority coordination and maintenance arrangements.

6.3 Lessons by stakeholder group

Citizens and volunteers engage more effectively when the activity is concrete, visible and well explained. They need to know what they are doing, why it matters, how to do it safely and what will happen with the results. Clean-ups, Plastic Labs, webinars and public workshops show that citizens are more likely to participate meaningfully when action is combined with simple learning tools and clear follow-up.

Students and young people respond well to experiential and creative formats. School clean-ups, the MERCAN education sessions in Mersin, the Island Guardians educational packs, the Santorini Plastic Lab and the zero-waste cosmetics workshops show that youth engagement works when it includes making, storytelling, experimentation, visual tools and direct connection to everyday habits. Young participants should not only be treated as an audience for awareness. They can also collect data, test tools, create objects, propose ideas and influence behaviour in their communities.

Fishers and maritime professionals require a practical and trust-based approach. Their engagement must respect their work, time, experience and operational constraints. The fishing gear test in Sardinia and the MARICES disposal-station work in Montenegro show that fishers can provide essential feedback on usability, location, handling, performance and barriers. They should be involved early, especially when activities concern fishing gear, marine litter collection, port infrastructure or Fishing for Litter.

Local authorities and municipalities are essential for access, infrastructure, waste logistics, permissions and continuity. Their role is visible in Mersin, Kerkennah, Guimarães, Tirana, Santorini, Koper and other Demo Sites. However, municipal involvement should not be limited to formal approval. Local authorities can help connect engagement with longer-term public services, procurement, waste systems, education and local policy.

NGOs and community organisations often act as trusted intermediaries. They mobilise participants, translate project objectives into local language, build trust and maintain contact with communities. Their role was visible in clean-ups, Open Call Associated Regions, Demo Site campaigns, school engagement and fisher-related work. They are particularly important where trust is low or where target groups are difficult to reach through formal institutions alone.

Researchers and technical partners provide methodological quality, scientific content and data reliability. Their role is especially important in monitoring, app-based reporting, drone demonstrations, microplastic filtration, plastic identification, fishing gear testing and policy workshops. However, technical partners need engagement partners to translate scientific content into accessible formats.

Entrepreneurs, artisans and local businesses are central to prevention and zero-waste solutions. They determine whether alternatives can be produced, adopted, maintained and scaled. The local value chain cases show that prevention depends on business feasibility, user acceptance, local materials, cost and regulatory conditions. Businesses should be engaged not only as beneficiaries but as co-creators of practical alternatives.

Policy actors and public institutions help translate local learning into systemic change. Policy workshops showed that engagement results need pathways into governance, funding, procurement, regulation and monitoring systems. Without this connection, successful local pilots may remain isolated.

6.4 Lessons by engagement category

For Raising Awareness, the main lesson is that awareness is strongest when it prepares people for action. The Plastic Fantastic webinars, REMEDIIES Flag, policy events, Demo Site videos, school materials and public exhibitions helped participants understand plastic pollution, but their value increased when linked to clean-ups, monitoring, workshops, Plastic Labs, technology demonstrations or local commitments.

For Action, the main lesson is that direct participation should produce documented results. Clean-ups, diver actions, fisher engagement and infrastructure-based activities should record what was done, who participated, what was collected or installed, and what follow-up is planned. Action without documentation is difficult to compare, report or replicate. Action without learning may mobilise people once, but does not necessarily build long-term behaviour change.

For Learning & Upscaling, the main lesson is that activities need a clear transfer pathway. Webinars, hackathons, policy workshops, Open Call activities, Plastic Labs and local value chain work all generated learning. Their value depends on whether that learning is captured, shared and adapted elsewhere. The Open Call for Associated Regions show that upscaling is strongest when territories adapt methods locally rather than copying them exactly.

6.5 Lessons by REMEDIIES pillars

For Detection & Monitoring, the main lesson is that technical tools need social preparation. Apps, protocols, GPS buoys, drones and monitoring methods can generate useful data, but citizens and stakeholders need to understand their purpose, how to use or support them, and how results will be used. Monitoring becomes stronger when linked to training, local knowledge, field application and feedback.

For Collection & Valorisation, the main lesson is that waste removal should be connected to learning and material pathways. Clean-ups and seafloor actions are important, but their value increases when plastics are separated, weighed, documented, analysed, reused, recycled, transformed into educational outputs or linked to prevention messages. Valorisation should be explored where feasible, but not assumed for all materials.

For Prevention & Zero Waste, the main lesson is that upstream solutions require user acceptance and local systems. Seaweed-coated cosmetics, fishing gear made with biodegradable materials, reusable cups, atmospheric water generators, plastic-free market practices, palm-leaf products and local value chains all depend on behaviour change, cost, infrastructure, regulation and trust. Prevention therefore requires co-creation with users, businesses, producers, public authorities and communities.

Across all three pillars, the same conclusion applies: citizen engagement is not a separate communication activity. It is part of implementation quality. It helps REMEDIIES understand local needs, test solutions, generate data, mobilise communities, improve tools, support policy learning and increase the chance that activities continue beyond the project.

6.6 Lessons about gender dimension, inclusion, and diversity

The REMEDIIES case studies show that gender dimension, inclusion and diversity are not separate from citizen engagement and co-creation. The gender dimension considers whether sex and gender are relevant to how research and innovation are designed, delivered, communicated, and taken up. Inclusion and diversity affect who participates, who feels able to contribute, whose knowledge is recognised, how accessible the activities

are, and whether results can be replicated across different places. After reviewing the cases, the strongest activities were those that created multiple entry points for participation: field action, learning, observation, feedback, technical testing, storytelling, documentation, artistic expression, policy dialogue or local infrastructure use.

A first lesson is that **inclusive engagement must be planned from the beginning**. Activities such as clean-ups, monitoring protocols, Plastic Labs, fisher workshops, zero-waste workshops and policy roundtables require different inclusion considerations. For example, beach monitoring and clean-ups may involve physical access and safety barriers; app-based reporting may involve digital literacy and language barriers; drone demonstrations may require translation of technical content; fisher engagement may depend on trust, working schedules and professional roles; and policy workshops may be shaped by institutional access, confidence and familiarity with policy language. Inclusion therefore needs to be addressed through activity design, not only through general communication.

A second lesson is that **diversity within stakeholder groups should not be overlooked**. “Citizens”, “fishers”, “students”, “volunteers”, “businesses” or “local communities” are not homogeneous groups. Fishing communities may include vessel owners, crew members, small-scale fishers, family members, younger and older workers, port users and waste handlers. Local value chains may include artisans, women and youth groups, small producers, informal actors, cooperatives and tourism workers. School and workshop activities may involve different ages, learning styles, levels of confidence and technical familiarity. Recognising this internal diversity helps avoid designing engagement formats only for the most visible or easiest-to-reach participants and improves the relevance of research and innovation outcomes for a broader range of users.

A third lesson is that **inclusion can be strengthened through role distribution**. Several REMEDIIES formats show that participants do not all need to contribute in the same way. In clean-ups, some participants can collect litter, while others sort, weigh, photograph, record data, support children or participate in reflection. In seafloor clean-ups, trained divers carry out underwater recovery, while non-divers can support documentation, sorting, exhibitions, education or public learning. In Plastic Labs, participants can observe, draw, sort, design, discuss, document or reflect, even if they do not operate machinery. This role-based approach makes participation safer, more accessible and more meaningful for different groups.

A fourth lesson is that **technical activities require inclusive translation**. Monitoring apps, GPS buoys, aerial drones, underwater drones, microplastic filtration systems, fishing gear made with biodegradable materials and citizen science protocols can appear expert-led or inaccessible if they are presented only through technical language. The cases show that these tools become more engaging when their purpose, limits, outputs and practical relevance are explained clearly. Inclusive communication, simple visual material, demonstrations, facilitator support and feedback opportunities are therefore essential for connecting technical innovation with public understanding and local ownership.

A fifth lesson is that **gender dimension and gender-sensitive communication are particularly important in activities linked to consumption, technology and innovation**. Zero-waste cosmetics workshops should avoid presenting cosmetics as relevant only to women or specific consumer groups. Plastic Labs and maker activities should avoid reinforcing the idea that technical or fabrication spaces are only for already confident or technically skilled participants. Hackathons and innovation bootcamps should recognise that entrepreneurial formats can favour participants who already know how to pitch, use technical vocabulary or access digital tools. Gender-sensitive and inclusive communication helps make these formats more open, accessible and relevant to diverse participants. The PLASTIC FANTASTIC Hackathon provides a concrete example of progress towards greater gender balance and gender-sensitive communication in practice. The open call reached applicants from 18 countries and recorded that 30% of applicants were women, while two of the winning teams were described as women-led or founded and led by women innovators. This shows that open innovation formats can support wider gender representation when outreach, selection, Bootcamp

support, mentoring and acceleration opportunities are designed to be accessible and inclusive. Future Hackathons could further integrate the gender dimension by encouraging teams, where relevant, to consider whether their proposed innovations respond to the needs, experiences or expectations of different users and whether sex or gender influence the usability or uptake of the proposed solutions.

A sixth lesson is that the **gender dimension should be considered as part of innovation design in addition to participation**. Several REMEDIIES case studies illustrate that the gender dimension is relevant not only to who participates in research and innovation activities, but also to whether innovations respond to the needs, experiences and expectations of different users. For example, biodegradable fishing gear, regenerative value chains and zero-waste cosmetic products may be experienced differently depending on user practices, gender-related roles or social expectations. Future co-creation activities should therefore consider, where relevant, whether sex and/or gender influence product usability, acceptance, communication or uptake, and document how these considerations informed the innovation design and co-creation process.

A seventh lesson is that **gender dimension, inclusion and diversity considerations should be documented more systematically**. The D6.5 cases show many promising examples of diverse participation, including children, schools, youth, volunteers, fishers, divers, merchants, artisans, women and youth groups, municipalities, NGOs, researchers, entrepreneurs and local authorities. However, the available evidence does not always record who participated, which groups were missing, what barriers appeared or whether adaptations were made. Future REMEDIIES activities and replications should therefore include simple documentation of gender dimension, inclusion and accessibility considerations, without creating unnecessary administrative burden.

For future implementation and replication, partners should document, where relevant and proportionate:

- Who was invited and who participated (including gender balance where appropriate)
- Whether sex and/or gender were relevant to the activity or innovation, and how this was considered
- Whether different participant groups had meaningful roles
- Whether the activity was accessible in terms of language, timing, location, digital access, safety and physical requirements
- Whether inclusive and gender-sensitive language and communication practices were used
- Whether any barriers to participation were identified
- Whether feedback reflected different stakeholder perspectives, user needs and experiences
- What should be adapted to improve consideration of the gender dimension, inclusion and accessibility in future activities

Overall, integrating the gender dimension, inclusion and diversity strengthens the REMEDIIES co-creation methodology by shifting the focus from participation numbers to the quality, accessibility and relevance of participation. Considering, where relevant, whether sex and gender influence research and innovation activities, while also ensuring inclusive and accessible engagement, contributes to more robust, user-centred and socially responsive innovation. An activity is more readily replicable when it is not only effective in one location, but also adaptable to different users, capacities, cultures, skills, working realities and local contexts. This lesson should inform future use of the D6.5 templates, checklists, feedback forms and replication tools.

7. Conclusions

D6.5 demonstrates that meaningful citizen engagement is a critical condition for achieving the Mission ocean and waters specific objectives for the Mediterranean seabasin and REMEDIIES objective of reducing plastic pollution in Mediterranean and to build upon plastic conscious society. Across the project, engagement worked best when it was connected to concrete places, visible problems and practical roles for participants. Beaches, rivers, marinas, islands, fishing shelters, schools, festivals, ports and protected areas became spaces where citizens and stakeholders could directly observe the plastic pollution challenge and contribute to solutions.

A key conclusion is that **engagement must be designed, not improvised**. Activities require a clear purpose, defined stakeholders, appropriate tools, safety planning, documentation standards, feedback mechanisms and a follow-up pathway. When these elements were present, REMEDIIES activities produced stronger results: clean-ups generated data and learning; monitoring tools became more understandable; workshops produced feedback and behavioural insights; fishers validated practical solutions; and policy workshops translated local evidence into recommendations to policymakers.

Another major conclusion is that **co-creation should be understood as practical influence**. It is not enough to say that citizens or stakeholders participated. The important question is what they contribution ment in the sense of helped shape, test, validate or improve. In REMEDIIES, co-creation appeared in many forms: fishers validating disposal station locations or fishing gear performance; citizens co-creating and testing zero-waste products; local actors adapting clean-up methods; Associated Regions translating REMEDIIES approaches into local infrastructure and citizens education; and policy workshop participants developing shared recommendations.

The REMEDIIES cases further show that **collection and valorisation must remain connected to prevention**. Clean-ups, fishing-net recovery, seafloor litter collection and Plastic Labs are valuable, but they should not imply that recycling or waste removal alone can solve marine plastic pollution. The strongest REMEDIIES activities used collection as an entry point for learning, material awareness, behavioural change and upstream reduction. This is particularly visible in the Santorini Plastic Lab, zero-waste cosmetics workshops and regenerative local value chain work.

The deliverable also concludes that **fishers, divers, local authorities, NGOs, schools, businesses and technical partners each play distinct and necessary roles**. No single stakeholder group can address marine litter and (micro)plastic pollution alone. Fishers contribute operational knowledge; divers reveal hidden underwater pollution; municipalities provide permissions, infrastructure and continuity; NGOs mobilise communities; schools and science centres support long-term learning; businesses and artisans test alternatives; and researchers ensure scientific quality. Effective engagement depends on recognising these roles early and designing activities around them.

Replication is another central conclusion. The Open Call Associated Regions show that REMEDIIES methods can be transferred beyond the original Demo Sites, but only through **local adaptation**. Replication should preserve the core engagement logic while adapting the format, partners, tools, infrastructure and communication to the local context. The toolkit included in D6.5 supports this process by offering templates, checklists and protocols that can be used before, during and after implementation.

