

**WORKSHOP TO DISCUSS AND IDENTIFY THE
APPROPRIATE MEASURES FOR THE REDUCTION OF
NEW INTRODUCTIONS AND FOR
ERADICATION/CONTROL OF NIS**

OUTCOMES SUMMARY

Supported By:



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OUTCOMES SUMMARY

1 INTRODUCTION

1.1 Overview

The Mediterranean Sea, a crucial hotspot of biodiversity, is increasingly threatened by non-indigenous species (NIS), endangering both its ecological balance and economic stability. Addressing this issue requires coordinated action across local, national, and regional levels.

To further these efforts, a workshop was held on January 23, 2025, in Rome, Italy, bringing together scientists, fishers, civil society organizations, national institutions, and entrepreneurs. Participants exchanged experiences and explored scalable solutions to tackle the NIS challenge in the Mediterranean.

Discussions centered on prevention, eradication, and control strategies to safeguard biodiversity, ecosystems, and local livelihoods. Through expert insights, knowledge sharing, and collaborative dialogue, the workshop aimed to generate concrete recommendations and strategic actions for enhancing NIS management in the region.

This initiative aligns with the Action Plan concerning Species Introductions and Invasive Species in the Mediterranean Sea under the Barcelona Convention, as well as the Post-2020 Strategic Action Programme for the Conservation of Biological Diversity and Sustainable Management of Natural Resources in the Mediterranean Region (Post-2020 SAPBIO). It highlights the critical need for regional cooperation, early detection, and policy integration to effectively address this escalating threat.



1.2 Objectives

The workshop aimed to:

- 1 Assess the current status of NIS in the Mediterranean and evaluate existing challenges and trends.
- 2 Explore strategic initiatives and measures to address NIS introduction, eradication, control and management.
- 3 Identify priority actions, including biosecurity, adaptive harvesting, and ecosystem protection.
- 4 Strengthen regional cooperation and facilitate knowledge sharing and collaboration among stakeholders.

2 WORKSHOP PRESENTATIONS

Please click on the title to access the presentation.

Session 1: Status of NIS in the Mediterranean and Strategic Initiatives

This session provided an overview of the current status of Non-Indigenous Species (NIS) in the Mediterranean, highlighting key findings from recent assessments and strategic initiatives. It includes insights from the:

- [MedQSR 2023 Findings on NIS](#) by Marika GALANIDI from (SPA/RAC consultant)
- [Italian activities on NIS in the framework of MSFD](#) by Annalisa PATANIA from MASE (Italy)
- [Italian NIS marine monitoring programmes: status and perspectives](#) by Luca CASTRIOTA from ISPRA (Italy)
- [GFCM pilot study on NIS in the eastern Mediterranean](#) by Stefano LELLI from GFCM

Session 2: Appropriate Measures for the Reduction of New Introductions of NIS

Discussions centred on proactive strategies to minimize the introduction of new invasive species. Presentations showcased:

- [Developing and Assessing Fishing-Related Strategies to Manage Aquatic Invaders](#) by Ernesto AZZURO from CNR-IRBIM (Italy)
- [Mediterranean NIS Action Plan and associated Guidelines for the control of vectors and risk analyses](#) by Marika GALANIDI from HCMR (Greece)

Session 3: Appropriate Measures for the Eradication and control of NIS

This session discussed targeted approaches to remove invasive species from marine ecosystems. It includes case studies drawing from real-world experiences:

- [Engaging Communities and Using social media to Tackle Lionfish in Libya](#) by Sara AL MABRUK from Marine Biology in Libya (Libya)
- [Invasive Species Control Through Targeted Removals and Market-Based Approaches in Cyprus](#) by Demetris KLETOU from MER (Cyprus)

Session 4: Appropriate Measures for the Control and Management of NIS

This session highlighted innovative initiatives that integrate NIS management with economic and social benefits. Topics include:

- [Pick The Alien project: Promoting responsible seafood consumption](#) by Roxani NAASAN AGA SPYRIDOPOULOU from iSea (Greece)
- [Marine aliens as a source of innovative products](#) by Paraskevi K. KARACHLE & Ioannis NENGAS
- [Le Puffer: Transforming Threats into Treasures with Eco-Positive Invasive Pufferfish Leather Products](#) by Aylin ULMAN, CEO, Olta Azul (Türkiye)
- [The Growth of Invasive NIS in Lebanese Waters: Opportunities for the Local Market](#) by Michel BARICHE from AUB (Lebanon)

ROUNDTABLES: CHALLENGES AND RESPONSES

This interactive session provided a platform for experts and stakeholders to discuss the challenges and practical solutions related to NIS management:

- [Appropriate measures for the reduction of new introductions of NIS and for the eradication, control, and management of NIS](#) by Periklis KLEITOU (SPA/RAC consultant)

Roundtable Summary:

Non-indigenous species (NIS) management in the Mediterranean requires adaptive, ecosystem-based strategies that balance biodiversity conservation with socio-economic needs. Given the region's ecological vulnerabilities, a multi-faceted approach is essential, integrating prevention, adaptive management, and the sustainable use of NIS to maintain ecological stability and resilience.

