REGENERATIVE ZERO WASTE LOCAL VALUE CHAINS



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Co-Creating a Plastic Litter Free Future

SMILO
SUSTAINABLE ISLANDS

REMEDIES
MEDITERRANEAN SEA BASIN LIGHTHOUSE

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More information:

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Executive Summary

Plastic pollution is a major threat to the Mediterranean Sea, endangering marine biodiversity, fisheries, tourism, and human health. Islands and remote coastal communities are particularly exposed due to their geographic isolation, limited waste management infrastructure, and strong dependence on imported goods. Seasonal tourism further exacerbates plastic waste generation, making locally adapted solutions essential.

The REMEDIES project and its partners demonstrate that local, regenerative, zero-waste value chains can provide effective and scalable alternatives to single-use plastics. From biodegradable cutlery and edible straws to seaweed-based cosmetic capsules and atmospheric water generators, these initiatives show how community-led circular approaches can simultaneously reduce plastic pollution, stimulate local economies, and strengthen territorial resilience.

Local value chains offer multiple benefits:

- **Environmental:** minimise plastic leakage into the sea, reduce microplastics, and conserve resources.
- **Economic:** support small-scale enterprises, create jobs, and valorise local materials.
- **Social:** preserve traditional crafts, strengthen community engagement, and promote sustainable consumption.

For islands, these solutions are not only desirable but essential. By fostering decentralised production, closed-loop systems, and community ownership, local value chains enhance resilience, reduce dependency on external supply chains, and provide scalable models for other Mediterranean territories.

Investing in such solutions is a strategic lever to restore the Mediterranean Sea, safeguard its ecosystems, and ensure a sustainable, circular future for its communities.



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1 Introduction


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1.1 Plastic pollution challenges in the Mediterranean Sea

Plastic pollution has become a critical environmental and health challenge for the Mediterranean region. Every year, more than 10 million tonnes of plastic enter the ocean, according to BeMed. As the world's largest enclosed sea, spanning 2.5 million km^2, and hosting nearly 9% of global marine biodiversity, with around 30% of species found nowhere else, the Mediterranean is particularly vulnerable.

Microplastics and hazardous additives increasingly contaminate marine food webs, drinking water and coastal environments, creating growing risks for human health through ingestion, bioaccumulation and chronic exposure.

Reducing plastic production, limiting unnecessary consumption and strengthening global regulations remain essential pillars of the response. However, these measures alone are not sufficient, especially in island and coastal territories where waste infrastructure is limited and tourism amplifies plastic flows.

Local, concrete solutions are therefore needed to prevent waste at source, replace single-use plastics with sustainable alternatives, and promote circular practices rooted in territorial resources and community engagement.

This technical note highlights ten such initiatives, regenerative and zero-waste local value chains developed across the Mediterranean and Europe, demonstrating how practical, locally produced alternatives can simultaneously reduce plastic pollution, build resilience and support long-term socio-economic transitions.

1.2 Policy frameworks to tackle plastic pollution

To prevent and control plastic pollution, a range of international, regional, and national policy instruments have been adopted or are currently under negotiation. These frameworks aim to regulate the entire lifecycle of plastic, from production to end-of-life, while promoting circular economy principles, extended producer responsibility, and behavioural change.

International level

Towards a global plastic treaty:
Negotiations for a legally binding Global Plastics Treaty were launched in 2022 under the auspices of the United Nations Environment Assembly (UNEA). The treaty aims to eliminate plastic pollution by 2040, covering the full plastic lifecycle, from fossil fuel extraction to production, use, and disposal.

Key ambitions include:

- Capping and gradually reducing virgin plastic production (by up to 40% by 2040 vs 2025 levels).
- Phasing out hazardous chemical additives.
- Establishing financing mechanisms (e.g. Extended Producer Responsibility (EPR) schemes) aligned with the polluter-pays principle.

Negotiation status:

- INC-5.1 (Busan, Nov 2024) ended without consensus due to resistance from fossil-fuel-producing countries, reflecting deep divisions between countries supporting strong, binding upstream measures and those favouring voluntary, downstream approaches.
- INC-5.2 (Geneva, Aug 2025) also adjourned without agreement. Delegations failed to reach common ground on a consolidated draft text, and discussions were suspended.
- A procedural session, INC-5.3 (February 2026), will focus mainly on electing a new Chair and clarifying the organisation of future work.
- A further negotiation round is expected later in 2026, with the aim of rebuilding consensus and working toward a final agreement, though the timeline is now significantly delayed.

Despite setbacks, a coalition of more than 90 countries, supported by civil society, continues to advocate for a robust and legally binding global treaty capable of addressing plastic pollution at its source.

High Seas Biodiversity Agreement (BBNJ):
In parallel, the BBNJ Agreement (Biodiversity Beyond National Jurisdiction), also known as the High Seas Treaty, entered into force on 17 January 2026 after reaching the required threshold of 60 ratifications in September 2025. The treaty establishes a legally binding framework to conserve and sustainably manage marine biodiversity in areas beyond national jurisdiction. While its primary focus is on biodiversity protection, it reinforces the need for cross-border cooperation and integrated ocean governance, complementing other initiatives to reduce marine pollution, including plastics. By providing rules for marine protected areas, environmental impact assessments, andbenefit-sharing, the BBNJ Agreement strengthens the overall international framework for protecting Mediterranean and global marine ecosystems.

Regional level Mediterranean

Regional Plan on Marine Litter (Barcelona Convention):
Adopted in 2013 and updated through the 2023–2030 Mediterranean Strategy for the Prevention and Management of Marine Litter, this Plan is the first legally binding regional instrument to address marine litter in the Mediterranean Sea.

Key measures include:

- Phasing out single-use plastics in priority sectors (e.g. tourism, fisheries).
- Preventing abandoned, lost, or discarded fishing gear.
- Promoting EPR schemes.
- Establishing national marine litter monitoring programmes.
- Encouraging clean-up operations and environmental education.

The Plan is implemented under the Mediterranean Action Plan (MAP) of the UNEP/MAP system, with coordination by MedWaves and other regional centres. It contributes to global targets including the SDGs and informs national marine litter action plans.

Relevance for local actors:
This framework provides island and coastal communities with a strategic and legal basis to design and fund projects that reduce plastic pollution, strengthen circular economy approaches, and develop local alternatives.



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European Union level

EU Strategy for plastics in a circular economy (2018):
As part of the European Green Deal and Circular Economy Action Plan, the 2018 Plastics Strategy lays the foundation for EU-wide action on plastic pollution. It sets out a vision where all plastic packaging is recyclable or reusable by 2030 and promotes innovation, investment, and better product design.

This strategy underpins several key legislative texts, including the Single-Use Plastics Directive and the Regulation on Packaging and Packaging Waste.

Directive (EU) 2019/904 on Single-Use Plastics (SUP):
Adopted on 5 June 2019, the SUP Directive targets the 10 most common single-use plastic items found on European beaches and seas, aiming to reduce their impact on the marine environment.

Key measures include:

- Ban on certain plastic items (e.g. cotton buds, straws, cutlery, plates, EPS containers).
- Consumption reduction targets for takeaway food containers and beverage cups.
- Collection targets for plastic bottles: 90% by 2029.
- Recycled content requirements: 25% by 2025 (PET), 30% by 2030 (all bottles).
- EPR obligations for producers, covering waste management, awareness campaigns, and clean-up costs.

The directive complements broader EU goals on resource efficiency, waste prevention, and marine protection, acting as a cornerstone of EU plastic policy.

Regulation (EU) 2025/40 on Packaging and Packaging Waste (PPWR):
Adopted in 2024 and entering into force in February 2025, the PPWR replaces the 1994 Packaging Directive with directly applicable rules covering all types of packaging, including plastic, across its entire life cycle. It is one of the EU's most comprehensive instruments for waste prevention and circular economy transition.

Key measures include:

- Waste prevention targets: reduction of packaging waste by 5 % by 2030, 10 % by 2035, and 15 % by 2040 (compared to 2018 levels).
- Recyclability requirements: all packaging must be recyclable in an economically viable way by 2030, with clear design-for-recycling criteria.
- Mandatory recycled content: minimum shares of post-consumer recycled plastic in packaging, progressively increasing after 2030.
- Reuse and refill targets: certain sectors (e.g. takeaway food, beverages, e-commerce) must offer reuse systems and allow consumers to bring their own containers at no extra cost.