Finally, D6.5 concludes that citizen engagement should be connected to **policy and systemic change**. Local action produces valuable experience, but long-term impact depends on whether this experience informs governance, funding, procurement, regulation, monitoring systems and replication strategies. The policy

workshops show how REMEDIES can move from local activities to wider recommendations for ocean restoration, plastic pollution prevention and circular transition.

In conclusion, D6.5 provides both an evidence base and a practical roadmap for citizen engagement and co-creation in marine litter reduction. It shows that effective engagement is not only about mobilising people, but about enabling them to contribute to evidence, action, learning, innovation and policy adaptation. Through its cases, guidelines and toolkit, the deliverable supports the continuation and replication of REMEDIES methods across Demo Sites, Associated Regions and future initiatives working towards plastic litter-free seas and waters beyond the Mediterranean sea basin.

8. Annexes

Annex 1. Activity planning, stakeholder mapping and co-creation design tools

Annex 1.1 Activity Planning Template

The Activity Planning Template should be used before any citizen engagement or co-creation activity. Its purpose is to help organisers define the basic design of the activity before implementation. It can be used for clean-ups, workshops, Plastic Labs, policy workshops, webinars, monitoring activities, fisher engagement, school activities, technology demonstrations or Open Call replication actions.

The template should include:

- activity title
- date and location
- REMEDIIES pillar
- engagement category
- activity purpose
- target group
- expected number and profile of participants
- organising partners
- local stakeholders involved
- tools, protocols or equipment needed
- communication and visibility needs
- safety and accessibility considerations
- expected outputs
- feedback method
- follow-up action

The template helps organisers avoid unclear engagement design. It also supports reporting because the expected outputs are defined before the activity takes place.

Template

Use this template before any citizen engagement or co-creation activity. It clarifies the purpose, audience, partners, tools, expected outputs, feedback method and follow-up.

Field	Information to complete
Activity title	
Date / timeframe	
Location / Demo Site / Associated Region	
Responsible partner	
Local partners involved	
REMEDIIES pillar	Detection & Monitoring / Collection & Valorisation / Prevention & Zero Waste / Cross-pillar
Engagement category	Raising Awareness / Action / Learning & Upscaling



Activity purpose	What should participation produce? Awareness, data, waste removal, feedback, testing, recommendations, local commitments, etc.
Target group	Citizens, volunteers, schools, fishers, divers, NGOs, municipalities, businesses, students, entrepreneurs, policy actors, etc.
Expected number and profile of participants	
Stakeholders and roles	Who organises, facilitates, provides scientific input, manages logistics, handles waste/data, communicates results?
Tools, protocols or materials needed	Apps, protocols, flags, checklists, workshop material, equipment, surveys, safety material, etc.
Health, safety and accessibility considerations	
Communication and visibility needs	Website update, social media, photos, branding, local press, invitations, participant briefing.
Expected outputs	Participants, waste collected, data entries, feedback forms, objects created, recommendations, videos, tools tested, etc.
Feedback method	Printed form, digital survey, QR code, group reflection, interview, observation notes.
Follow-up action	How will participants receive results or be invited to next steps?

Pre-activity confirmation

Check	Item	Notes / evidence
☐	Purpose is clear and agreed by partners.	
☐	Target group and expected role are clear.	
☐	Local partners and responsibilities are confirmed.	
☐	Tools, protocols and materials are ready.	
☐	Safety and accessibility have been checked.	
☐	Feedback method is prepared.	
☐	Expected outputs are defined.	
☐	Communication and visibility plan is prepared.	
☐	Follow-up pathway is defined.	

Annex 1.2 Stakeholder mapping template

The Stakeholder Mapping Template should be used when an activity depends on cooperation between several actors. This is particularly important for clean-ups, fisher engagement, Plastic Labs, local value chains, policy workshops, Open Call activities and infrastructure-based actions. The template helps organisers identify who needs to be involved, what role each actor should play and how they should be approached.



The template should map stakeholders according to:

- stakeholder name or type
- role in the activity
- level of influence
- level of interest
- expected contribution
- engagement method
- contact person
- risks or sensitivities
- follow-up needed

The cases show that local authorities, NGOs, schools, fishers, divers, volunteers, marina operators, artisans, merchants, recycling companies, waste operators, researchers and policy actors all have different roles. Mapping these roles early helps avoid gaps in implementation.

Template

Use this template to identify the stakeholders needed for successful implementation, especially where activities involve local authorities, NGOs, schools, fishers, divers, researchers, businesses, waste operators, policy actors or technical partners.

Stakeholder name / type	Category	Interest	Influence	Expected role	Engagement method	Risks / sensitivities	Follow-up needed

Stakeholder categories to consider

- Local authorities and municipal services
- Schools, universities and youth groups
- NGOs, community groups and volunteer networks
- Fishers, port users, marina operators and divers
- Waste operators, recycling companies and technical providers
- Local businesses, tourism operators, merchants and artisans
- Researchers, innovation partners and technology developers
- Policy actors, public agencies and related EU projects

Annex 1.3 Co-creation design canvas

The Co-Creation Design Canvas should be used when citizens or stakeholders are expected to shape, test, adapt or validate something. This may include a monitoring protocol, digital tool, clean-up process, fishing-net disposal station, gear made with biodegradable materials test, zero-waste product, local value chain, Plastic Lab, workshop format, policy recommendation or replication model.

The canvas should help organisers answer five questions:

1. What is being co-created, tested or validated?
2. Who needs to contribute?
3. What kind of contribution is expected?
4. How will feedback be collected?
5. What can change as a result of the feedback?

This tool is important because co-creation should not be used as a vague term. If nothing can be influenced, tested or adapted, the activity may still be useful, but it should not be described as co-creation.

Template

Use this canvas when participants or stakeholders are expected to shape, test, adapt or validate something. It helps avoid using co-creation as a vague term by clarifying what can actually be influenced by participation.

Field	Information to complete
1. What is being co-created, tested, adapted or validated?	Examples: protocol, app, clean-up process, disposal station location, gear made with biodegradable materials, workshop format, zero-waste product, local value chain, policy recommendation.
2. Who needs to contribute?	Which citizens, stakeholders, experts, local actors or users have relevant knowledge?
3. What contribution is expected?	Ideas, field observations, testing, feedback, validation, design input, local knowledge, operational comments, policy recommendations.
4. What can change as a result?	Clarify which elements can be adapted and which are fixed because of scientific, safety, regulatory or project constraints.
5. How will feedback be collected?	Survey, discussion, interview, debrief, observation, workshop notes, testing record, app feedback, policy recommendation record.
6. How will feedback be used?	Tool improvement, activity redesign, protocol clarification, recommendation, replication guidance, partner reporting.
7. How will participants be informed of results?	Email, website update, meeting, report, public presentation, follow-up event.

Co-creation quality check

Check	Item	Notes / evidence
☐	The object of co-creation is clearly defined.	
☐	The right knowledge holders are involved.	
☐	Participants know what they can influence.	

[]	Feedback method is realistic for the audience.	
[]	There is a way to document and use feedback.	
[]	The activity team agrees how results will be communicated back.	

Annex 2. Feedback collection form

Annex 2 provides a short Feedback Collection Form that can be adapted for different activity types. Feedback is essential for co-creation because it helps organisers understand what participants learned, what worked, what was difficult, and what should be improved in future implementation.

The form can be used after clean-ups, workshops, Plastic Labs, webinars, monitoring activities, fisher engagement, policy workshops and Open Call activities. It can be used as a printed form, digital survey, QR code, short interview guide or facilitated discussion prompt.

The basic feedback questions should cover:

- Did you understand the purpose of the activity?
- What did you learn?
- What was clear or unclear?
- What worked well?
- What was difficult?
- Were the tools, instructions or materials useful?
- Would you participate again?
- What should be improved?
- What follow-up would you like to see?
- Was the activity accessible and understandable for different participant groups?
- Were any barriers related to language, timing, mobility, digital access, confidence, safety or physical effort identified?
- Did participants feel that they had a meaningful role?
- Were any groups missing from the activity or consultation?
- What should be adapted to make the next activity more inclusive?

For specific activities, additional questions should be added. App-based monitoring should ask about tool usability. Clean-ups should ask whether sorting and safety instructions were clear. Fisher engagement should ask about operational feasibility, location, time, cost and effort. Plastic Labs should ask about safety, learning and material understanding. Zero-waste workshops should ask about product usability and willingness to adopt. Policy workshops should ask whether the recommendations reflect the discussion.

Feedback should not remain unused. It should inform future activity design, tool improvements, workshop adaptation, policy recommendations and replication guidance.

Template

This form can be adapted for clean-ups, workshops, Plastic Labs, webinars, monitoring activities, fisher engagement, policy workshops and Open Call activities. It can be used as a printed form, online survey, QR form, interview guide or facilitated discussion prompt.

Field	Information to complete
Activity title	
Date	
Location	
Participant profile	Citizen / volunteer / student / fisher / business / municipality / NGO / researcher / other
Optional contact for follow-up	

Core feedback questions

Did you understand the purpose of the activity?

Answer: _____

What did you learn?

Answer: _____

What was clear?

Answer: _____

What was unclear or difficult?

Answer: _____

Were the tools, instructions or materials useful?

Answer: _____

Did you feel safe and able to participate?

Answer: _____

What worked well?

Answer: _____

What should be improved?

Answer: _____

Would you participate in a similar activity again?

Answer: _____

What follow-up would you like to see?

Answer: _____

Optional activity-specific questions

- App-based monitoring: Was the app easy to use? Which step was difficult?
- Clean-ups: Were sorting, weighing and safety instructions clear?
- Fisher engagement: Was the proposed action feasible in terms of time, cost, safety and effort?
- Gear testing: How did the material perform in handling, catch, durability, fouling and hauling?
- Plastic Labs: Did you understand the plastic lifecycle, machine process and safety rules?
- Zero-waste workshops: Would you use or recommend the product or solution tested?
- Policy workshops: Do the recommendations reflect the discussion? What is missing?

Annex 3. Citizen science protocols

Annex 3 gathers or references the citizen science protocols and supporting educational materials used in REMEDIIES engagement activities. These materials are important because they help partners move from general participation to structured citizen science, field documentation and practical learning.

Annex 3 includes three sub-annexes:

- **Annex 3.1** Citizen Science Protocol for Beach Litter Clean-Ups
- **Annex 3.2** Citizen Science Protocol for the Implementation of Zero-Waste Seaweed Coatings for Cosmetics
- **Annex 3.3** Citizen Science Protocol for Beach Plastic Monitoring Using Aerial Drones

These materials should be used when citizens contribute to monitoring, reporting, data collection, protocol testing or structured feedback. This includes beach litter monitoring, clean-up data recording, app-based reporting, plastic identification, zero-waste workshop surveys and related citizen science activities.

Before using these protocols and materials, organisers should clarify whether the activity is expert-led monitoring, citizen-supported monitoring or full citizen science. This distinction matters because the level of training, facilitation and quality assurance should match the level of citizen contribution.

For citizen science activities, organisers should ensure that:

- the citizen science purpose is clear
- the relevant protocol or tool has been selected
- participant roles are defined
- training or briefing is prepared
- data categories are understandable
- quality assurance is considered
- safety and ethics are addressed
- GDPR and photography practices are clear
- feedback to participants is planned
- results will be stored or reported properly

Annex 3 should be used together with the case studies on the Shoreline ML App, beach litter monitoring, clean-ups, and zero-waste workshops.

Annex 3.1 - Citizen Science Protocol for Beach Litter Clean Ups⁴

1. Title

Beach Litter Clean-Up: Citizen Science Action for the REMEDIIES Project

2. Introduction

Marine litter, especially plastics, poses a significant threat to coastal and marine ecosystems, biodiversity, and the social and economic value of coastal areas. Beach clean-ups are a practical, visible, and inclusive

⁴ Zenodo link: <https://zenodo.org/records/18695293>

citizen science action that mobilises communities to remove litter while documenting the impact of their effort.

This protocol provides step-by-step guidance for planning and implementing a safe and effective Beach Litter Clean-Up within the REMEDIIES project. Citizens play a key role by participating in the clean-up, separating collected materials, and documenting results (e.g., participants, weights, photos) using the REMEDIIES Citizen Science tools.

The activity supports REMEDIIES objectives by raising awareness, enabling structured citizen engagement, and contributing to local actions that reduce plastic pollution and advance the Mission Restore Our Ocean and Waters targets.

3. Objectives

- Remove beach litter in a safe, organised, and environmentally respectful way.
- Engage and empower citizens and local stakeholders to take action against marine litter.
- Ensure basic, harmonised documentation of clean-up outputs (participants, weights, photos) to support communication and impact reporting.
- Promote source-reduction awareness by highlighting common litter types and local drivers of pollution.

4. Target Group

This activity is suitable for organised citizen groups and the general public, including youth groups, schools (with supervision), coastal communities, NGOs, local authorities, and company volunteer teams. Participation should be adapted to local conditions and safety requirements.

5. Materials & Tools Needed

Core equipment and materials for a beach clean-up:

- Table (for organising materials and registration).
- Smartphone(s) for documentation and optional use of the REMEDIIES Citizen Science App.
- Camera (smartphone acceptable).
- Dynamometer scale (or equivalent) for weighing collected waste.
- Printed clean-up data sheet (VLPF format) as a backup.
- Protective gloves of different sizes for all participants.
- Litter pickers (optional but useful).
- Coloured waste bags to separate plastics from non-plastics (reported separately).
- First aid kit.
- Visibility/identification items (optional): t-shirts, flags, caps, posters, etc., with REMEDIIES and EU donor logos where relevant.

Digital tools:

- REMEDIIES Citizen Science App (for recording types of collected litter, uploading photos, and entering bag weights). Download the app [here](#).

6. Step-by-Step Process

6.1 Preparation

Preparation is essential for participation, safety, and effective waste handling. Before confirming the date and location, coordinate with relevant authorities and consider weather, tourism seasons, and biodiversity sensitivity.