Prevention, particularly through strict biosecurity measures, remains the most cost-effective long-term strategy. However, climate change and established invasions demand broader approaches beyond eradication, including habitat restoration, spatial control within Marine Protected Areas (MPAs), and market-based solutions such as the valorisation of edible invaders.

Nine key priorities were identified, including strengthening biosecurity, improving early detection and rapid response, standardizing monitoring efforts, and supporting native predator communities. Where eradication is not feasible, market valorization and adaptive fisheries regulations can help manage populations while creating economic opportunities. Additionally, legislative reforms, socio-economic assessments, public awareness initiatives, and transboundary cooperation are essential for effective NIS management in the Mediterranean.

Challenges such as **limited financial resources, regulatory gaps, and socio-economic trade-offs** were highlighted. Participants stressed the need for **regional cooperation, cross-sector collaboration, and sustained funding** to implement long-term solutions for NIS management in the Mediterranean.

3 KEY OUTCOMES

Critical perspectives and challenges related to each proposed measure for reducing new NIS introductions, eradication, control and management of NIS in the Mediterranean context are discussed and are outlined below:

Measure #1: Comprehensive Biosecurity & Early Detection

This measure aims to prevent new NIS introductions by strengthening biosecurity protocols at key entry points, including ports, aquaculture facilities, and shipping routes. It also emphasizes early detection systems to identify and respond to potential invasions before they become established.

Progress: Most cost-effective and scalable regional prevention strategy.

Considerations: Implementing strict biosecurity measures across Mediterranean countries is complex due to varying national regulations, enforcement capabilities, and economic priorities. Many countries lack the financial and technical resources to sustain long-term early detection programs. Additionally, gaps in international shipping regulations and weak or inconsistent enforcement at ports and aquaculture make biosecurity efforts inconsistent.

Challenges: The high connectivity of maritime trade, tourism, and aquaculture increases the risk of introductions, making prevention difficult. Coordination among multiple jurisdictions is required, but political and economic disparities among Mediterranean nations hinder unified biosecurity enforcement.

Measure #2: Standardized, Multi-Parameter Monitoring at Sentinel Sites

This measure aims to establish a network of sentinel sites where standardized, multi-parameter long-term monitoring can track the presence and spread of NIS. These sites will provide critical data to inform management decisions and enable early eradication efforts.

Progress: Enables cost-effective early eradication, monitoring of NIS impacts, and efficiency of management interventions.

Considerations: Standardizing monitoring protocols across a diverse region with different scientific capacities and national priorities is challenging. Monitoring efforts often lack sustainable funding, leading to data gaps and inconsistencies.

Challenges: The Mediterranean is highly heterogeneous, with varying environmental conditions, making it difficult to define standardized parameters that apply across all regions. Additionally, the long-term commitment required for meaningful data collection is often limited by short funding cycles and shifting policy priorities.

Measure #3: Localized control in Priority Sites

This measure aims to remove NIS from ecologically or economically sensitive areas where their presence poses significant threats. Localized eradication and control focus on species that are newly established or confined to specific locations.

Considerations: Eradication in open marine systems is often impractical and costly, especially for widely established species. Removal efforts can disrupt ecosystems and unintentionally harm native

species. Control requires commitment and consistency of removal efforts. Control practices vary among taxonomic groups.

Challenges: Identifying priority sites requires robust ecological and socio-economic assessments, which are often lacking. In many cases, eradication may only offer temporary relief if sources of reinfestation are not controlled. Localized efforts target a limited number of species. Limited data on the efficiency of the measure on most taxa.

Measure #4: Protect Ecosystems & Native Predators

This measure aims to enhance ecosystem resilience by protecting and restoring native predators and habitats, which can naturally regulate NIS populations and reduce their impacts.

Considerations: Restoring native predator populations may not always be effective, as some NIS have no natural predators in the Mediterranean. Protection efforts can also lead to conflicts with fisheries that rely on predator species for economic livelihoods.

Challenges: Overfishing, pollution, and habitat destruction already threaten many native predators, making their restoration a long-term and complex process. Encouraging predator recovery without addressing broader ecosystem stressors may have limited success.

Measure #5: Adaptive Harvest / Fisheries

This measure encourages coordinated action to integrate NIS into management practices, ensuring that environmental conservation and sustainable fisheries management go hand in hand including by promoting their harvest in a way that reduces their populations while providing economic opportunities for fishers.

Considerations: Adaptive fisheries management requires real-time monitoring and responsive policy adjustments, which can be difficult to implement in countries with limited governance capacity. Impacts of species might change over time requiring adaptive and continuous iterative processes and monitoring.