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- Restrictions on specific formats: phase-out of unnecessary single-use packaging, including for fruits and vegetables, small hospitality items, and very lightweight carrier bags.
- Chemical safety: bans on the use of hazardous substances such as PFAS in food contact packaging.

The PPWR complements the SUP Directive by addressing all packaging materials, not only the most littering plastic items, with binding, measurable targets. Its focus on design, reuse, and recycling standards makes it a critical driver for shifting away from single-use plastics towards local, low-impact, and bio-based alternatives.

European Ocean Pact:
In addition to these measures, the European Ocean Pact was adopted by the European Commission on 5 June 2025. This non-legislative framework aims to strengthen integrated ocean governance, promote a sustainable blue economy, and enhance cooperation among EU countries, regions, coastal and island communities, and stakeholders. It brings together existing ocean-related policies under a coordinated strategic umbrella structured around six priorities, including boosting marine ecosystem health, supporting coastal and island communities, advancing ocean research and innovation, and intensifying international ocean diplomacy and governance. An implementing Ocean Act is planned by the end of 2026 to support delivery of the Pact's objectives.

Pact for the Mediterranean:
The Pact for the Mediterranean was officially adopted on 16 October 2025 as a new strategic framework between the European Union and its Southern Mediterranean partners. It aims to strengthen political, economic and social cooperation across the region by building a "Common Mediterranean Space" founded on co-ownership and shared responsibility. The Pact sets out joint initiatives across people, sustainable economies, and security, and complements existing Euro-Mediterranean cooperation mechanisms by expanding shared action on regional challenges including economic integration, environmental sustainability and resilience.

Together, these legal and policy frameworks, from regional conventions to EU regulations and global negotiations, are shaping a multi-level governance architecture to tackle plastic pollution. They provide both obligations and opportunities for national authorities, local stakeholders, and civil society to develop and scale up alternative value chains, including reuse models, bio-based materials, local crafts, and community-based solutions.

1.3 Objectives and context

The REMEDIES project, part of the EU Mission "Restore Our Ocean and Waters" under the Horizon Europe programme, is a European initiative aimed at preventing and eliminating the use of non-biodegradable plastics in oceans, seas, and inland waters. Running from December 2022 to December 2026, this four-year project brings together 23 partner organisations to implement a wide range of solutions, including zero-waste initiatives, to support a more sustainable future for the Mediterranean Sea.



The project is structured around 3 main pillars:

- **Detection & monitoring**
- **Collection & valorisation**
- **Prevention & zero waste**

Research activities focus on identifying and mapping plastic pollution in various environments, beaches, rivers, islands, and waters, across the Mediterranean. By building on existing knowledge and linking with similar initiatives, REMEDIES aims to collect consistent, actionable data to better understand the sources, flows, and accumulation zones of plastic waste.

The collection pillar focuses on reducing plastic and microplastic presence in marine and coastal areas. This includes intercepting plastic waste close to its source, empowering local communities in collection and recycling efforts, and retrieving microplastics from the sea.

The prevention pillar seeks to develop and promote zero-plastic-waste alternatives for sectors such as fishing, coastal and island businesses, and tourism. The objective is to reduce dependence on non-degradable plastics by encouraging the uptake of sustainable materials and practices. Under the prevention pillar, as part of Work Package 3, which addresses circular solutions for plastic waste prevention, Task 3.5 focuses specifically on developing approaches to avoid the use of single-use plastic products. Key activities include:

- Developing washing systems for reusable cups and bottles with integrated heat and water recovery.
- Organising citizen science workshops on zero-waste cosmetics and sustainable consumption.
- Showcasing zero-waste alternatives by demonstrating solutions.



The overall objective is to create regenerative, zero-waste local value chains, particularly as alternatives to single-use plastics. The project promotes decentralised, community-based models and encourages the use of renewable, recyclable and compostable materials. It aims to foster local innovation by helping businesses to designv sustainable solutions using reused biomaterials. The focus is on developing, implementing and replicating these solutions at the local level, while involving communities through awareness campaigns and stakeholder participation.

This technical note aims to highlight a diverse portfolio of initiatives led by REMEDIES and other Mediterranean partners, focusing on local regenerative value chains that contribute to reducing plastic waste in the Mediterranean Sea. It presents 10 solutions that apply regenerative and zero-waste approaches in the local Mediterranean context.

1.4 Zero waste regenerative local value chains

Zero-waste regenerative local value chains are 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 solely on material substitution, they address the entire value chain, from the sourcing of raw materials to production, distribution, use, and end-of-life, with the objective of generating positive environmental, economic, and social outcomes at the local level.

These value chains rely on short, decentralised supply chains and prioritise the use of locally available, renewable, or recovered resources. They promote the local production of sustainable alternatives made from reusable, recyclable, or compostable biomaterials such as reeds, agricultural residues, or mycelium.

By mobilising local resources and skills, they reduce dependence on imported materials, limit transport-related emissions, and strengthen territorial resilience, particularly in island and remote coastal contexts.





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Beyond waste reduction, the regenerative dimension refers to the capacity of these value chains to restore and reinforce local systems. This includes the valorisation of underused biomass, the revival of traditional knowledge and artisanal practices, the creation of local jobs, and the strengthening of social cohesion. By closing material loops locally and prioritising reuse, compostability, and biodegradability, these approaches contribute to ecosystem regeneration and to more circular resource management.

Zero-waste regenerative local value chains therefore represent more than technical alternatives to plastic: they offer a practical pathway for territories to regain control over their resources and consumption patterns. Rooted in place-based innovation and community engagement, they provide concrete implementation models for European and Mediterranean policy frameworks addressing plastic pollution.

2 Methodology

To identify, document, and analyse ten regenerative local value chains offering alternatives to plastic in the Mediterranean region, we adopted a multi-step methodology combining desk research, stakeholder engagement, structured interviews, and fieldwork. This approach enabled us to gather consistent and comparable information on each solution, while mobilising the networks and expertise available within SMILO and the REMEDIES consortium.

2.1 Identification and selection of solutions

The selection process began with an internal assessment of solutions already developed or supported as part of the REMEDIES project. We examined these initiatives in light of the definition of alternative local regenerative value chains to plastic established in the project's technical note. This definition served as the main selection criterion throughout the exercise.

We then expanded the scope of our research by engaging with regional partners in Provence-Alpes-Côte d'Azur, in France, in particular the ARBE and Ecoscience Provence. Their Guide to Zero Plastic Solutions, developed with the support of ADEME and the Région Sud, provided a comprehensive overview of 23 eco-responsible alternatives to plastic packaging and tableware. The guide follows a rigorous "step-by-step" assessment method built around 22 environmental criteria grouped into four priorities: durability manufacturing, transport, and end-of-life. Of the solutions presented in the guide, four directly matched our definition of regenerative local value chains and were therefore incorporated into our analysis.

Given SMILO's international network of small islands, we also mobilised our insular partners to identify context-specific practices emerging locally. This process highlighted, among others, the traditional craftsmanship of Kerkennah (Tunisia) associated with the use of date-palm materials, as well as the island's experimentation with a drinking-water fountain based on a dehumidification system. Both were included as relevant local alternatives to plastic.

Finally, we consulted the REMEDIES consortium partners to determine whether additional solutions existed within their respective networks. This resulted in the inclusion of two further initiatives: Staramaki (via ANGR) and MyCo (via ETMI).

Overall, only solutions that aligned with our definition of regenerative local alternative value chains to plastics were selected.

2.2 Data collection

Data collection relied on a combination of desk-based research and direct engagement with solution providers. For each case, we consulted official websites and press articles. These sources were complemented by direct exchanges with founders or key representatives of each solution, which were conducted via e-mail, LinkedIn, or in person.

A dedicated field visit was carried out in February 2025 on the island of Kerkennah. This mission included an on-site workshop on the date-palm value chain and the testing of the atmospheric water fountain. The fieldwork provided essential first-hand information for understanding the local context, the complexity of creating a regenerative local value chain as an alternative to plastic, and the socio-environmental dynamics.

All interviews followed a structured template, ensuring coherence across cases. Questions systematically covered: **What, Why, Who, When, Where, How, Budget, Key results, Next steps, and Challenges.** This structure ensured that we collected a comparable level of detail for each solution.