Site identification (recommended criteria):

- Public access all year (no private/closed areas).
- Easy and safe access for participants and for waste removal logistics.
- Low to moderate beach slope (approx. 1-45°), avoiding shallow tidal mudflat areas.
- Open shoreline sections that are walkable (not obstructed by breakwaters/jetties).
- Close to a street and with nearby parking or public transport.
- Visible litter accumulation hot spots.

Operational scouting steps:

1. Scout the area and identify litter hot spots.
2. Record the geographical coordinates of the selected hot spot(s) using a GPS-enabled smartphone.
3. Take photos and/or short video clips of the overall area and hot spots (useful for impact communication).

Authorisations, logistics, and safety:

4. Contact the city/local authority departments for any required authorisations.
5. Coordinate with the waste management authority to arrange removal, final disposal, and any special logistics (provide location, timetable, and final pick-up point).
6. Secure appropriate insurance for the activity (as required locally).
7. Identify and brief a responsible safety focal point (first aid kit, risk awareness, incident response).
8. Ensure the clean-up will not threaten endangered or protected species or sensitive habitats; consult protected area management authorities where relevant.

Pre-event communication (start approx. 2-4 weeks before):

9. Date, start and end time of the clean-up.
10. Exact location and a clearly visible meeting/information point (easy to reach, near transport/parking).
11. Contact person (phone and email).
12. Partners/organisers/sponsors (if applicable).
13. Basic recommendations for participants (closed shoes, gloves, sun protection, water, etc.).
14. Event flyer with logistics and time schedule (recommended release 10-14 days before).

6.2 Clean-Up Implementation

On the day of the clean-up:

15. Organisers arrive at least 30 minutes before the announced start time to set up materials and the meeting point.
16. Welcome participants and deliver a short briefing covering: (a) the area to be cleaned; (b) safety rules (do not lift heavy items; avoid dangerous areas); (c) respect for wildlife and the environment; (d) confirmation that everyone has gloves and bags; (e) reminder of end time; (f) where waste bags will be gathered for collection.
17. Ask participants to use two different bags: one for plastics and one for non-plastics.
18. Keep at least one organiser at the meeting/information point to welcome late volunteers.
19. Provide a presentation/training on the different types of plastics found on the beach, with the support of the REMEDIATION Flag on the Different Types of Plastics.

20. Provide continuous assistance and supervision during the activity.
21. About 30 minutes before the end, guide teams towards the waste collection point to close the event smoothly.
22. Ensure all participants leave the area safely and that collected waste is stored/disposed of according to the waste management authority's instructions.

6.3 Documentation and Data Recording

Before the waste is removed by the waste management authority, record the following minimum information:

- Number of participants.
- Total weight of plastics collected (kg).
- Total weight of non-plastics collected (kg).
- Photos of the overall collected waste bags (and group photo, if appropriate).

Record and store this information using the REMEDIES Citizen Science App whenever possible. If needed, enter bag types and weights via the REMEDIES web portal after the event.

Using the REMEDIES Citizen Science App:

23. Download the REMEDIES Citizen Science App from Google Play or the [Apple App Store](#).
24. Organiser: log in to the web portal and create a new clean-up campaign (name, date/time, location, description).
25. Organiser: create one or more groups and assign a coordinator to each group (email required).
26. Coordinator/participants: log in or sign up via the mobile app and join the correct group.
27. During the clean-up: add collected litter in the app using the available categories.
28. End the clean-up session and upload group photos and bag photos (coordinator).
29. Record bag types and weights (kg) per bag either in the portal (Bags Details table) or in the mobile app (Cleanup > Manage Bags).

GDPR and data privacy:

The REMEDIES citizen tools follow GDPR principles (consent, transparency, and data control). Participants should be informed about data processing and photography practices according to local requirements.

Post-event communication (recommended):

- Share date and area cleaned, number of participants/partners, weights collected (plastic and non-plastic), and a short photo gallery.
- Highlight any follow-up actions or next clean-up dates to maintain engagement.

7. Additional Materials

- [Download the REMEDIES Citizen Science App](#), created by Infordata, here.
- [REMEDIES Citizen Science App - User Manual](#) (step-by-step guide for organisers, coordinators, and participants), created by Infordata, here.
- [REMEDIES Citizen Science App - Video Tutorial](#), created by Infordata, here.
- [REMEDIES Citizen Science App - Infographic](#), created by Infordata, here.
- [REMEDIES Flag on the Different Kind of Plastics \(vertical\)](#) and [horizontal](#), created by Impact Hub Athens, University of Maribor, and Venice Lagoon Plastic Free.
- [REMEDIES Citizen Science Manifesto](#), created by Impact Hub Athens, here.

- [The recording of the PLASTIC FANTASTIC webinar](#) on plastic identification and beach litter monitoring, with educational content from Venice Lagoon Plastic Free and University of Maribor, here.
- [REMEDIES Beach Litter Monitoring and Clean up At a Glance - Do's and Don'ts](#), created by Venice Lagoon Plastic Free, here.

The present protocol was drafted by [Impact Hub Athens](#) with the support of [Venice Lagoon Plastic Free](#), [Infordata](#), [NIC](#) and [VITO](#).

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Annex 3.2 - Citizen Science Protocol for the Implementation of zero waste seaweed coatings for cosmetics⁵

Zenodo link: <https://zenodo.org/records/18456407>

Workshop-based citizen engagement methodology for plastic reduction in cosmetics

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1. Introduction

Discover how innovative seaweed-based coatings are transforming the cosmetics industry by eliminating single-use plastic bottles. Each dissolvable “cosmetic ball” replaces traditional packaging, offering a fully biodegradable, zero-waste alternative that reduces plastic at the source.

This technology supports:

- Major plastic waste reduction - tackling over 100 billion single-use units produced globally each year.
- Sustainable habits - encouraging individuals, businesses, hospitality, and sports centres to switch to effortless, eco-friendly solutions.
- High-impact sectors - perfect for tourism, hotels, gyms, and high-traffic areas where waste is generated the most.
- Explore the future of sustainable cosmetics - plastic-free, zero-waste, and powered by nature.

2. Objectives

The objectives of this citizen science activity are to:

- Raise awareness about plastic waste generated by cosmetic products;
- Introduce zero-waste and circular economy principles applied to cosmetics;
- Enable hands-on participation in the preparation and testing of seaweed-coated cosmetic formulations;
- Encourage sustainable consumption habits through experiential learning;
- Collect feedback, baseline knowledge, and post-workshop insights from participants;

⁵ **Zenodo link:** <https://zenodo.org/records/18456407>

- Support structured reporting of citizen engagement activities within the REMEDIIES framework.

3. Target Group

This activity is suitable for:

- General public and local communities;
- Students (secondary and higher education);
- Tourism, hospitality, and sports centre staff;
- NGOs, educators, and sustainability practitioners;
- Participants of public engagement events, festivals, or workshops.

Participation can be adapted to different group sizes, age categories, and event formats.

4. Methodological Framework - Workshop Structure

The workshop is organised into four main phases, following a structured citizen science engagement pathway: awareness → experimentation → reflection → reporting.

4.1 Part 1 - Building awareness and collection of the baseline knowledge and interest of the participants

Purpose: To introduce zero-waste concepts, assess participants' existing knowledge, and create an interactive learning environment.

Activities include:

- Introduction to zero-waste philosophy and circular economy principles;
- Interactive word cloud activity ("What does zero-waste mean to you?");
- Short quizzes on cosmetic formulations (e.g. water content in shampoos);
- Explanation of key cosmetic ingredients (surfactants, glycerol);
- Discussion on environmental and skin impacts of cosmetic ingredients.

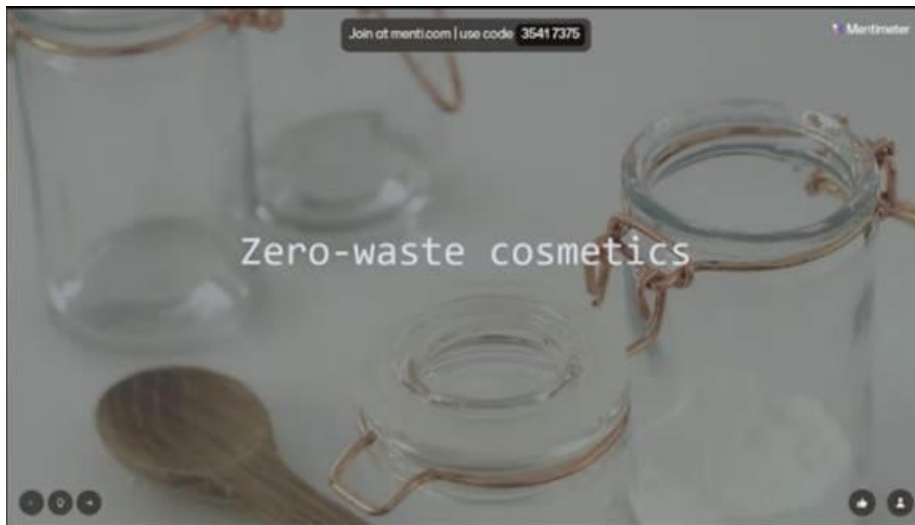
Tools used:

- Mentimeter or equivalent interactive survey platform;
- QR codes for anonymous participation;
- Visual slides and ingredient illustrations.

The awareness and introductory phase of the workshop could be supported by visual presentation materials (slides). Below illustrative examples are available, which serve as an example of how zero-waste concepts and cosmetic-related knowledge can be communicated to participants. The included slides represent example content used during the previous workshops and may be adapted to different audiences, event formats, or local contexts.

Slide 1 - Title Slide

"Hello everyone, and welcome to today's workshop titled Zero-Waste Cosmetics. Today, we'll explore how cosmetic products can be designed, used, and reimaged in a more sustainable way - with minimal waste and packaging. This session will be interactive, so I encourage you to take part in the activities throughout."



Slide 1 - Title Slide

Slide 2 - Instructions / QR Code

“Before we begin, please take your phone or laptop and scan the QR code on the screen. This will take you to our Mentimeter page, where you’ll be able to vote, answer questions, and share your thoughts during the workshop. Don’t worry - all responses are anonymous. The goal is simply to collect everyone’s ideas and start a good discussion.”

(pause to allow everyone to connect)



Slide 2 - Instructions / QR Code

Slide 3 - What does zero-waste mean to you?

“To start off, let’s see what zero-waste means to you personally. Type in the first few words that come to mind. As you do, your answers will appear in the word cloud on the screen - the more often a word appears, the bigger it gets.”

(after responses appear)

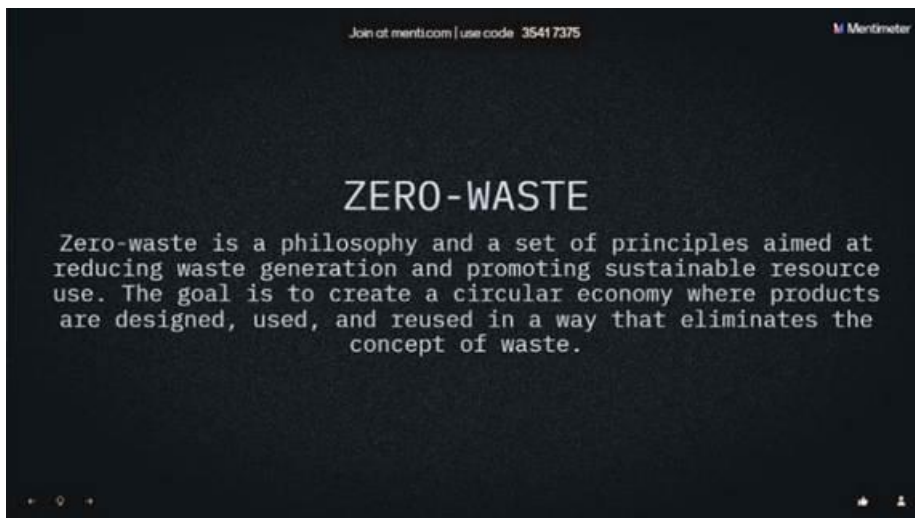
“Great! I see words like no packaging, recycling, sustainability, less waste - these are exactly the core ideas behind zero-waste thinking. Let’s build on these together.”



Slide 3 - What does zero-waste mean to you?

Slide 4 - Definition of Zero-Waste

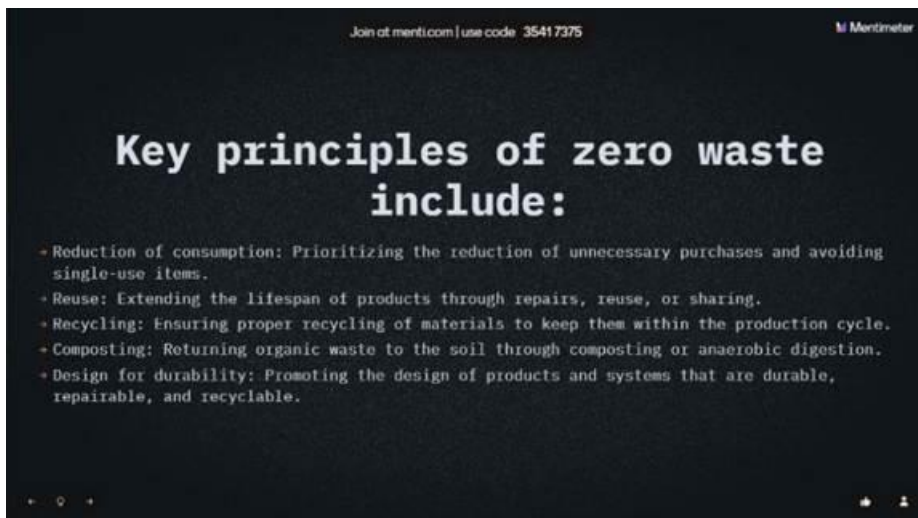
“So, what exactly is zero-waste? It’s not just a trend, but a philosophy - a set of principles aimed at reducing waste generation and promoting the sustainable use of resources. The goal is to create a circular economy, where products are designed, used, and reused in a way that eliminates the very concept of waste. It’s about changing how we think - from disposable to reusable, from linear to circular.”