2.3 Interviews

We interviewed one representative per solution, typically the founder or project lead, as they are best positioned to provide comprehensive and up-to-date information.

Depending on availability, interviews were conducted through a mix of communication (e-mail, LinkedIn, in person). The structured interview guide was used systematically across all cases.

2.4 Analysis and validation

Following data collection, we organised and synthesised the information according to the structure of the interview template. This allowed us to compare the ten solutions on an equal basis and identify common patterns, strengths, and contextual specificities.

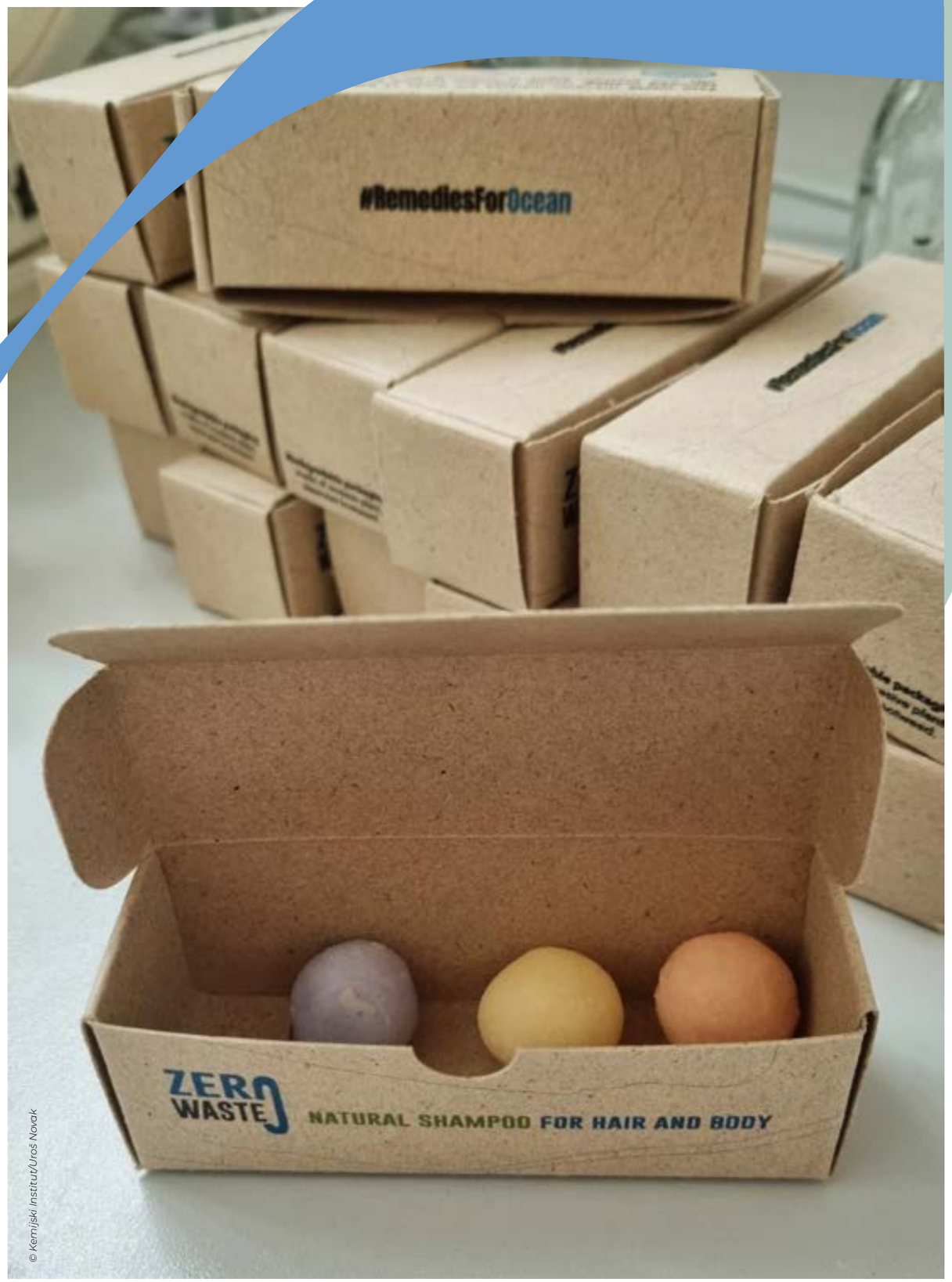
The analysis focused on describing each local value chain as accurately and comprehensively as possible, considering elements such as materials used, production processes, stakeholders involved, environmental impact and scalability.

Draft case descriptions were systematically shared with the solution providers for review and validation. This step ensured the accuracy of the information and reduced the risk of misinterpretation.

2.5 Limitations

While the methodology enabled the identification and documentation of ten relevant local alternative value chains, several limitations remain. First, the sample is partly influenced by the networks mobilised, both within REMEDIES and SMILO, meaning that additional solutions likely exist in the Mediterranean region but were not captured in this initial mapping.

Secondly, the availability and quality of documentation varied across solutions, which in some cases limited the level of analysis. Lastly, as several insights rely on interviews, some degree of subjectivity may persist despite the verification process.



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3 Demonstrative regenerative zero waste local value chains

In this section, we present 10 regenerative local value chains that offer tangible alternatives to plastic products, showcasing circular solutions tailored to island and Mediterranean contexts.



Solution 1.

Provence giant reed objects

Provence-Alpes-Côte d'Azur Region, France

Antoine Boudin - Self-Employed



© Antoine Boudin

What?

Since 2021, this initiative has supported 25 shopkeepers and restaurant owners in the Provence-Alpes-Côte d'Azur Region on the islands of Porquerolles, Port-Cros, and Levant, and since 2022 on the Frioul islands, in replacing single-use plastic items (such as straws, ice cream spoons, stirrers, and cutlery kits) with a more sustainable, locally produced alternative.

The new items are crafted from natural, biodegradable Provence giant reed, upcycled from the waste produced by the local reed industry used to make musical instrument reeds. Washable and reusable, these eco-designed products are created and distributed within a 50 km radius, ensuring a fully local lifecycle.

This initiative contributes to:

- Supporting a local industry based on a natural, sustainable, and locally available material.
- Upcycling waste generated by the instrument-making musical industry.
- Promoting circular economy practices.

Why?

In summer, small islands experience a significant surge in tourist numbers, which leads to increased consumption of single-use plastic utensils, especially in ice cream shops and cold drink bars. These plastic items, after a complex international supply chain journey, are often discarded after a single use, and many ultimately end up in the environment.

Given the absence of viable local alternatives innovation became necessary. Antoine Boudin with SMILO committed to identifying a solution adapted to the context of the islands of Porquerolles, Port-Cros, Levant (all within Port-Cros National Parc), and Frioul (within Calanques National Parc)..

Who?

- SMILO (coordinator).
- Antoine Boudin (designer).
- Committed local shopkeepers from the islands of Porquerolles, Port-Cros, Levant, and Frioul.
- A Provence cane producer.
- Port-Cros National Parc.
- Calanques National Parc.
- Residents and visitors.

Financial support was provided by: Beyond Plastic Med (BeMed) and Region Sud Provence-Alpes-Côte d'Azur.

When?

The "Zero Plastic on the Hyères Islands" campaign was launched in June 2021 in Porquerolles by SMILO and its partners, and in 2022 on the island of Frioul.

Where?

The initiative was implemented on the islands of Porquerolles, Port-Cros, and Levant (within Port-Cros National Parc), as well as on the island of Frioul (near Marseille, within Calanques National Parc).

How?

The designer repurposed offcuts of Provence cane, originally used to produce high-quality reeds for wind instruments such as saxophones and oboes.

He created various food-related items, straws, cutlery (spoon, fork, knife), ice cream spoons, and tapas sticks, manufactured locally in the Var territory.

Once produced, the items were distributed to participating businesses across the islands. This initiative is rooted in a circular economy approach, valuing local natural resources and traditional expertise.

Budget

The project designed and produced 35,000 reusable catering items made from Provence reed, with a total budget of 142,050 euros. The price of one cutlery set is 9 euros.

Key results

- Replacement of single-use plastics with local, sustainable, and biodegradable alternatives.
- Valorisation of Provence giant reed waste from the musical reed industry.
- Development of a local micro-industry using Provence giant reed.
- Recognition of the Hyères and Frioul islands as exemplary pilot territories.
- Raised public and visitor awareness of plastic reduction and available sustainable alternatives.
- Achieved reduction in SUP waste generated by the adopting businesses.

Main challenges

· Cost barrier: The price of one cutlery set is 9 euros, which may discourage some shopkeepers. However, these items become cost-effective after just 10 uses, when compared with disposable plastic equivalents.

· Adoption model: A deposit-refund scheme could help facilitate uptake by both businesses and consumers.

· Awareness and engagement: Additional efforts are needed to involve more s hopkeepers and to strengthen their understanding of the economic and ecological benefits of this approach.

Here is the webpage.



© SMILO/Ambre Badiqué

Solution 2.

Edible cutlery biscuits
Marseille, France
Koovee



© Koovee/Tiphaine Guerout

What?

Koovee has developed a fully local value chain to produce edible, vegan and biodegradable cutlery, as an alternative to single-use plastic or wooden utensils.

The products, spoons, forks and knives, are made from French wheat flour, sourced from the Provence-Alpes-Côte d'Azur Region, in France, and are produced and packaged locally in their production workshop in Marseille, in France.

The cutlery can be eaten like a biscuit after use or composted if not consumed. They are heat-resistant for over 5 minutes, and contain no plastic, wood or chemical additives. Their entire lifecycle is local and circular, based on nearby agricultural and food-processing sectors.

This initiative contributes to:

sustainability, innovation and enjoyment, offering a fun and responsible alternative to disposable items.

Why?

Koovee's edible cutlery tackles several key environmental issues:

- Marine and terrestrial pollution from single use plastics.
- High CO2 emissions from the production and transport of plastic or wooden utensils.
- Deforestation, chemical additives, and non-recyclability of so-called "eco" alternatives.
- Lack of truly circular and waste-free solutions in takeaway food services.

Koovee's approach is to prevent waste generation altogether, rather than managing it post-use.

Who?

This initiative is led by Koovee, an innovative French start-up co-founded by Tiphaine Guerout and Johanna Maurel.

Key partners include:

- Local wheat producers and millers in southern France.
- The Koovee team.
- Distributors and clients in fast food, snacking, and event sectors.

When?

Koovee began development in 2017 and launched its first products in 2020. Since then, the solution has expanded gradually across France and Europe.

Where?

The raw materials are sourced in the Provence-Alpes-Côte d'Azur Region and processed in Marseille. The products are then distributed across France and other European countries.

How?

Koovee has developed a unique and proprietary manufacturing process, using only natural ingredients:

• Raw materials: French wheat flour and plant-based ingredients (no additives or plastics).
• Design: ergonomic, sturdy and appetising cutlery.
• Production: an industrial baking process ensures food safety and durability.
• Usage: the utensils can be used as regular cutlery and eaten like biscuits.
• End of life: if not consumed, they are fully compostable and biodegradable.

This process ensures minimal carbon foot-print and zero waste.

Budget

Edible cutlery costs between 0.17 euros and 0.40 euros per unit, depending on type and quantity ordered. Koovee operates a B2B model, targeting fast food outlets, snack services, events and festivals. The company currently works with over 350 clients.

Key results

- Several thousand edible cutlery items sold across France and Europe.
- Zero waste, with positive public reception.
- Proven ability to replace plastic and wooden cutlery.
- Engaging and fun user experience, encouraging behaviour change.
- Reduced carbon footprint, waste and deforestation.

Next steps

• Scale up edible cutlery production and distribution.
• Continue expanding into new sectors and markets.

Main challenges

• Cost: higher than plastic, but competitive with wooden cutlery.
• Cultural shift: normalising the idea of eating or composting single use utensils.
• Growing demand: requiring increased production capacity.

Here is the webpage.



© Koovee/Tiphaine Guerout

Solution 3.

Handcrafted objects made from palm tree's branches

Kerkennah Island, Tunisia

AKDDCL – REMEDIES project



© SMILO/Ambre Badiqué

What?

Revival of an ancestral craft from the island of Kerkennah: the production of functional objects, particularly fishing traps, made from date palm branches.

Once central to the local economy, these traps have gradually been replaced by plastic versions, which contribute to marine pollution and ghost fishing. The initiative reintroduces these biodegradable, locally sourced tools through hands-on workshops, with the aim of establishing a women's cooperative dedicated to their production and commercialisation.

Why?

Replace polluting plastic products with biodegradable, locally sourced alternatives.

- Reduce marine pollution and ghost fishing caused by plastic traps.
- Preserve and promote a traditional craft that is part of the local cultural heritage.
- Create new economic opportunities, particularly for fishermen's wives.

Who?

- AKDDCL association.
- Municipality of Kerkennah.
- Fishermen, fishermen's wives, artisans, and coastal communities.

When?

· Craft skills passed down from generation to generation.
· Gradual substitution by plastic products over the past decades.
· 2025: organisation of eight training sessions as part of the "No More Plastic in Kerkennah" project, funded by REMEDIES cascade funding, bringing together around 50 participants (mainly fishermen's wives).

Where?

Kerkennah Island, Tunisia.

How?

• Collection and preparation of date palm branches.
• Manual weaving of fishing traps and other items using traditional techniques.
• Organisation of skills-transfer workshops for the local population, with a focus on fishermen's wives.

Budget

A cooperative has not yet been established, so no price has been set at this stage. What is interesting is that the raw material, date palm branches, is free as it is green waste that has fallen to the ground.

Key results

- Resumption of artisanal production of fishing traps and other date palm branch items.
- Around 50 people trained in 2025.
- Increased awareness of the environmental benefits of biodegradable products.

Next steps

Establishment of a women's cooperative to produce and sell these items in Kerkennah and the Sfax region, in Tunisia.

Main challenges

· Competition from cheap, readily available plastic fishing traps.
· Maintaining consistent demand for palm branch products.
· Scaling up production while preserving artisanal quality.
· Ensuring a sustainable supply of palm branches without harming local ecosystems.

Here is the webpage.



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© Yassine Hamouda

Solution 4.

Zero-waste shampoo and cosmetic containers made from a seaweed-based biopolymer

Ljubljana, Slovenia - NIC

Kemijski Institut – REMEDIES project



© Kemijski Institut/Uroš Novak

What?

An innovative alternative to single-use plastic cosmetic bottles, particularly common in the tourism and hospitality sector.
The solution uses a seaweed-based biopolymer to produce biodegradable, water-soluble and compostable capsules for products such as shampoo, conditioner, or shower gel.
These capsules fully dissolve during use, leaving no packaging waste.

The technology is adaptable for both artisanal and industrial-scale production and can be implemented locally in tourist destinations to reduce on-site plastic waste.

Why?

- Eliminate plastic packaging in the cosmetics sector, which produces over 120 billion plastic units per year.
- Reduce marine and terrestrial pollution caused by non-biodegradable packaging.
- Minimise waste of unused product in small plastic bottles.
- Support a circular and local economy, especially in tourist areas.

Who?

- Lead organisation: NIC – Kemijski Institut (Slovenia).
- Beneficiaries: cosmetic manufacturers, hotels, resorts, tourism operators, and consumers.

When?

· Technology already tested and operational in 2025 with the REMEDIES project.
· Current production capacity: 500,000 zero-waste cosmetic capsules per year.
· Next phase: expansion to European scale in partnership with tourism and hospitality stakeholders.

Where?

Developed in Slovenia.
· Designed for deployment in tourist destinations and hospitality establishments across Europe.

How?

- Production of a natural biopolymer coating for cosmetics from seaweed.
- Encapsulation of liquid or solid cosmetic products in biodegradable, water-soluble shells.
- Direct use by consumers (capsules dissolve entirely during washing).
- Potential for local production to reduce transport and on-site waste.

Budget

The investment required to scale up production, including the employment of personnel, amounts to 40,000 euros per year. In addition, regulatory and certification costs for launching a new cosmetics line are estimated at 3,000 euros.

The production cost for a single layer of zero-waste coating is 0.03 euros per single-use cosmetic product.

The price of zero-waste seaweed-coated cosmetics, such as shampoos, gels, and soaps intended for single use, ranges from 0.25 to 0.40 euros per item.