Slide 4 - Definition of Zero-Waste

Slide 5 - Key Principles of Zero-Waste

“The zero-waste approach is built on a few key principles: Reduce consumption: Buy less and avoid unnecessary single-use products. Reuse: Extend the life of products through repairing, reusing, or sharing. Recycle: Ensure proper recycling of materials to keep them in the production loop. Compost: Return organic waste to the earth through composting or digestion. Redesign: Encourage the design of durable, repairable, and recyclable products and systems. We’ll see how these ideas apply to cosmetics in just a moment.”



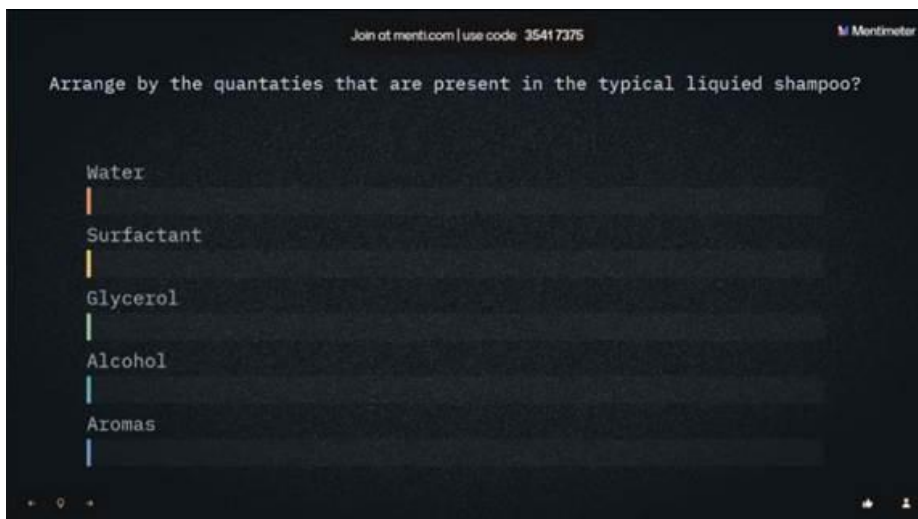
Slide 5 - Key Principles of Zero-Waste

Slide 6 - Which ingredient is most common in shampoos?

"Let's make things more concrete - let's talk about shampoos! Here's a quick quiz: Which component do you think is most present in shampoo? Is it distilled water, glycerol, surfactant, alcohol, or fragrance? Make your selection on your device."

(pause for voting)

"I can see that most of you chose distilled water - and that's absolutely correct! Let's take a closer look at why that matters."



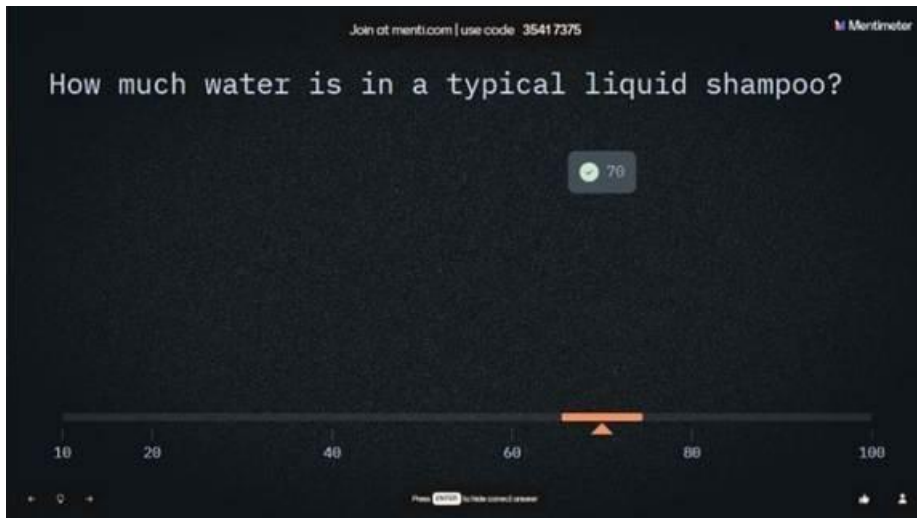
Slide 6 - Which ingredient is most common in shampoos?

Slide 7 - How much water is in a regular shampoo?

"Next question - how much water do you think a typical liquid shampoo contains? Enter your guess as a percentage."

(pause for results)

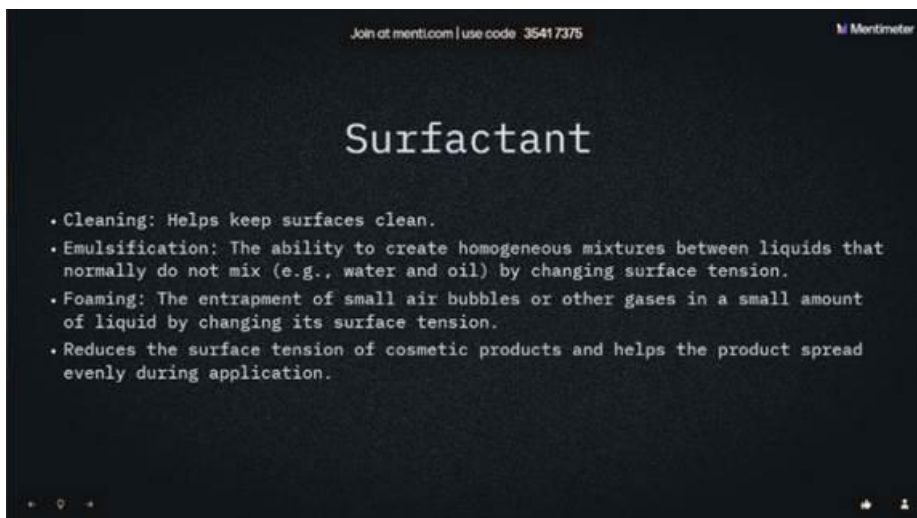
"The correct answer is around 70% - more than half of a regular shampoo bottle is simply water! That means more plastic packaging, heavier transport, and more energy used in production. This is one of the main reasons why zero-waste cosmetics promote solid, concentrated forms - they eliminate unnecessary water from the formulation."



Slide 7 - How much water is in a regular shampoo?

Slide 8 - Surfactant

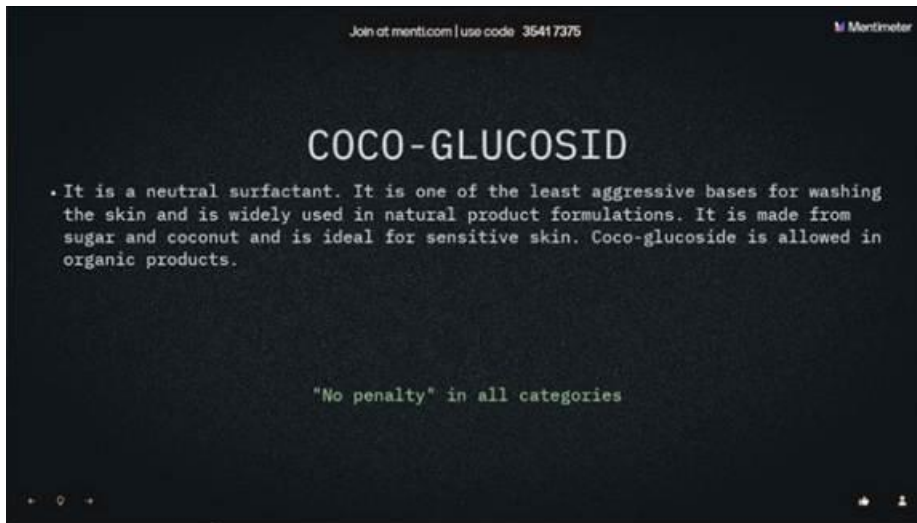
“Now, let’s look at one of the key ingredients: the surfactant. Surfactants are surface-active agents that make cleaning possible. They help mix water and oil, create foam, and remove dirt and grease. Without surfactants, shampoo wouldn’t lather or cleanse properly - but some of them can be quite harsh on the skin and the environment. So, choosing the right one is crucial.”



Slide 8 - Surfactant

Slide 9 - Coco-Glucoside

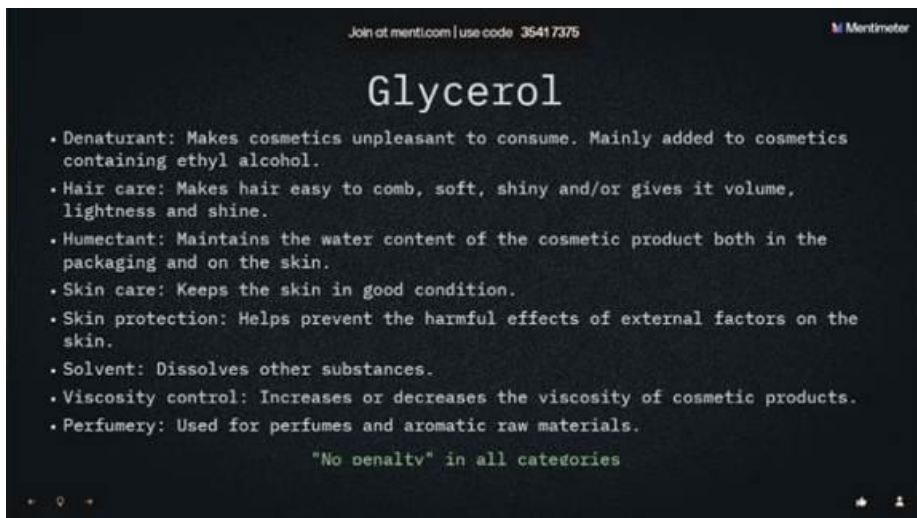
“One of the gentlest surfactants is Coco-Glucoside. It’s a natural, plant-based surfactant made from sugar and coconut. It’s very mild, making it ideal for sensitive skin, and it’s also approved for use in certified organic cosmetics. So, when you’re reading ingredient labels, this is one of the names you want to look for!”



Slide 9 - Coco-Glucoside

Slide 10 - Glycerol

"Another common ingredient is Glycerol, or glycerin. It serves several purposes - it acts as a humectant that retains moisture in both the skin and the product, helps protect the skin from environmental stress, and makes hair soft, shiny, and easy to comb. It also helps maintain the right consistency of the cosmetic product. In zero-waste cosmetics, we prefer using plant-based glycerine rather than synthetic versions."



Slide 10 - Glycerol

End of Part 1

"So, that wraps up the first part of our workshop. Invitation for participants to participate in survey about zero-waste cosmetics (example of the survey - share our link). You now understand the key principles of zero-waste and how they relate to cosmetic formulations. In the next section, we'll move into practice - creating simple, sustainable cosmetic products and seeing how small changes in formulation can make a big environmental difference."



End of Part 1 - Survey about zero-waste cosmetics

4.2 Part 2 - Hands-on Workshop: Zero-Waste Cosmetic Preparation

Purpose: To actively involve participants in the preparation and demonstration of zero-waste cosmetic solutions using seaweed-based coatings.

Activities include:

- Demonstration of seaweed-based coating technology;
- Step-by-step preparation of cosmetic balls (shampoo or shower gel);
- Explanation of material selection and sustainability benefits;
- Optional participant involvement depending on safety and event conditions.

Invitation to scan or share the slides on the monitor for participants to follow the steps. There are three variations of the demonstration that can be tailored for the event type or other requirements.



Figure 1: QR codes with the link to the guidelines for step-by-step production of zero-waste seaweed coating cosmetics.

4.3 Part 3 - Harvesting of the results

Purpose: To capture learning outcomes, behavioural reflections, and user experience feedback.

Data collected may include:

- Participant feedback on zero-waste awareness;
- Perceived usability of cosmetic balls;
- Willingness to adopt zero-waste cosmetics in daily life;

- Suggestions for improvement or further development.

Tools used:

- Post-workshop surveys accessed via QR code;
- Optional at-home testing surveys for product use in real-life settings.

Workshop concluding remarks example:

“Thank you for joining our zero-waste cosmetics workshop series. You’ve learned how to reduce waste, reuse ingredients, and design sustainable routines. We hope you leave inspired to apply these practices at home, share the knowledge with others, and continue exploring innovative, eco-friendly cosmetic solutions. You are further invited to co-create methodology via provide feedback on the workshop they participated.”

QR codes to surveys for providing participant feedback:

The following QR codes support the harvesting of learning outcomes and behavioural insights, enabling participants to reflect on their journey from awareness to practical application of zero-waste solutions.

Post-Workshop Reflection Survey:

Participants are invited to complete a short survey reflecting on their knowledge, perceptions, and attitudes towards zero-waste cosmetics after the workshop. The survey builds on the previously answered baseline questions, allowing comparison between initial understanding and post-workshop learning outcomes.



Figure 2: QR code for participants after the workshop.

Zero-Waste Cosmetics Testing & Feedback Survey:

As a final step, participants are encouraged to test the produced zero-waste shampoo or shower gel balls in an environment of their own choosing (e.g. home, gym, travel). Through this survey, participants share their user experience, usability feedback, and reflections on adopting zero-waste cosmetics in daily routines.

This step supports the transition from educated to engaged and ultimately conscious plastic-free or zero-waste individuals, completing the innovation and behavioural change pathway.



Figure 3: QR code to zero-waste cosmetics with seaweed coating product testing survey.

4.4 Part 4 - Workshop impact reporting to REMEDIIES dashboard by the workshop facilitator

Purpose: To ensure harmonised reporting of citizen science activities within the REMEDIIES project.

After the workshop, organisers are encouraged to:

- Report the event through the REMEDIIES dashboard;
- Upload basic metadata (date, location, number of participants);
- Indicate the type of activity (workshop, demonstration, citizen engagement);
- Link survey results where applicable;
- Promote zero-waste cosmetic practices through social media or newsletters.



Figure 4: QR code with the link to survey to report the workshops or event to REMEDIIES dashboard.

5. Ethics, Data Protection, and GDPR

All data collected during the workshop should be handled in accordance with GDPR principles, including:

- Voluntary participation and informed consent;
- Anonymised survey responses;
- Transparent communication about data use;
- Responsible use of photographs and documentation materials.

Participants should be informed in advance about data collection and reporting practices.

Additional Materials available on: <https://remedies-for-ocean.eu/citizen-science-demonstration-protocol-for-the-preparation-of-zero-waste-seaweed-coatings-for-cosmetics/>

This protocol was developed within the framework of the REMEDIES project and contributes to the EU Mission “Restore Our Ocean and Waters”.

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Annex 3.3 - Citizen Science Protocol for beach plastic monitoring using aerial drones⁶

1. Introduction

1.1 Background and Importance

Plastic pollution on beaches is a pressing environmental issue characterized by the accumulation of plastic debris, ranging from bottles and bags to microplastics, along coastal areas worldwide. This pollution not only tarnishes the natural beauty of beaches but also poses significant threats to marine ecosystems, wildlife, and human health.

Monitoring plastic pollution on beaches is crucial for several reasons: Environmental Impact, Human Health Concerns, Economic Impact, Policy and Regulation, Public Awareness. The situation is more crucial for wild beaches with bad accessibility. Technology is used in this context to resolve such problems.

1.2 Objectives

- Identify the most affected areas.
- Quantify plastic pollution on beaches.
- Track pollution trends over time.

2. Materials and Methods

2.1 Equipment

2.1.1 Drone

DJI MAVIC AIR (MAVIC AIR 3 in future).

The DJI Mavic Air is equipped with a high-quality camera with the following specifications:

- Sensor: 1/2.3" CMOS, 12 megapixels
- Lens: 85° FOV, 24 mm equivalent, f/2.8 aperture
- Image Resolution: 12 MP (4056x3040)
- Video Resolution:
- 4K: 3840x2160 at 24/25/30 fps
- 2.7K: 2720x1530 at 24/25/30/48/50/60 fps
- FHD: 1920x1080 at 24/25/30/48/50/60/120 fps
- HD: 1280x720 at 24/25/30/48/50/60/120 fps
- Image Formats: JPEG, DNG (RAW)
- Video Formats: MP4, MOV (H.264)

⁶ Zenodo link: <https://zenodo.org/records/18694946>



Drone equipment used for aerial beach plastic monitoring.

The DJI Mavic Air has a battery life that supports up to 21 minutes of flight time under optimal conditions. Here are some additional details:

- Battery Type: Intelligent Flight Battery
- Capacity: 2375 mAh
- Voltage: 11.55 V
- Energy: 27.43 Wh
- Weight: Approximately 140 grams
- Charging Time: Approximately 55 minutes using the DJI charger

2.1.2 Software

Pilot and flight planning software.

For piloting and flight planning with the DJI Mavic Air, several software options are available that provide comprehensive control and planning capabilities. We use: DJI GO 4.

DJI GO 4

Features:

1. Flight Control: Real-time video feed, flight telemetry, and aircraft control.
2. Camera Settings: Adjust camera settings, including resolution, frame rate, ISO, and more.
3. Intelligent Flight Modes: Access to features like ActiveTrack, QuickShots, TapFly, and more.
4. Flight Data: View and record flight data, including battery status, GPS signal strength, and flight logs.

Compatibility: Available for both iOS and Android devices.

Image analysis software

Our model IA is designed to detect plastic debris in general. A first improvement is the counting of the number of debris detected and a second improvement is also underway with the knowledge of several types of plastic (bottle, Cap, Goblet, Bag ..).

Label Studio: Open-source tool for data labeling, essential for training ML models. User-friendly interface for annotating text, images, audio, and video. Supports collaboration, automation, and integrates with ML frameworks.

- mean Average Precision at 0.5 threshold: mAP@0.5 = 77.03%
- mean Average Precision at 0.95 threshold: mAP@0.95 = 68.17%

- Precision = 71.47%
- Recall = 78.09%
- F1 score = 74.63%

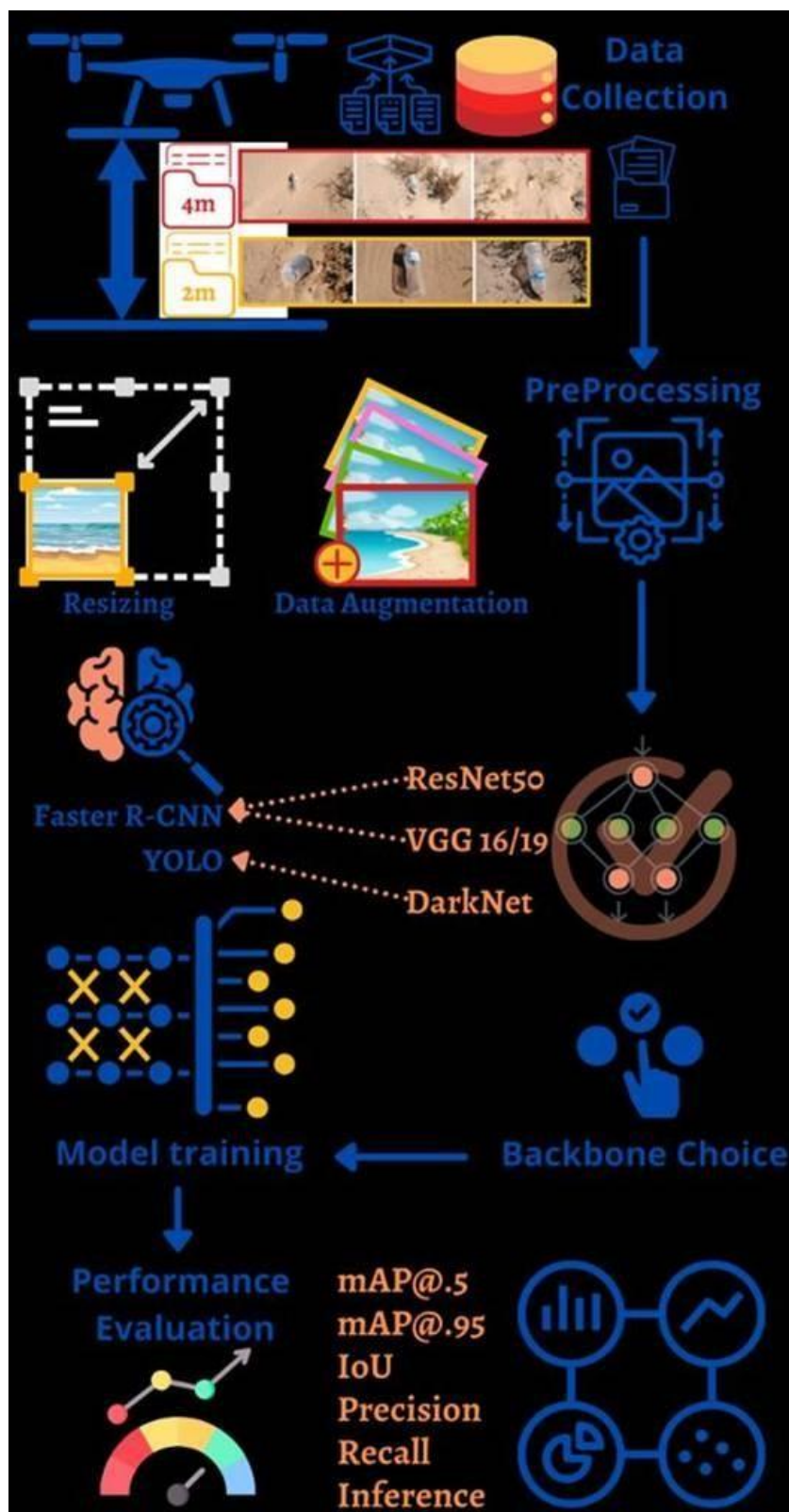


Image analysis workflow shown in the source protocol.

Height influences detection accuracy: comparative study confirms this.

Flight Altitude : 4m



Flight Altitude : 2m



Detection examples from different flight altitudes.

2.2 Study Area

2.2.1 Location

- Sadia Beach, site of biological and ecological interest Moulouya: Eastern Morocco, like all the regions of Morocco, is well known for the diversity of its ecosystems, which include forests, steppes and wetlands.
- Exact location 35.123401, -2.347291

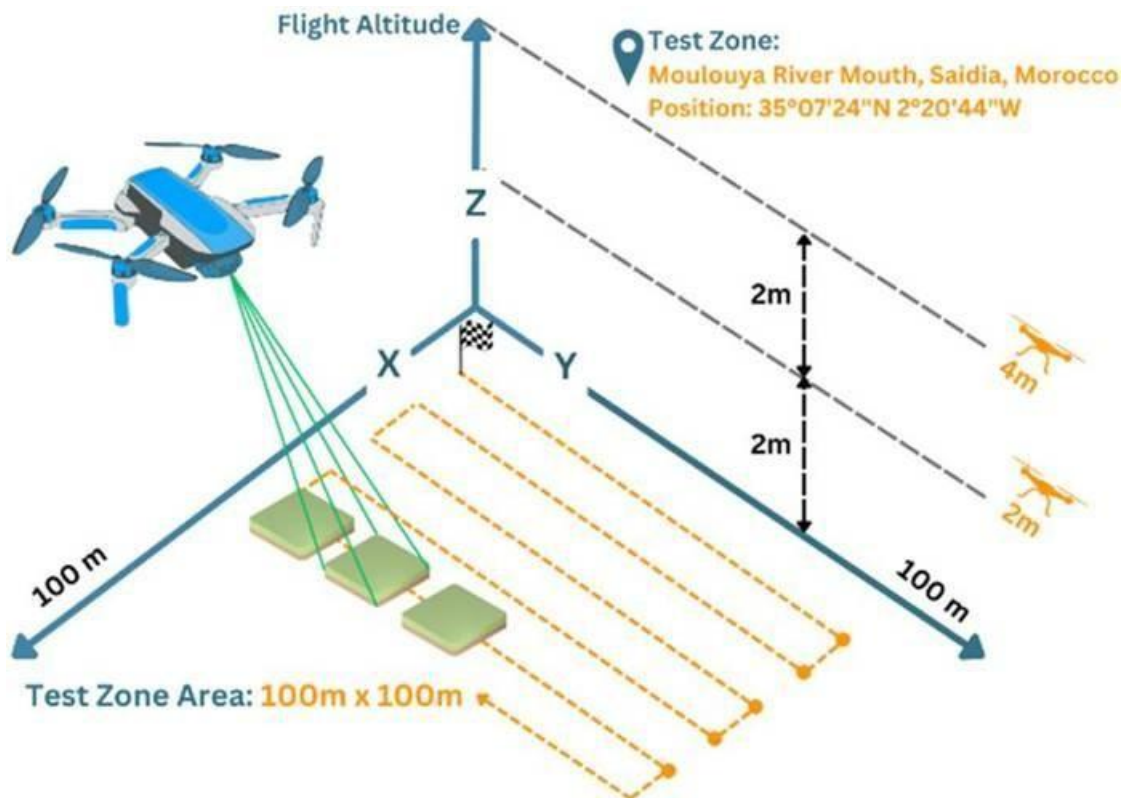
2.2.2 Monitoring Period

- Frequency of flights: Three months (every time a seasonal survey is made)
- Maximum Wind Speed for Flight: Max 5m/s

2.3 Flight Plan

- Flight altitude: 2m
- Flight speed: 1m/s (we can go faster, a study will be carried out to find the optimum speed to maximize flight time and the percentage of detection)
- Image with 20% image overlap for complete coverage.
- Flight path: zigzag flight path with 1m step (the step size can be increased, but a study must be carried out to find the best step size to minimize flight time, maximize the detection percentage and minimize the overlap area) to cover the monitoring area

At this speed, it takes almost 47 minutes to fly over the 100*28m zone. We have 3 batteries to cover this zone with this slowest and most precise mode.



Flight plan diagram for the monitored test zone.

3. Data Collection

3.1 Pre-flight Preparation

Drone inspection:

- Check the Drone Exterior,
- Inspect the Battery,
- Inspect the remote controller for any physical damage or loose components,
- Power on the drone and check the camera and gimbal functionality.
- Connect the drone to the DJI GO 4 app and verify flight settings such as return-to-home altitude, maximum flight altitude, and intelligent flight modes.
- Conduct a short test flight in a safe and open area to verify the drone's stability and responsiveness.
- Maximum Wind Speed for Flight: Max 10m/s (we recommend 5m/s)

3.2 Flight Execution

- Follow the flight plan to cover the monitoring area.
- Real-time control via laptop screen, but model performance is less reliable given the model's high computational resource requirements.
- Record videos of flight coverage of the area for asynchronous analysis on a powerful server video to be uploaded [here](#) with file format: saidia_30_Nov_2023.avi

4. Data Analysis

4.1 Image Processing

- Record videos of flight coverage of the area for asynchronous analysis on a powerful server video to be uploaded [here](#) with file format: saidia_30_Nov_2023.avi.

- Videos correction.

4.2 Detection and Quantification of Plastic Debris

- The UMP technical team will process the video within 24 to 72 hours and will upload a video with the plastic box waste on the same file. saidia_30_Nov_2023_Box.avi.
- Once the counting system is up and running, the resulting video will contain the localized plastic waste and its count. saidia_30_Nov_2023_Box_Count.avi.
- In the phase where several plastic classes will be finalized, the resulting video will contain the classes with their cumulative numbers saidia_30_Nov_2023_Box_Count_Classes.avi.
- Comparison of automatically detected results with the manually performed operation to calculate model accuracy.

4.3 Mapping Debris

- Create maps showing the spatial distribution of plastic debris.
- Analyze spatio-temporal trends.

5. Reporting and Communication

5.1 Report Writing

- Standardized format for reports.
- Include maps, graphs, and statistics.