Key results

- Elimination of plastic bottles for certain cosmetics.
- Ready-to-scale technology with demonstrated capacity (500,000 units/year).
- High compatibility with existing cosmetic production processes.

Next steps

· Scale up production and distribution at EU level.
· Build partnerships with hotel chains and tourism operators.
· Promote adoption among both niche eco-brands and major cosmetic companies.

Main challenges

· Market acceptance and behavioural change among consumers and businesses.
· Competition with cheap single-use plastic shampoo bottles.
· Need to adapt packaging and logistics for different cosmetic formulations.
· Ensuring sustainable sourcing of seaweed feedstock at large scale.

Here is the REMEDIES website for Zero-waste Seaweed coatings for cosmetics.



© Kemijski Institut/Uroš Novak

Solution 5.

PLUG-AND-PLAY 2 ZERO-WASTE – Cleaning infrastructure for reuse with reusable bio-based cups & mobile application

Croatia, Spain and Greece

Alchemia-nova Greece, Bio-Mi, AITIIP, Cibos, National Technical University of Athens



© Alchemia-nova Greece

What?

A circular solution designed to eliminate up to 70% of single-use plastic (SUP) waste at tourist hotspots, festivals, and busy venues. PLUG-AND-PLAY 2 ZERO-WASTE stands out by applying a full circular approach at every stage, from production and use to end-of-life. Beyond improving materials, it addresses disposable habits directly at the point of service through a "Product as a Service" (PaaS) model, increasing social, economic, and environmental value. By creating prevention-focused systems where infrastructure and resources are shared instead of individually owned, it enables scalable, low-impact reuse solutions across the Mediterranean.

Technical features include:

- Decentralized cleaning: Large and small-scale modular dishwashing infrastructures customized to serve over 2,000 clean cups per hour, using nature-based solutions to restore water.
- Reusable packaging: Biobased-biodegradable cups for beer (0.5L), made by bio-polyesters compliant with EU No 10/2011, mechanically recyclable, and dishwasher safe over 100 cycles, and glass bottles (0.3L) certified to ISO 22000.
- Digital platform/User App: NFC/QR/barcode scanning for user identification, performance tracking, and integration with event operations
- Mobile application using NFC/QR/Barcode scanning for user identification and integration with business operations, featuring user engagement tools, reuse rates tracking, and environmental footprint metrics..

Why?

- Reduce single-use plastic waste, particularly beer cups and water bottles, which account for over 70% of event-related waste.
- Overcome barriers to reuse adoption (lack of infrastructure, high costs, fragmented logistics, consumer reluctance).
- Offer a hygienic, efficient, and convenient reuse model for high-traffic and water-stressed environments.
- Promote circular economy practices with traceable material flows.

Who?

- Key partners: Bio-Mi – material development & production, AITIIP – mold design & injection molding, CIBOS – mobile app development, NTUA – water quality assurance, ANGR – PaaS & nature-based solutions (NBS).
- Beneficiaries (B2B/B2G): beverage suppliers, event organisers, cultural managers, venue operators, sponsors, hotel resorts, municipalities, EXPOs.
- Beneficiaries (B2C): festival attendees, tourists, public.

When?

- Solution developed and tested in 2025 with the REMEDIES project; operational demonstrator focuses on 0.5L beer cups.
- Ongoing deployment at tourism and event locations; scale-up phase planned for broader European adoption.

Where?

Developed in Greece with potential replication across Europe's hospitality and event sectors.

How?

- **Deploy on-site reuse systems with plug-and-play dishwashing infrastructure.**
- **Integrate nature-based solutions to address water scarcity and reclaim water.**
- **Replace disposables with alternatives that are safe to people and the environment.**
- **Close the loop by extending material value through mechanical recycling.**
- **Track environmental impact to incentivize reuse behaviors via feedback loops.**

Budget

The system is ready to market by 2027, operating on a Pay-As-You-Wash model at €1.40 per item/cycle, covering lease, dishwashing, transport, DRS, and storage. Site commissioning costs begin at €1,500 for small-scale and €7,500 for large-scale licenses.

Key results

- Replace single-use items with 25,000 reusable plastic containers and 5.000 glass bottles.
- Reuse up to 2,000 reusables per hour through on-site dishwashing.
- Reduce 100 kg of single-use packaging per day.
- Prevent 70% of plastic waste per location.
- Restore over 80% of water through nature-based dishwashing processes.
- Regenerate plastic via mechanical recycling, exploring 5 cross-value-chain applications.

Next steps

- Replicate the solution to demonstrate system benefits in real-world contexts.
- Secure capital to reach a higher Technology Readiness Level (TRL7-8) for scaling.
- Expand to additional reusable food-contact packaging options.
- Create synergies with local governments and regional stakeholders.

Main challenges

- Deep-rooted throwaway culture in leisure and outdoor consumption.
- High plastic dependency in the beverage and bottling industry.
- Seasonality of coastal activities and hospitality demand.
- Operational complexity in event-specific branding and sponsorships.
- Lack of consistent national standards for reusable packaging.
- Strict food safety and compliance requirements across applications.
- Dependence on bio-based polymer production outside the EU.

Here is the REMEDIES website for PLUG-AND-PLAY 2 ZERO WASTE.

Solution 6.

Atmospheric water generators Producing drinking water from air

France/Tunisia - Kumulus compagny

Greece - *H2Oasis - Remedies Project*



© Kumulus

What?

Kumulus and H2Oasis are two innovative atmospheric water generation systems designed to produce high-quality drinking water directly from ambient air humidity. Using a condensation process inspired by the natural dew phenomenon, these autonomous units capture moisture, condense it via a refrigeration cycle, and purify the resulting water through multi-stage treatment (filtration, UV sterilisation, and mineralisation). The clean water is then stored internally and dispensed on demand via an integrated tap.

Both systems operate without the need for heavy infrastructure or connection to a central water network, making them easy to deploy in island territories, arid zones, or areas vulnerable to water stress. This fully localised production and distribution cycle reduces transport requirements and avoids reliance on plastic packaging or industrial-scale bottling.

· Kumulus: up to 30 litres/day, with a new higher-capacity model in development.
· H2Oasis: up to 50 litres/day depending on ambient conditions (projected performance in current testing phase).

Why?

- Combat water scarcity, notably in island territories or water-stressed areas.
- Reduce the use of single-use plastic bottles.
- Limit emissions linked to water transport.
- Ensure a local, resilient, and circular drinking water supply.

Who?

- Kumulus: Developed, produced, and deployed by Kumulus; intended for municipalities, public spaces, hotels, businesses, and schools.
- H2Oasis: Developed by MCGREECE under the REMEDIES project; designed for municipalities, public spaces, hotels, businesses, and schools.

When?

· Kumulus: First installations in 2022, with more than 140 units deployed in 2025.
· H2Oasis: REMEDIES project launched in 2022, currently in testing phase, with scale-up planned for 2026.

Where?

· Kumulus: France, Tunisia, Spain; upcoming deployment in the Indian Ocean (Mayotte).
· H2Oasis: Targeted for Mediterranean, arid, or island regions.

How?

- Capture of ambient humidity.
- Condensation via refrigeration cycle.
- Multi-stage purification (filtration, UV treatment, mineralisation).
- Internal storage and tap distribution.
- Operates on solar power or grid electricity.
- Maintenance includes filter cleaning, UV checks, and water quality monitoring.

Budget

· Kumulus: Approx. 5,900 euros (unit + installation) and 1,000 euros/year (maintenance).
· H2Oasis: Information not disclosed for the moment.

Key results

- Kumulus: Up to 0.5 tonnes of plastic and 2 tonnes of CO2 avoided per year per unit.
- H2Oasis: Significant expected reduction in plastic use and emissions thanks to local production (no quantified data yet available).

Next steps

· Kumulus: Expansion to other islands or vulnerable territories, increased production capacity.
· H2Oasis: Transition from testing to commercialisation phase.

Challenges

· High initial cost for some organisations.
· Performance dependent on humidity (less effective in very dry or cold climates).
· Regular maintenance and related costs.
· Production capacity limitations.

Here is the Kumulus website.

Here is the REMEDIES website for H2Oasis.


© Kumulus


© MCG/Eleftheriou Antonios

Solution 7.