5.2 Sharing Results

- With local authorities.
- With local communities.
- Scientific publications and presentations.

6. Safety and Ethics

6.1 Operational Safety

- Compliance with local regulations regarding drone flights.
- Protocols for emergencies (drone failure, adverse weather conditions).

6.2 Ethical Considerations

- Respect the privacy of people on the beaches, a deep learning model is being developed to hide people's faces in recordings.
- Minimize the environmental impact of flight operations.

7. Conclusion

- Summary of the objectives and importance of monitoring.
- Future perspectives and recommendations to improve the protocol.

The present protocol was drafted by [MOH](#) and [Infordata](#).

Contributors/Authors: Mounir Grari, Alae-eddine Barkaoui, Marko Petelin, Nicola Zuccato, Samuel Zidaric

Annex 4. Replication checklists

Annex 4 includes the practical checklists referred to throughout the deliverable. The checklists should be used before, during and after implementation to support quality, safety, documentation and replication. They are designed as practical prompts rather than long reporting tools.

Annex 4 includes eleven sub-annexes:

- **Annex 4.1** Activity Planning Checklist
- **Annex 4.2** Stakeholder Mapping Checklist
- **Annex 4.3** Co-Creation Readiness Checklist
- **Annex 4.4** Citizen Science Readiness Checklist
- **Annex 4.5** Clean-Up Engagement Checklist
- **Annex 4.6** Fisher Engagement Checklist
- **Annex 4.7** Workshop and Plastic Lab Checklist
- **Annex 4.8** Policy Workshop Checklist
- **Annex 4.9** Open Call / Associated Region Replication Checklist
- **Annex 4.10** Communication and Visibility Checklist
- **Annex 4.11** Replication Readiness Checklist

Annex 4.1 Activity Planning Checklist

This checklist confirms that the activity purpose, target group, partners, tools, expected outputs, feedback method and follow-up are clear before implementation.

Template

Use this checklist as a practical prompt for planning, implementing and documenting REMEDIATION engagement activities. Adapt it to the local context and activity scale.

Check	Item	Notes / evidence
☐	Activity purpose is clear.	
☐	REMEDIATION pillar and engagement category are identified.	
☐	Target group and expected participant role are defined.	
☐	Responsible partner and local partners are confirmed.	
☐	Location, date and timing are realistic.	
☐	Permissions or approvals have been checked.	
☐	Tools, protocols, materials and equipment are ready.	
☐	Safety, accessibility and ethics have been considered.	
☐	Expected outputs and indicators are defined.	
☐	Feedback method is ready.	
☐	Communication and visibility plan is prepared.	
☐	Follow-up action is planned.	

Annex 4.2 Stakeholder mapping checklist

This checklist supports organisers in identifying relevant stakeholders and assigning clear roles. It is especially useful for activities involving municipalities, NGOs, fishers, schools, divers, researchers, technical partners, businesses or policy actors.

Template

Use this checklist as a practical prompt for planning, implementing and documenting REMEDIIES engagement activities. Adapt it to the local context and activity scale.

Check	Item	Notes / evidence
☐	Relevant public authorities are identified.	
☐	Local community organisations or NGOs are identified.	
☐	Schools, universities or youth groups are considered where relevant.	
☐	Fishers, divers, marina operators or port users are considered where relevant.	
☐	Waste operators or recycling companies are involved where needed.	
☐	Researchers or technical partners are identified where scientific input is needed.	
☐	Businesses, merchants, artisans or tourism operators are considered where prevention or local value chains are relevant.	
☐	Each stakeholder role is clear.	
☐	Influence and interest levels are assessed.	
☐	Risks, sensitivities and trust issues are noted.	
☐	Follow-up responsibilities are assigned.	

Annex 4.3 Co-creation readiness checklist

This checklist helps organisers confirm whether the activity has a real co-creation element. It asks what participants or stakeholders can shape, test, adapt or validate, and how their feedback will be used.

Template

Use this checklist as a practical prompt for planning, implementing and documenting REMEDIIES engagement activities. Adapt it to the local context and activity scale.

Check	Item	Notes / evidence
☐	The object of co-creation is defined.	
☐	It is clear what can be shaped, tested, adapted or validated.	

☐	Participants know their expected contribution.	
☐	The right knowledge holders or users are involved.	
☐	Fixed constraints are explained, including scientific, safety or regulatory limits.	
☐	Feedback collection method is prepared.	
☐	There is a plan for analysing and using feedback.	
☐	There is a plan to communicate results back to participants.	
☐	The activity should genuinely be described as co-creation, not only participation.	

Annex 4.4 Citizen science readiness checklist

This checklist should be used before activities involving citizen-generated data, monitoring, reporting, app use or structured feedback. It supports preparation around purpose, protocols, training, data quality, safety, ethics and feedback to participants.

Template

Use this checklist as a practical prompt for planning, implementing and documenting REMEDIIES engagement activities. Adapt it to the local context and activity scale.

Check	Item	Notes / evidence
☐	Citizen science purpose is clear.	
☐	Protocol or tool is selected.	
☐	Participant roles are defined.	
☐	Training or briefing is prepared.	
☐	Data categories are understandable.	
☐	Quality assurance is considered.	
☐	Safety and environmental sensitivity are addressed.	
☐	GDPR, consent and photography practices are clear.	
☐	Data storage or reporting pathway is defined.	
☐	Feedback to participants is planned.	
☐	Links to ECSA principles are considered in the activity design.	

Annex 4.5 Clean-up engagement checklist

This checklist is based on the REMEDIIES Citizen Science Protocol for Beach Litter Clean-Ups. It supports organisers in planning clean-ups as structured engagement and citizen science actions, not only as volunteering events.

The checklist should cover three stages: before, during and after the clean-up. Before the clean-up, organisers should select a safe and accessible site, coordinate with local authorities, arrange waste removal, prepare equipment and prepare the participant briefing. During the clean-up, they should explain safety rules, define the clean-up area, support sorting and collect material at agreed points. After the clean-up, they should count participants, weigh plastic and non-plastic waste, take photos, upload or store results, coordinate waste removal, communicate results and collect feedback.

Template

Use this checklist as a practical prompt for planning, implementing and documenting REMEDIIES engagement activities. Adapt it to the local context and activity scale.

Check	Item	Notes / evidence
☐	Site is safe, accessible and environmentally suitable.	
☐	Local authorities and waste operators are informed or involved.	
☐	Waste removal and disposal are arranged.	
☐	Gloves, bags, scales, first aid and documentation tools are prepared.	
☐	Participant briefing is ready.	
☐	Clean-up area is defined.	
☐	Plastic and non-plastic separation is explained.	
☐	REMEDIIES Citizen Science App or reporting sheet is prepared where relevant.	
☐	Participant number is recorded.	
☐	Plastic and non-plastic waste are weighed separately.	
☐	Photos of collected waste are taken.	
☐	Results are communicated and feedback is collected.	

Annex 4.6 Fisher engagement checklist

This checklist should be used for activities involving fishers, fishing organisations, port users or maritime professionals. It is relevant for Fishing for Litter, abandoned-net recovery, fishing-net disposal stations, fishing gear made with biodegradable materials testing, port-based clean-ups, fisher consultations and marine litter source identification.

The checklist should support organisers to identify trusted local intermediaries, approach fishers early, clarify the purpose of engagement, respect working hours and seasonal fishing patterns, document fisher knowledge and collect feedback on usability, safety, cost and effort.

For gear testing, the checklist should include questions on rigging, handling, hauling, durability, catch performance, fouling, damage, safety, end-of-life and willingness to adopt. For disposal stations, it should include location, accessibility, maintenance, responsibility and usage barriers.

Template

Use this checklist as a practical prompt for planning, implementing and documenting REMEDIIES engagement activities. Adapt it to the local context and activity scale.

Check	Item	Notes / evidence
☐	Relevant fishing groups or port users are identified.	
☐	Trusted local intermediary is involved where possible.	
☐	Purpose of engagement is clear and practical.	
☐	Fishers are approached early, before decisions are fixed.	
☐	Fishing seasons, working hours and time constraints are respected.	
☐	Language is practical and non-technical.	
☐	Fishers are not framed only as contributors to pollution.	
☐	Feedback on location, usability, cost, effort and safety is collected.	
☐	For gear testing, handling, catch, durability, fouling, hauling and end-of-life are documented.	
☐	For disposal stations, location, maintenance, accessibility and responsibility are clarified.	
☐	Feedback is recorded and shared with the activity team.	

Annex 4.7 Workshop and plastic lab checklist

This checklist should be used for hands-on learning activities, including zero-waste cosmetics workshops, Plastic Labs, upcycling workshops, plastic identification sessions, school workshops and maker-based engagement activities.

The checklist should cover target group, age range, learning objective, workshop duration, venue, materials, equipment, facilitator roles, safety rules, accessibility, participant briefing, hands-on activity steps, feedback method, outputs to be documented and follow-up resources.

For Plastic Labs, the checklist should also cover machine safety, material sorting, use of shredder, injector, extruder or compression moulding equipment, protective gloves, facilitator-led operation and safe distance from heated or moving parts. For zero-waste cosmetics workshops, it should include baseline questions, hands-on preparation or demonstration, post-workshop reflection and product testing feedback.

Template

Use this checklist as a practical prompt for planning, implementing and documenting REMEDIIES engagement activities. Adapt it to the local context and activity scale.

Check	Item	Notes / evidence
☐	Target group and age range are defined.	
☐	Learning objective is clear.	
☐	Workshop duration and agenda are realistic.	
☐	Venue layout and accessibility are checked.	
☐	Materials and equipment are prepared.	
☐	Facilitator roles are assigned.	
☐	Safety rules are prepared and communicated.	
☐	For Plastic Labs, machine operation is facilitator-led.	
☐	Protective gloves and safe distance from heated or moving parts are ensured.	
☐	Hands-on steps are clearly explained.	
☐	Discussion connects reuse with prevention and plastic reduction.	
☐	Outputs are documented and feedback is collected.	

Annex 4.8 Policy Workshop Checklist

This checklist should be used when designing policy workshops as co-creation spaces rather than dissemination events. It should support organisers in defining the policy question, selecting participants, preparing evidence inputs, designing facilitated discussion formats and documenting recommendations.

The checklist should help organisers confirm that the workshop includes:

- a clear policy or governance question
- a balanced mix of participants
- short evidence inputs from REMEDIIES activities
- facilitated discussion or roundtables
- recommendation-building
- documentation of key points
- follow-up with participants
- links to policy recommendations or further action

Template

Use this checklist as a practical prompt for planning, implementing and documenting REMEDIIES engagement activities. Adapt it to the local context and activity scale.

Check	Item	Notes / evidence
☐	Policy or governance question is clearly defined.	
☐	Participant mix includes relevant actors from research, public authorities, civil	

	society, local communities, innovators, entrepreneurs or EU projects.	
☐	Evidence inputs from REMEDIIES activities are prepared.	
☐	Format is not presentation-only.	
☐	Facilitated roundtables or small groups are included.	
☐	Participants identify barriers and enabling conditions.	
☐	Recommendations or next steps are documented.	
☐	Policy recommendation link or output location is defined.	
☐	Follow-up with participants is planned.	

Annex 4.9 Open call / associated region replication checklist

This checklist should be used when adapting REMEDIIES methods to new territories. It should support local actors in translating the REMEDIIES approach into their own context rather than copying activities mechanically.

The checklist should help Associated Regions or external actors define:

- the local plastic pollution challenge
- the relevant REMEDIIES pillar
- the engagement methods to be combined
- the local stakeholders needed
- expected outputs and indicators
- infrastructure or equipment needs
- communication and visibility actions
- risks, permissions and delays
- feedback collection
- continuation after the activity

Template

Use this checklist as a practical prompt for planning, implementing and documenting REMEDIIES engagement activities. Adapt it to the local context and activity scale.

Check	Item	Notes / evidence
☐	Local plastic pollution challenge is defined.	
☐	Relevant REMEDIIES pillar is selected.	
☐	Engagement methods to be combined are identified.	
☐	Local stakeholders are mapped.	

☐	Expected outputs and indicators are defined.	
☐	Infrastructure, equipment or material needs are checked.	
☐	Permissions, procurement and administrative risks are considered.	
☐	Communication and visibility actions are prepared.	
☐	Feedback collection is planned.	
☐	Continuation after the activity is considered.	
☐	Link to Open Call updates is included in the relevant report section.	

Annex 4.10 Communication and visibility checklist

This checklist should be used to document public visibility and communication outputs linked to engagement activities. It supports reporting by helping partners record photos, articles, posts, videos, newsletters, event announcements, public results and other visibility evidence.

The checklist should help partners record:

- activity title and date
- communication channels used
- website article or update
- social media posts
- photos and videos
- newsletter items
- press or media coverage
- public results shared
- visibility of EU and REMEDIATION branding
- links to published material

This checklist replaces the need for a separate communication and visibility evidence annex.

Template

Use this checklist as a practical prompt for planning, implementing and documenting REMEDIATION engagement activities. Adapt it to the local context and activity scale.

Check	Item	Notes / evidence
☐	Activity title, date and location are recorded.	
☐	Photos and videos are collected with appropriate consent.	
☐	Participant numbers and key results are available.	
☐	Website article or update is prepared where relevant.	
☐	Social media posts are planned or published.	

☐	Newsletter or press item is considered where relevant.	
☐	EU and REMEDIIES branding are visible.	
☐	Public results are shared after the activity.	
☐	Links to published material are stored.	
☐	Communication outputs are aligned with project messages and evidence.	

Annex 4.11 Replication readiness checklist

This checklist should be used before transferring an activity to a new location. It helps organisers check whether the method is ready to be adapted and whether the receiving location has the necessary conditions for implementation.

The checklist should ask:

- What method is being replicated?
- What local problem will it address?
- What elements are essential and what can be adapted?
- Who are the local partners?
- Are permissions or approvals needed?
- Are safety requirements clear?
- Are materials, equipment or tools available?
- Is there a waste, data or follow-up pathway?
- Is participant feedback planned?
- Are communication and visibility actions prepared?
- Is there a plan for sustainability after the activity?

Replication should preserve the core engagement logic while adapting the format to local conditions. A clean-up protocol, Plastic Lab, webinar, fisher engagement process, local value chain activity or policy workshop can all be transferred, but only if the local context is considered.

Template

Use this checklist as a practical prompt for planning, implementing and documenting REMEDIIES engagement activities. Adapt it to the local context and activity scale.

Check	Item	Notes / evidence
☐	Method to be replicated is defined.	
☐	Local problem it will address is clear.	
☐	Essential elements and adaptable elements are distinguished.	
☐	Local partners and roles are confirmed.	
☐	Permissions or approvals are identified.	
☐	Safety requirements are clear.	
☐	Materials, equipment or tools are available.	
☐	Waste, data or follow-up pathway is defined.	

☐	Participant feedback is planned.	
☐	Communication and visibility actions are prepared.	
☐	Sustainability or continuation plan is considered.	
☐	Results and lessons will be shared with relevant partners.	

Annex 5. Santorini plastic lab handbook, equipment and presentation for schools

Annex 5 includes supporting material for the Santorini Plastic Lab. It brings together the practical handbook, equipment overview and school presentation material used to support the Plastic Lab format.

Annex 5 includes two sub-annexes:

- **Annex 5.1** Plastic Lab Santorini Handbook & Equipment
- **Annex 5.2** Plastic Lab Presentation for Schools

Annex 5.1 Plastic lab Santorini handbook & equipment

This annex presents the **Plastic Lab Santorini workshop design and equipment overview**, bringing together the educational methodology, workshop journey and practical setup required for the implementation of the Plastic Lab activities.

The annex includes the workshop aims, learning outcomes, target age group, duration, teaching approach, health and safety considerations, and practical notes for facilitators. The module introduces children aged 6 to 9 to plastic use, pollution, recycling, sustainable making and creative design. It supports learning on the lifecycle of plastic, responsible plastic use, recycling categories, fabrication technologies, and the movement from idea to object through sketching, prototyping and making.

The annex also presents the equipment considered for the Plastic Lab, including **Precious Plastic equipment** and adapted educational setups for small-scale plastic valorisation. The main machines and tools covered include: shredder, injector, extruder, compression moulding machine, moulds and nozzles.

The equipment overview should also address key safety considerations, particularly in relation to heated and moving machinery, the use of protective gloves, facilitator-led machine operation, preparation before use, and clear participant guidance throughout the workshop.

PLASTIC LAB SANTORINI - MODULE DESCRIPTOR



Overview

Plastic Lab Santorini introduces children aged 6-9 to the world of plastic use, pollution, recycling, sustainable making, and creative design. Through hands-on exploration and guided participation, children learn about different plastic types, recycling processes using Precious Plastics machines while collaboratively creating objects from recyclable plastic.

Aims

Introduce children to the lifecycle of plastic and principles of recycling and upcycling.

- Develop awareness of responsible plastic use.
- Familiarise participants with different plastic materials, properties, and recycling categories.
- Introduce the basics of fabrication and making technologies through Precious Plastics equipment.
- Encourage collaborative creativity, imagination, and design thinking.
- Support children in understanding how ideas move from concept to object through sketching, prototyping, and fabrication.
- Foster confidence in observing and safely engaging with workshop environments and machinery.

Ages	6-9 years
Duration	2 hours - 4 hours
Workshop Type	Collaborative hands-on design and making workshop
Approach	Sustainability, design thinking, circular economy, fabrication literacy

Learning Outcomes

By the end of the module, children will be able to:

Knowledge & Understanding





- Recognise common types of plastic and understand basic differences in their properties.
- Identify what plastics are commonly recyclable and which materials are unsuitable for processing.
- Describe the basic lifecycle of plastic, from production to reuse and recycling.
- Understand the purpose and function of selected Precious Plastics machines.

Technical Awareness



- Identify and describe the basic operation of:
 - a shredder (breaking plastic into flakes),
 - an injection moulding machine (forming objects through moulds),
 - an extruder (creating continuous plastic forms),
 - a compression moulding machine (shaping plastic under heat and pressure).
- Understand age-appropriate workshop health and safety principles and responsible behaviour around machinery.

Creativity & Design



- Generate ideas for products that could be made from recycled plastic.
- Express ideas visually through drawing and collaborative brainstorming.
- Understand how drawings can become digital designs (CAD) and fabricated moulds.
- Participate in imagining future products and sustainable solutions.

Environmental Values



- Demonstrate increased awareness of plastic consumption and waste.
- Show consideration for reuse, recycling, and material responsibility in everyday life.
- Understand that waste materials can have a second life through design and making.

Introduction

What happens to plastic after we throw it away? Where does it go after we finish using it? Can plastic have a second life instead of becoming waste? And what happens when plastic ends up in rivers or the sea-how might this affect fish, turtles, and other underwater life? How does this affect us here and now and what could we do to prevent it? Could we choose alternative materials from now on?

In this module, children explore these questions through hands-on learning, observation, and creative making. Participants discover different types of plastic, learn which materials can be recycled and why, and explore how Precious Plastics machines can transform plastic waste into new objects.

Workshop Journey

1. Introduction and project presentation

- We introduce the project and talk about circular practices, using simple examples from both the local and global context.

- Together with the participants, we discuss current social and environmental challenges through questions and open exchange of ideas.
- We demonstrate the machines and introduce the tools and materials we will use, explaining in a simple way why they were chosen and how they support sustainability, reuse, and responsible consumption and production.

2. Hands-on workshop

- Participants build a simple, practical project themselves, learning through doing.
- At the end, they take their project with them, helping connect the learning experience to everyday life.

3. Discussion and reflection

- We reflect together on the building process and what we learned.
- We ask the question: what can we do here and now?
- How can design reduce waste?
- We explore simple and practical ways each person can contribute positively to society and to the protection of the planet.
- (Interactive discussion and exchange of ideas)

Health & Safety



Health and safety are embedded throughout the workshop. The machines reach 230 degrees celcius. Children are introduced to age-appropriate safe workshop behaviour, including observation boundaries, protective practices, and responsible participation around heated and moving machinery. Machine operation is facilitator-led, with supervised opportunities for involvement appropriate to participants' age and experience.

Teaching & Learning Approach



The workshop uses:

- Hands-on experimentation
- Collaborative making
- Guided observation
- Storytelling and discussion
- Drawing and imagination exercises
- Design-to-making processes

Learning is experiential, playful, and rooted in curiosity, encouraging children to become confident, environmentally aware young makers.

Expected Outcomes

Children will leave the workshop with:

- A collaboratively produced recycled plastic object.
- Original drawings and design ideas for future making.
- Foundational understanding of recycling and fabrication processes.
- Increased awareness of sustainable material choices and plastic responsibility.

Some useful practical notes:

Capacity: This workshop is feasible with a group of minimum 10 children and a maximum of 25 (in which case a second educator/supervisor is advised)

Duration: Depending on the educator's experience, the hands on part can be longer for each kid to familiarise themselves with the equipment and to make their own or team product. In this case the workshop is longer however a consideration of supervision is advised while the rest of the kids are in the same space.

Preparation: it is useful to have already prepared objects in case something does not work as expected.

Workshop phases: What works is to have previous contact with the participants, meeting them beforehand and introducing the project to them. This way, they have time to collect the right plastic in order to bring it to the workshop. Also, a touch base meeting is useful so they turn their own ideas into designs which could then be made into objects. This gives time to the educators to prepare and make the objects (see previous comment on preparation)

Improvement: Temperature resistant gloves are essential for using the equipment. Typically the gloves are one size (L-XL) which is not practical for smaller hands. You may want to find / order the right size as this

reduces the time of your machine use and leaves things tidier. Make sure the injection molding machine is on and ready 10min prior of use. Leaving it more than 20min it can cause plastic overheating and the results are not desirable.

General note: The scope of the workshop is to discuss the collection and reuse of recyclable plastic. However, this does not imply that recycling alone is the solution to plastic consumption or that we should continue using plastic without reconsideration. On the contrary, the workshop has a dual purpose: first, to explore better ways of collecting and reusing recyclable plastic, and second, to rethink and discuss alternative approaches to reducing and ultimately avoiding plastic use in the future.

Annex 5.2 Plastic Lab Presentation for Schools

This sub-annex includes the presentation material used with schools and young participants. It introduces plastic pollution, the positive and negative aspects of plastic use, plastic types, thermoplastics, thermoset plastics, RIC numbering, recyclable materials such as HDPE and PP, and the broader Santorini Blue Loop Living Lab context.

The presentation is useful for preparing children and participants before the hands-on workshop and for connecting the Plastic Lab activity with circular economy, marine pollution prevention and local sustainability.



Santorini Blue Loop Living Lab

σκοπός
μείωση της ρύπανσης της θαλασσίας ρύπανσης
προώθηση της κυκλικής οικονομίας και
ανάπτυξη βιώσιμων πρακτικών στο νησί

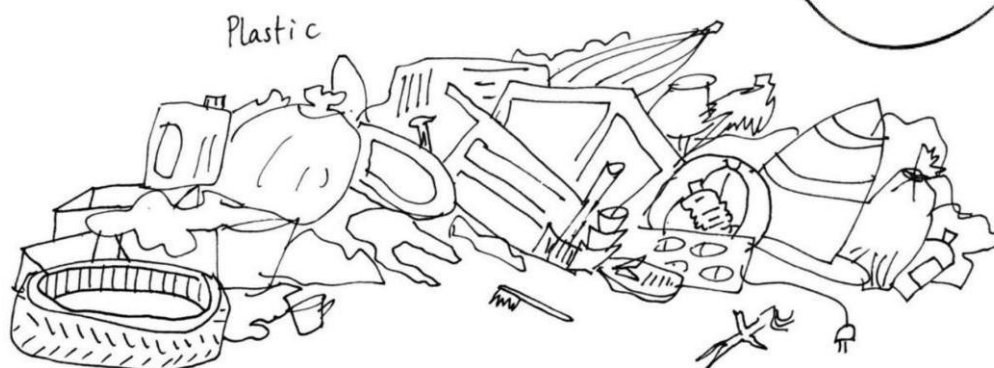




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MEDITERRANEAN SEA BASIN LIGHTHOUSE