Organic rye drinking straws

Provence-Alpes-Côte d'Azur Region, France



© La Perche/Jeff Lubrano

What?

Since 2018, La Perche has been producing 100% natural, reusable and compostable drinking straws made from organic rye stems.

Originally based in Normandy, production was relocated three years ago to Signes (Var), in the Provence-Alpes-Côte d'Azur Region, due to the impacts of climate change. Increasingly heavy and intense rainfall in Normandy made rye cultivation unreliable. The Mediterranean climate of the Var region has proven more suitable for stable production.

This local organic value chain is particularly virtuous:
· the grain is used to produce organic flour;
· the stems (straw) are recovered to manufacture drinking straws.
The production process is frugal and low-impact: stems are simply harvested, cut to size, cleaned and sterilised.

The straws comply with European food-contact standards. They are suitable for both hot and cold drinks, do not disintegrate or alter taste, and can be reused several times. At end of life, they are compostable. Decomposition may take longer in home compost, but they break down efficiently in industrial composting facilities.

Why?

In France alone, 3.2 billion plastic straws are used each year, contributing to marine and terrestrial pollution. La Perche offers an alternative that is:
· plastic-free;
· biodegradable;
· circular;
· rooted in local organic agriculture;
· capable of generating additional income for farmers.

In the Provence-Alpes-Côte d'Azur region, rye is also used as a cover crop, particularly in vineyards, to improve and purify soils. However, the stems are often not valorised afterwards. Transforming both the grain (into flour) and the straw (into drinking straws) optimises the resource and prevents waste.
The founders' ambition is clear: produce locally and consume locally, embedding the initiative within a territorial circular economy.

Who?

- La Perche: design, processing and distribution;
- Organic farmers in the South of France: rye cultivation and dual valorisation (grain and stems);
- Commercial partners: cafés, hotels, restaurants, event organisers and organic retailers.

Professional clients who have signed with La Perche tend to reorder regularly, reducing the need for extensive marketing and demonstrating the robustness of the business model.

When?

Production launched in 2018 and ongoing, with both B2B and B2C distribution channels.

Where?

Production and processing take place in Signes (Var), Provence-Alpes-Côte d'Azur Region, France. Distribution covers France.

How?

- Organic rye cultivation;
- Use of grain for flour production;
- Recovery of stems (straw);
- Cutting (13 cm or 19 cm), cleaning and sterilisation;
- Packaging and distribution.

Production waste is minimised and managed within a circular logic.

Budget

Products are sold in packs of 25 or jars of 80 straws:
· Reusable glass jar (80 straws): 29 euros, contains 80 organic rye straws (classic 19 cm or cocktail 13 cm, to be specified when ordering).
· Refill pack (80 straws): 19 euros, in a compostable kraft pouch (classic 19 cm or cocktail 13 cm, to be specified when ordering).
· Compostable Kraft pouch (25 straws): 9 euros (classic 19 cm or cocktail 13 cm, to be specified when ordering).

Key results

- Replacement of plastic straws with a natural, reusable and biodegradable alternative;
- Frugal, circular agricultural model;
- Additional revenue stream for farmers;
- Particularly well-suited to island contexts: local, circular, plastic-free and low logistical dependency.

Next steps

Strengthen territorial anchoring in Southern France;
· Expand into Mediterranean and island markets;
· Further promote reusable natural alternatives.

Challenges

· Competing with cheaper paper or bamboo imports.
· Encouraging consumer habit change towards reusable natural straws.
· Maintaining consistent supply of high-quality rye stems from organic sources.

Here is the webpage.



© La Perche/Jeff Lubrano

Solution 8.

Edible drinking straws
Touraine, France
BeestrO



What?

BeestrO is an innovative edible drinking straw created by Muriel de Peretti, designed as a zero-waste, eco-responsible alternative to plastic straws. Made from natural ingredients, chestnut flour and propolis, these straws are gluten-free, free from additives, and produced in an organic workshop near Chinon in Touraine in the Region Centre-Val de Loire in France. They come in straight or wavy shapes, withstand hot and cold beverages, and offer a pleasant biscuit-like taste that does not alter the drink. Entirely edible and biodegradable, BeestrO straws provide a sustainable solution with a premium positioning at 0.90 euros per unit.

Why?

After witnessing the detrimental effects of plastic straws on wildlife, notably marine turtles, and faced with the 2021 French ban on single-use plastic straws, Muriel de Peretti, a speech therapist and vocal coach, sought a safer, eco-friendly alternative tailored to her professional needs and those of environmentally conscious restaurateurs.

Existing options such as paper, metal, or bamboo straws were unsuitable for her vocal therapy work, leading her to invent the BeestrO straw, which supports both ecological and functional requirements.

Who?

- Muriel de Peretti: Founder, designer, and hands-on producer.
- A small, dedicated team of 4-5 employees.
- Professional clients: mainly restaurateurs and vocal therapy practitioners.

When?

The BeestrO project was launched following a successful crowdfunding campaign in 2020, accelerated by the COVID-19 pandemic context, and production continues today locally in Touraine with artisanal methods.

Where?

Production is based near Chinon in Touraine, in the Region Centre-Val de Loire in France. BeestrO's ambition includes future expansion to Corsica using local chestnut flour.

How?

• Selection of high-quality organic chestnut flour and propolis;
• Artisanal production process in a bio-certified workshop;
• Custom cutting, packaging, and personalization carried out by Muriel herself;
• Packaging is biodegradable and the entire process is zero waste;
• The straws resist at least 45 minutes in alcoholic beverages without degradation.

Budget

Each straw is sold at 0.90 euros per unit, reflecting its artisanal quality and premium market positioning.

Key results

- Development of a fully edible, biodegradable alternative to plastic straws.
- Meeting the specific needs of vocal therapy and hospitality sectors.
- Successful crowdfunding and community support enabling artisanal production.
- Increasing awareness and demand for sustainable, zero-waste beverage accessories.

Next steps

· Expand production capacity and regional sourcing, particularly in Corsica.
· Continue product innovation while maintaining artisanal quality and ecological standards.

Challenges

· Scaling up artisanal production while preserving quality.
· Competing with cheaper mass-produced alternatives.
· Raising consumer awareness of edible straw benefits and changing consumption habits.
· Securing reliable organic supply chains for chestnut flour and propolis.

Here is the webpage.

Solution 9.

Mushroom mycelium and agricultural waste-based materials

Bzenec, Czech Republic

MyCo



© MyCo

What?

MyCo designs and manufactures biodegradable, plastic-free materials made from mushroom mycelium and organic waste, offering a direct alternative to polystyrene and other single-use packaging.

The company has developed several product ranges:
· MYCO 4Pack & SafePads: A protective system combining paper capsules filled with Myco material (Myco SafePads) and cardboard. The SafePads absorb shocks, while the combination with cardboard ensures effective and environmentally friendly protection for transported goods.
· MYCO FixPack: A bespoke protective solution, with Myco material moulded exactly to the shape of the product, replacing polystyrene or other plastic-based inserts and fillers. Suitable for both primary packaging and gift boxes.
· MYCO Go & Comfy: Eco-friendly aroma diffusers for home and car. The capsules, made from sawdust infused with mycelium, efficiently absorb fragrant oils and release them gradually.

Why?

· Reduce plastic pollution.
· Eliminate the spread of microplastics.
· Lower CO2 emissions by replacing petroleum-based materials.
· Make use of renewable and compostable resources.

Who?

The company was founded by David Šohaj Minařík in 2021, with the support of co-founders Jan Ostrezi, Vladan Košut and Martin Janča, as well as investors Garage Angels and JIC Ventures.

When?

Initial experiments began in 2019, the company was officially established in January 2021, and secured a major investment in July 2022, with continuous product development planned through to 2025.

Where?

Headquartered in Bzenec, Czech Republic, with an 800 m2 production site, targeting the Czech, German and broader European markets.

How?

- Sterilising agricultural and forestry waste (sawdust, hemp shavings, paper).
- Inoculating the substrate with mycelium.
- Growing for five weeks.
- Moulding into the desired shape.
- Drying to obtain a rigid, lightweight and compostable material.
- Using a continuous substrate preparation line and semi-automated moulding process.