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μέχρι πυραύλους του
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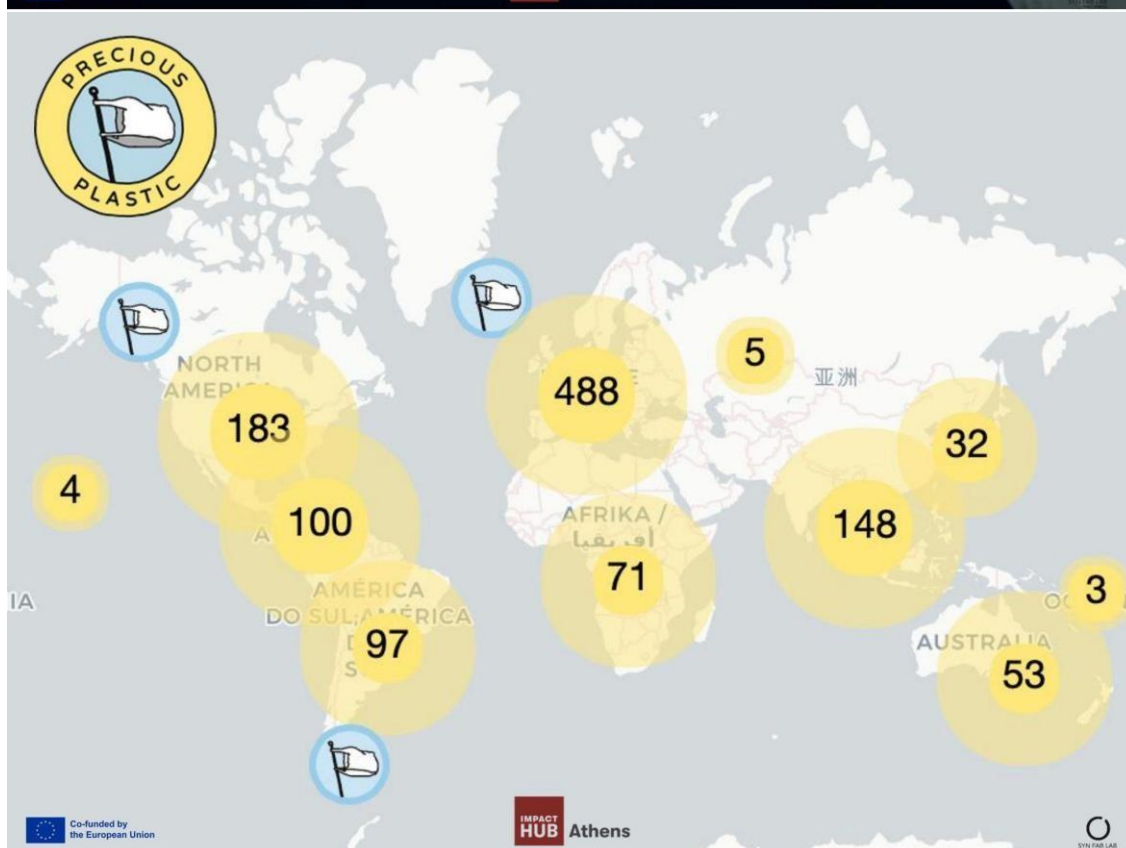
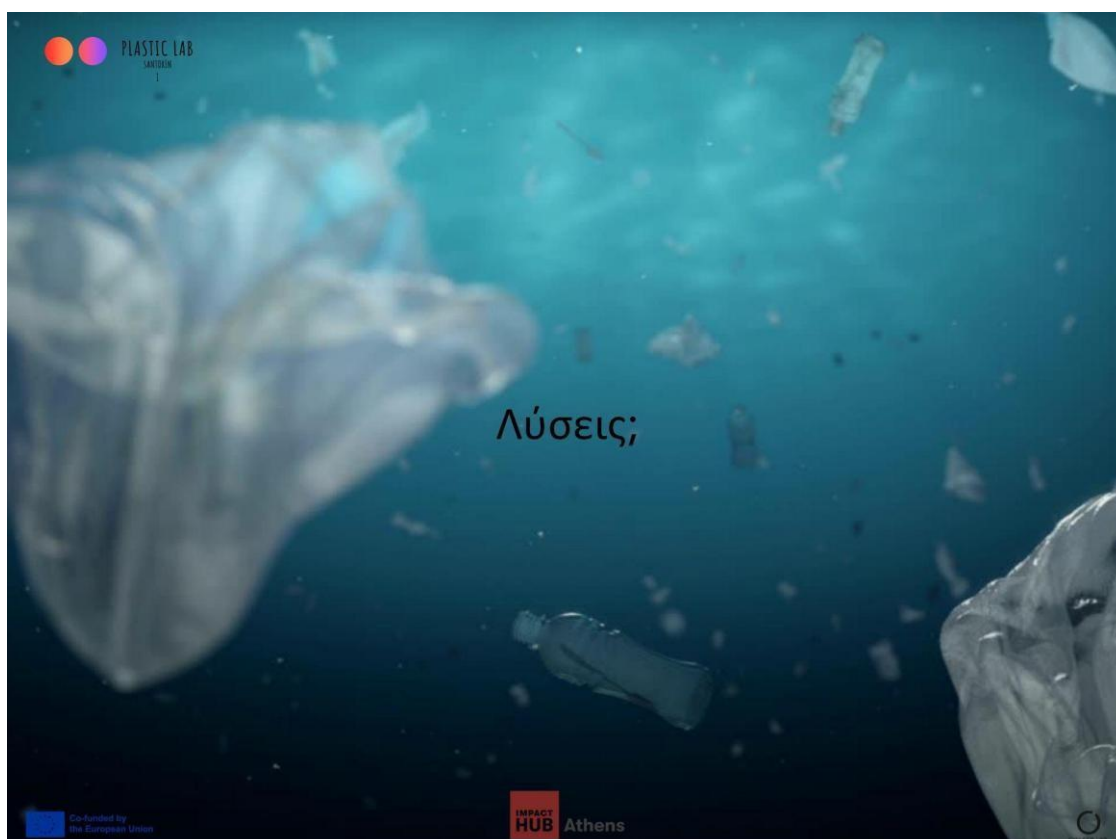
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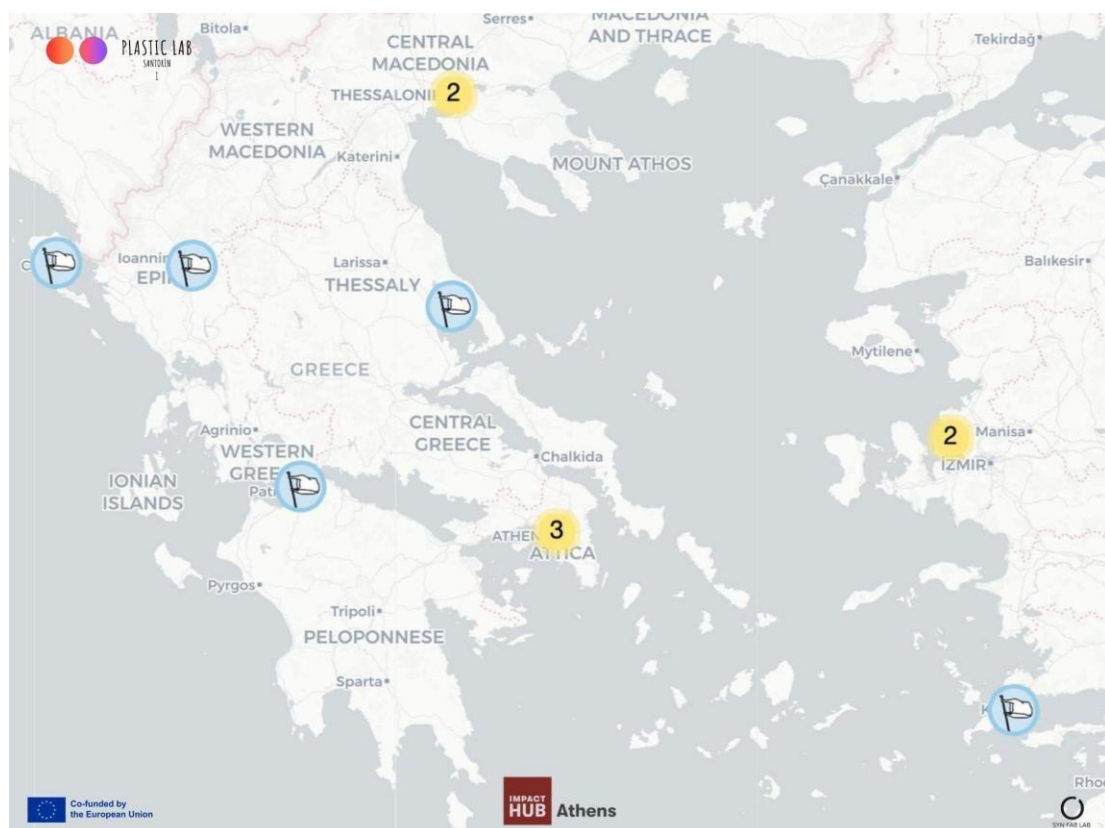
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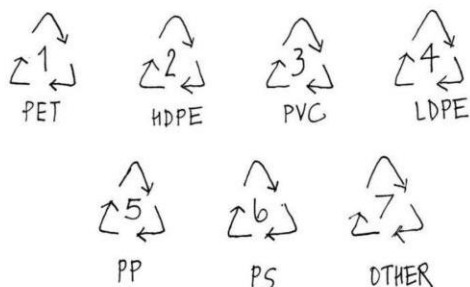
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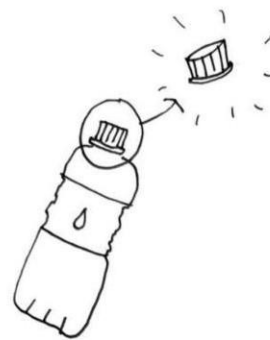
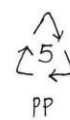
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14-17 Μαΐου

βιωματικά εργαστήρια για παιδιά και ενήλικες, με κεντρικό άξονα το Plastic Lab, καθαρισμούς βυθού,

δράσεις «fish for litter» με τη συμμετοχή αλιέων και δοκιμές βιοδιασπώμενων διχτυών,

σταθμούς συλλογής θαλάσσιων απορριμμάτων και εκπαιδευτικές δραστηριότητες γύρω από τη θαλάσσια ρύπανση και την Ποσειδωνία, καθώς και

διαδραστικά workshops μέσω κινητών μονάδων εκπαίδευσης και τεχνολογίας.

Παράλληλα, θα πραγματοποιηθεί διαβούλευση με τοπικούς φορείς και η επίσημη έναρξη του Living Lab

Annex 6. REMEDIIES Anti-litter Campaigns Guidelines

The Anti-Litter Campaigns provide REMEDIIES partners with a common framework for mobilising local communities around plastic-litter awareness and action. Eight Anti-Litter Campaigns are included as a WP6 KPI under Task T6.5. At the time these Guidelines were prepared, UM, CNR, IHA, MCG (via All For Blue), SMILO, ETMI, AITIIP, and EXIT had confirmed their participation in campaign implementation.

By implementing Anti-Litter Campaigns across REMEDIIES demo-site regions, the collective effort can generate greater impact. The following steps should be considered during the planning and design of each campaign.

1. Define Your Communication Objectives:

- Increase Environmental Awareness: Educate the public about the harmful effects of plastic debris on beaches and the surrounding ecosystems, emphasizing the importance of preserving these environments

Indicative KPI: Audience reach >1,000; social media engagement rate monitored through the relevant platform analytics.

- Encourage Community Involvement - Call to Action: Mobilize individuals and communities to actively participate in beach clean-up initiatives/monitoring, fostering a sense of responsibility and ownership towards maintaining clean and healthy beaches.

Indicative KPI: Number of Attendees to your Activities

- Promote Sustainable Behavior Change & Educate: Encourage long-term behavioral change by instilling habits of responsible waste disposal and promoting the adoption of eco-friendly practices among participants. Educate on the categories of plastic, identification of plastic, etc.

Indicative KPI: Number of participants in related educational activities and REMEDIIES webinars.

- Promote the technologies and the innovation of each demo site, via workshops that will showcase the development so far, and the impact we wish to achieve, targeting both the general public, and the industry/tech experts/scientific community.

Indicative KPI: Number of Attendees to your Activities

2. Choose your Anti-Litter Campaign Co-organizer(s)

Look for partners who share your commitment to environmental conservation and community engagement.



Seek out allies with a track record of successful collaboration and a willingness to contribute resources and expertise. Engage with a variety of stakeholders, including local NGOs, environmental groups, and community organizations, to maximize impact and reach. Set clear goals for the collaboration to ensure a productive and successful partnership.

The objective is for each demo site to engage their strongest local organization(s) under the umbrella of collaborative environmental action.

3. Identify Your Target Audience

Examples of Target Audiences:

Local residents, students and youth, local businesses and entrepreneurs, environmental advocacy organizations and nonprofits, educators and schools, local government officials, local press, industry, scientific community, media and influencers.

4. Determine your Key Messages

Some General Advice to achieve this:

Have a good understanding of your audience, keep your key message clear & simple, appeal to emotions by evoking empathy and concern, and clearly outline actionable steps for involvement.

Examples: “Do you accept the 20TonnesChallenge?”, “Join the Movement for a healthier ocean”, “Adopt a beach now!”

5. Choose your Communication Channels

- Social Media Platforms
- Newsletters
- Blog Posts
- Local Newspapers/Regional Radio Stations, Media Relations
- Community Ambassadors (someone respected in the local community, like the Mayor, citizen, or community leaders among citizens)
- Influencer Marketing (choose environmental activists of high popularity and engagement rate)

For social media, conduct research to determine which platforms are most relevant to your target audiences. Relevant channels may include Instagram, Facebook, LinkedIn, TikTok and X.

6. Campaign Pillars:

- **Environmental Activities** such as beach clean-ups, other regional interventions, in collaboration with key stakeholders and local institutions.
- **Awareness** and Follow-up: Collaborate with community leaders, local organizations with influence, NGOs, and key stakeholders to reach a larger audience. Create and share educational content, such as videos and testimonials, and follow up on campaign actions through the relevant communication channels.
- **Educational Activities** for your local community, providing guidelines to all the environmental activists, researchers, and advocates. Potential activities: Seminars, Workshops, Conferences, the REMEDIATION Webinar (by UM, VLPPF, & IHA)
- **Technologies & Innovations** of the REMEDIATION program are showcased and updates on their development are shared. The goal is to reach the right audience, that is industry users and potential sponsors, collaborators, and investors.

Then, create the communication timeline around each activity, taking into consideration the type of content that will be produced for each one of them. For your reference, check out the APPENDIX on the present Guidelines.

7. Create your Communication Timeline

For each campaign action, define in advance what communication content will be produced, when and how often it will be published, and which channels will be used. Consider whether a press release, dedicated blog post or interview with local media is relevant and schedule it accordingly.

8. Allocate your resources:

Prioritise activities, define the preparation and implementation period, assign responsibilities within the project team, consider paid social media promotion where appropriate, and identify relevant dissemination partners.

9. Measure Your Success:

Measuring the success of an Anti-Litter campaign involves tracking various metrics and KPIs to assess its impact and effectiveness.

- **Report** the results on a **quarterly basis** via the Communication and Dissemination report.

- Report beach and river clean-ups in the T2.4 Excel database, under the “Database” tab.

SOCIAL MEDIA NOTES

Keeping a Shared Visual Identity:

This includes the following elements:

Logos: Use the REMEDIES logo, the EU emblem with the required funding statement, and the EU Mission visual identity where applicable. Find the logos [here](#).

Photography: Images might feature activities, events, researchers and technology, international conferences, exhibitions, environmental pollution, or other relevant subjects.

Hashtags - Include relevant hashtags in social media posts to connect with the program's audience and broader community, as well as the REMEDIES hashtags.

Lead Hashtags: **#RemediesForOcean #20TonnesChallenge #REMEDIES_EU #EUMissions**

More Specific Ones, like #BeachCleanUp (when relevant), or:

#PlasticPollutionSolution #HorizonEurope #RepurposePlastic #PlasticLitterFree #ZeroWaste #CleanWaters #Sustainability #ProtectOurOceans

Feel free to add some that seem relevant to you, and are related to the type of your post.

Taglines - To be adjusted accordingly and used in all social media and comms material, along with your copies and texts:

“Plastic-free coasts start with us! Join our efforts in the #20TonnesChallenge.”

“Protecting our rivers and coastlines, one clean-up at a time! Join the #20TonnesChallenge.”

“Cleaner shores, healthier seas! Unite with us in the fight against plastic pollution with #20TonnesChallenge.”

Tags & Mentions:

Always be sure to **tag/mention** the **remedies official accounts** to your posts (Instagram: @remedies_eu, Facebook: @remedies.eu, LinkedIn: @remedies, TikTok: @remedies_eu, X: @remedies_eu, **as well as**



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@bluemissionmed (on Instagram, Facebook, LinkedIn and X)

IMPORTANT NOTE: Tagging and mentioning relevant third parties in social media posts can increase visibility and engagement, strengthen stakeholder interaction, extend content reach and support collaborative relationships within the community.

APPENDIX - The Impact Hub Athens & WWF Anti-Litter Campaign example

Impact Hub Athens, in collaboration with WWF Greece, launched this Anti-Litter Campaign in May 2024 as part of the REMEDIES programme. The campaign ran for approximately three months and is presented here as a practical example for other demo-site partners.

This campaign provides a practical example of how the Guidelines can be applied, showing how an initial idea can be translated into an Anti-Litter Campaign.