Budget

In 2022, MyCo raised CZK 14 million (approx. 570,000 euros) to expand production and fund R&D. Pricing for their mycelium-based inserts (MYCO4Pack, SafePads, FixPack) is client-specific but remains cost-competitive at medium to high volumes. They match the price range of equivalent polystyrene or PU inserts while being carbon-negative (–1.36 kg CO2/kg), fully compostable, and made from renewable resources.

Key results

- 1st Prize – E. ON Energy Globe 2022 (Czech Republic).
- Medal of Honour – Energy Globe Award 2022 (Global).
- 1st Prize – Generali SME EnterPRIZE 2023 (Startup category).
- Recognised innovation offering a local, compostable alternative to plastics, particularly polystyrene, with lower CO2 emissions than their petroleum-based equivalents.

Next steps

· Increase production capacity.
· Enter the German market through strategic partnerships.
· Certify materials for new applications (construction, insulation).

Challenges

· Achieving large-scale production at competitive cost.
· Raising market awareness of mycelium-based materials.

Here is the website.



© MyCo


© MyCo

Solution 10.

Natural wheat-stem straws
Kilkis, Greece
Staramaki


© Staramaki/Stefanos Kamperis

What?

Staramaki designs and manufactures biodegradable, plastic-free drinking straws made entirely from natural wheat stems, a by-product of cereal cultivation in Northern Greece. These straws provide a direct alternative to single-use plastic straws, paper straws (which soften in use), and bioplastics.

The company has developed several product ranges:

- Staramaki 16/100: 16 cm straws (diameter 3.5–5.5 mm), carton packaging, 100 units.
- Staramaki 13/100: 13 cm straws (diameter 3.5–5.5 mm), carton packaging, 100 units, also usable as stirrers.
- Individually Wrapped Straws:
- Standard (17, 18, 19 cm, diameter 4.0–5.5 mm, 1000 units/box)
- Narrow (17, 18, 19 cm, diameter 3.0–4.0 mm, 1000 units/box)
- Petit (13, 14, 15 cm, diameter 4.0–5.5 mm, 1000 units/box)
- Petit Narrow (13, 14, 15 cm, diameter 3.0–4.0 mm, 1000 units/box)
- Reed case: Natural reed tube (22 cm) with cork cap, designed to hold 5–10 straws, customizable with laser engraving.

Why?

- Reduce plastic pollution and single-use plastic waste in Mediterranean ecosystems.
- Provide a 100% natural, home-compostable and durable alternative that does not soften in liquid, unlike paper straws.
- Lower CO2 emissions by using agricultural residues instead of petroleum-based or industrially processed alternatives.
- Operate within a circular economy model: valorising local wheat stems and reintegrating production residues for animal bedding, biomass or compost.
- Stimulate local employment and social inclusion in a rural area affected by unemployment, while showcasing a cooperative ownership model.

Who?

- Founded in 2019 in Kilkis, Greece, originally as a Social Cooperative Enterprise, now transformed into Staramaki S.A. with the support of impact investors (Investing for Purpose).
- The enterprise employs and trains locals (including women and youth) and works with a network of farmers cultivating and supplying wheat stems.
- Recognised as a European best practice in circular economy and social innovation.

When?

The cooperative was established in 2019, with ongoing expansion of production capacity and social impact. By 2025, Staramaki has scaled from artisanal volumes to millions of straws annually, thanks to automation and EU-funded R&D projects.

Where?

Headquartered and producing in Kilkis, Northern Greece, sourcing wheat stems directly from local fields and building farmer networks in the region.

How?

• Collecting stems after harvest: cutting, sterilising, drying, inspection and packaging.

• Integration of AI-based defect detection and semi-automated processing lines to ensure higher quality and scalability.

• Closing the loop: residues are reused in farming and local biomass systems, enriching soils and reducing waste.

Budget

- Initial handmade straws cost 0.13 euros each.
- Thanks to automation and scaling, current cost has decreased significantly, enabling competitive pricing (depending on volume and packaging).
- Premium positioning for coffee chains, hotels, bars, restaurants, and retail (Costa Navarino, Nespresso).

Key results

- Over 5 million straws sold across Greece and export markets.
- 15 direct jobs created in Kilkis, with indirect impact on local farmers and supply chains.
- Recognised by EU institutions, circular economy networks, and media as a flagship Mediterranean bioeconomy case.
- Partnerships with international companies (Nestlé/Nespresso).

Next steps

- Scale production to 45 million units annually by 2029, through further equipment upgrades and raw material improvements.
- Expand distribution across Europe and the Mediterranean, especially in markets with strong SUP legislation.
- Develop new product lines (panels from straw residue, cookies from triticale flour, wide smoothie wheat straws).
- Strengthen regenerative agriculture practices in wheat cultivation to improve raw material quality and resilience in arid regions.

Challenges

- Balancing cost-competitiveness with sustainability and inclusivity.
- Overcoming consumer misconceptions (fragility vs. durability once wet, floating vs. functional design).
- Scaling while preserving the social cooperative DNA in the new corporate structure.

Here is the website.

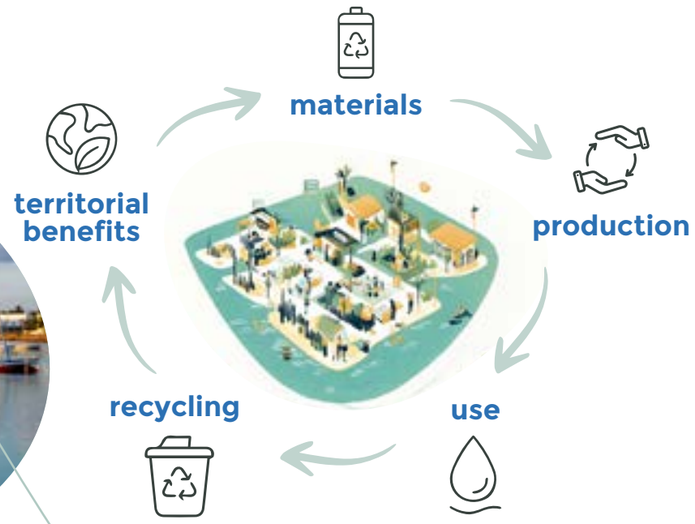


© Staramaki/Stefanos Kamperis

4 Solutions analysis

This chapter summarises the analysis of the ten regenerative local value chains presented in the previous section. Rather than repeating individual case descriptions, it identifies cross-cutting trends, common barriers, enabling factors, as well as the environmental, economic, and social benefits generated by these initiatives. Collectively, these solutions illustrate both the potential and the limitations of local and regenerative alternatives to plastic in Mediterranean and island contexts.


© Yassine Hammami



4.1 Common characteristics of the solutions

Despite their diversity in terms of materials, sectors, and maturity levels, the ten solutions share several structural characteristics:

- **Local sourcing of materials:** All solutions rely on resources available locally or from regional supply chains (for example: Provence cane, wheat stems, rye, date palm branches, seaweed, atmospheric humidity). This reduces dependence on imported raw materials and lowers transport-related emissions.
- **Short and decentralised value chains:** Production, processing, and, in many cases, distribution occur within a limited geographic area. This feature is particularly pronounced in island or rural contexts, where decentralisation strengthens resilience.
- **Prevention of plastic and single-use items:** Most initiatives aim to avoid both plastic and single-use items, rather than merely replacing them with another disposable material.
- **Strong human and territorial anchoring:** Many solutions are led by individual entrepreneurs, cooperatives, or small teams, often closely connected to local communities, traditions, or specific territorial challenges.

These shared characteristics confirm that local value chains are not defined by a single technology but by a systemic approach combining materials, governance, and territorial anchoring.

4.2 Environmental benefits and regulatory relevance

Across the ten cases, environmental benefits are central and closely aligned with existing and emerging policy frameworks aimed at tackling plastic pollution at European and Mediterranean levels.

- **Direct response to single-use plastic directive:** The analysed solutions provide concrete alternatives to products targeted by the European Single-Use Plastics Directive (SUP), such as cutlery, straws, cups, and packaging. By offering reusable, edible, biodegradable, or packaging-free options, they enable economic actors, particularly in tourism, hospitality, and event to comply with bans and reduction obligations without resorting to other disposable materials.
- **Direct response to the European Packaging and Packaging Waste Regulation (PPWR) objectives:** Several solutions also answer the PPWR targets, particularly r egarding waste prevention, reuse objectives, and restrictions on unnecessary single-use packaging. Reuse systems, local water production, and packaging-free cosmetics illustrate practical ways to reduce packaging volumes at the source.
- **Reduction of plastic leakage and marine litter:** The ten initiatives help prevent plastic entering the environment by eliminating plastic products before they become waste. This directly supports the objectives of the Mediterranean Regional Plan on Marine Litter under the Barcelona Convention, which prioritises upstream prevention, particularly in tourism, fishing, and coastal activities.

- **Reduction of carbon footprint and transport-related impacts:** Short supplychains, local production, and the use of bio-based materials significantly reduce greenhouse gas emissions compared with conventional plastic alternatives. These benefits are particularly relevant for islands, where imported plastic products often travel long distances, generating disproportionately high transport emissions.

- **Improved resource efficiency and circularity:** Many initiatives valorise local waste or by-product streams (agricultural residues, palm branches, reed offcuts), transforming them into functional products and closing material loops at the territorial level. This approach aligns fully with the circular economy principles promoted by European and regional strategies.

Overall, environmental benefits are greatest when solutions are integrated into local consumption systems (tourism, hospitality, events, fishing) and supported by regulatory frameworks prioritising prevention over end-of-life management.

4.3 Economic benefits

Alternative local value chains generate economic value that goes beyond simple plastic substitution.

- **Support for local economies and employment:** The solutions create or sustain local jobs, often in rural or island areas with limited economic opportunities. This includes artisanal production, agricultural supply chains, processing, logistics, and maintenance.

- **Reduction of dependence on imports:** By producing alternatives locally, territories reduce exposure to global supply chain disruptions and price volatility, a key factor for islands and remote areas.

- **Emergence of new business models:** The solutions demonstrate a diversity of models, ranging from social cooperatives and artisan enterprises to scalable start-ups. Some show that economic competitiveness with plastic is achievable at sufficient scale, while others remain positioned in niche or premium markets.

Economic viability, however, often depends on external support (public funding, impact investment, regulatory incentives) during initial phases.

4.4 Social and cultural benefits

Beyond environmental and economic impacts, the solutions generate significant social value.

- **Preservation and revitalisation of traditional skills:** Initiatives such as palm branch weaving or reed craftsmanship reconnect communities to ancestral practices adapted to contemporary environmental challenges.

- **Social inclusion and empowerment:** Several value chains explicitly involve women, youth, or workers in the social and solidarity economy, contributing to skills development and local empowerment.

- **Behavioural change and awareness:** Edible cutlery, reusable systems, and visible plastic alternatives play an educational role, helping consumers and tourists rethink daily habits.

- **Community engagement:** Many solutions rely on close collaboration between producers, users, local authorities, and civil society, strengthening social cohesion and collective ownership of environmental challenges.

These social dimensions are particularly important in island contexts, where community dynamics strongly influence the success or failure of local initiatives.

4.5 Common barriers

Despite their positive impacts, the ten solutions face recurring challenges:

- **Cost and price sensitivity:** Plastic alternatives are often more expensive than conventional disposable products, particularly at small scale. This is a major barrier to widespread adoption, especially in price-sensitive sectors.

- **Scaling up while remaining local:** Balancing scale-up with territorial anchoring is a key tension. Increased volumes can improve profitability but may also strain local resources or weaken artisanal and social dimensions.

- **Regulatory and certification constraints:** Food contact and hygiene regulations can be complex and costly, particularly for small producers.

- **Behavioural and cultural barriers:** Consumer habits, resistance to change, and misconceptions about sustainability or hygiene can slow adoption, even when alternatives are technically mature.

- **Network and visibility limitations:** The identification of these ten solutions largely reflects the existence of already established local value chains. Many similar initiatives likely exist but remain fragmented, under-documented, or insufficiently supported.

Recognising these barriers is essential for designing effective support mechanisms and public policies.

4.6 Key success factors

The analysis of the ten case studies highlights several key factors that determine the success and sustainability of regenerative local value chains:

- **Alignment with regulatory frameworks:** Solutions that clearly align with existing and emerging regulations, particularly those targeting the reduction or ban of single-use plastics, benefit from a favourable environment for the deployment of sustainable alternatives.

- **Access to local raw materials:** Availability of local resources ensures technical feasibility, strengthens supply chain resilience, and minimises transport-related environmental impacts.

- **Territorial relevance:** Solutions designed in response to specific local needs, practices, and constraints, especially in island or rural contexts, are more likely to be adopted and sustained.

- **Strong local leadership and engagement:** Project leaders rooted in their territory (entrepreneurs, cooperatives, associations) can mobilise local networks, unite stakeholders, and ensure continuity over time.

- **Support from public authorities and institutions:** Structural backing from government bodies, research and innovation institutions, and European programmes is crucial during experimentation, capacity building, and scaling phases.

When these factors are present and effectively combined, local value chains can move beyond the experimental stage, achieve economic resilience, and become firmly embedded in local economies and territorial transition strategies.

Keys takeaways for territories :

Key takeaway 1

Start from local resources

Regenerative local value chains are most robust when they build on locally available materials and skills, reducing dependency on imported plastics and strengthening territorial resilience.

Key takeaway 2

Prevention works better than substitution

Preventing plastic at source through reuse, edible or packaging-free solutions is more effective than replacing single-use plastics with other disposable materials.

Key takeaway 3

Islands as living laboratories

Island territories, due to logistical constraints and waste management limits, are particularly well suited to pilot and scale decentralised, circular and self-sufficient value chains.



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Conclusion

The portfolio of local, regenerative, and zero-waste value chains presented in this note demonstrates the transformative potential of community-driven solutions to tackle plastic pollution in the Mediterranean. By producing sustainable alternatives to single-use plastics, these initiatives not only reduce environmental impacts but also stimulate local economies, preserve traditional knowledge, and promote social inclusion.

For islands and remote territories, such approaches are particularly critical. Geographic isolation increases dependence on imported goods and complicates waste management, while fragile ecosystems, water scarcity, and seasonal tourism intensify the impacts of plastic pollution. In this context, decentralised and circular value chains, rooted in local resources and skills, offer a pathway towards greater resilience and self-sufficiency.

Regenerative local value chains are therefore not merely an ecological response to plastic pollution; they represent a broader social and economic opportunity for Mediterranean islands and coastal communities. As demonstrated by REMEDIES and other initiatives across the region, investing in locally rooted solutions can strengthen circular economies, enhance waste management systems, and empower communities to reclaim control over their resources.

Supporting and scaling up these models constitutes a strategic lever for restoring the Mediterranean Sea while fostering sustainable development in territories where isolation amplifies both vulnerability and innovation potential. These local regenerative solutions also align with broader European and international frameworks, including EU directives and regulation such as the SUP and PPWR, as well as ocean governance initiatives like the EU Ocean Pact, highlighting how community-driven action can contribute to policy objectives at multiple levels.

Glossary

Biological diversity: means the variability among living organisms from all environments (ecosystems) including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within and between species, as well as within ecosystems.

Biowaste: any non-hazardous biodegradable garden or park waste, any non-hazardous food or kitchen waste, especially from households, restaurants, caterers or retail stores, as well as any comparable waste from establishments producing or processing foodstuffs.

Ecosystem: means a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.

Macro plastics: pieces of plastics larger than 5mm.

Marine litter: Marine litter (in the USA and other parts of the world named also as «marine debris») is any persistent, manufactured or processed solid material discarded, disposed of, abandoned or lost in the marine and coastal environment. It includes items entering the marine environment via rivers, sewage outlets, storm water outlets and windblown litter items.

Maritime Traffic: means all shipping for business purposes between two or more ports or moorings, with the exclusion of regular ferry services, pleasure boating, coastal fisheries and inland waterway transport.

Micro plastics: small pieces of plastics, usually smaller than 5mm down to the nanometre (nm) scale.

Regenerative: supplied repeatedly by itself without addition.

Small islands: according to SMILO: less than 150 km², no bridge to the mainland and a clear separation at low tide, inhabited or not, protected or not, in the seas of the whole world.

Local Value Chain: refers to a system in which products, such as alternatives to single-use plastics, are produced, distributed, and consumed within a specific geographic region.

Zero waste: means designing and managing products and processes to reduce the volume and toxicity of waste materials, conserve and recover all resources, and not burn or bury them.

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