Challenges: Shifting efforts toward NIS may require restructuring of fishing practices. Compliance with adaptive regulations may be low if economic benefits are uncertain.

Measure #6: Market Valorisation & Promotion of NIS Products

This measure aims to create economic incentives for controlling NIS populations by promoting their use in commercial markets, such as food, leather, cosmetics, or bioproducts.

Considerations: While creating economic incentives to exploit NIS can help control populations, it also carries risks. Overharvesting can drive demand and unintentionally lead to commercial protection of invasive species, making them harder to manage. If not well-regulated, market promotion could encourage NIS aquaculture, further exacerbating their spread.

Challenges: Consumer acceptance of NIS products varies, and some species may not be economically viable due to processing costs or cultural preferences. Developing sustainable markets requires strong regulation and long-term consumer engagement.

Measure #7: Legislative Reforms & Socio-Economic Cost–Benefit Analyses

This measure aims to strengthen legal frameworks and integrate socio-economic analyses into decision-making processes to ensure that NIS management policies are both effective and financially viable.

Considerations: Legislative reforms require strong political will, and policy changes are often slow due to bureaucratic processes and conflicting economic interests. Many Mediterranean countries prioritize economic development over environmental protection, making enforcement of stricter NIS regulations difficult.

Challenges: Conducting accurate socio-economic cost-benefit analyses requires reliable data, which is often lacking for NIS impacts. Differences in national legal frameworks complicate the implementation of region-wide policies.

Measure #8: Education & Public Awareness

This measure aims to increase awareness and knowledge about NIS among key stakeholders, including policymakers, fishers, and the public, to encourage proactive management and prevention efforts

Considerations: Education and public awareness is highly linked with most measures. Awareness campaigns often fail to reach key stakeholders, such as small-scale fishers and aquaculture operators, due to language barriers, lack of interest, or economic constraints. Many campaigns remain generic and do not provide actionable solutions for local communities.

Challenges: Changing public behaviour is a slow process, especially when economic incentives contradict conservation efforts. Without sustained funding and engagement, awareness initiatives may have little long-term impact.

Measure #9: Transboundary Collaboration & Stakeholder Co-Management

This measure aims to foster regional cooperation and shared governance structures to improve coordination among Mediterranean countries and stakeholders in NIS management.

Considerations: Effective collaboration across Mediterranean countries is challenging due to political tensions, differences in economic priorities, and uneven enforcement capabilities. Stakeholder co-management requires strong governance structures, which are weak or absent in some regions.

Challenges: Coordinating multiple stakeholders with diverse interests—fisheries, tourism, conservation, and industry—is difficult, and conflicting priorities can lead to slow decision-making and ineffective implementation. Moreover, resource inequalities between countries make equal participation in regional initiatives challenging.

4 RECOMMENDATIONS

- **Urgency action:** The Mediterranean Sea is highly vulnerable to NIS introductions due to its unique biodiversity and high levels of human activity. Immediate and coordinated action is necessary to mitigate the ecological and economic impacts of NIS. Prevention is still a priority.
- **Management** should consider both negative and positive outcome of species invasions and both ecological and socio-economic implications. To support adaptation and mitigation efforts, practical and targeted actions must be implemented. These actions should be based on a well-informed management strategy, developed in close collaboration with key stakeholders. Implementation should occur at the local, national, and subregional levels, with a strong emphasis on fostering regional cooperation to ensure a coordinated and effective response.
- **Integrative monitoring approaches** are highly encouraged to enhance the monitoring of Non-Indigenous Species (NIS) and their taxonomic identification. While current methods have limitations, advancements in technology, such as environmental DNA (eDNA) metabarcoding, hold significant promise. These innovative tools can improve early detection and monitoring of NIS, serving as valuable complementary methods to traditional taxonomic analyses. By combining these approaches, we can achieve more accurate and efficient identification and tracking of invasive species.
- **Regional cooperation:** The success of NIS management depends on strong regional cooperation and the sharing of knowledge, resources, and technologies among Mediterranean countries.
- **Long-term commitment:** Addressing the NIS issue requires long-term commitment from governments, researchers, industries, and local communities. Continuous monitoring, research, and adaptive management are crucial for sustained success.
- By **raising awareness** and promoting the responsible consumption of edible NIS, we can turn the challenge of invasive species into an opportunity for ecological restoration and sustainable resource use. This approach not only helps control NIS populations but also supports local economies and promotes environmental stewardship.
- **Integrated Approach:** A multi-faceted/transversal approach combining prevention, eradication, control, and management measures is essential for addressing the NIS challenge adapted to national context.
- **The following measures were identified and discussed as the most appropriate measures to be promoted:**

Appropriate measures for the reduction of new introductions of NIS:

- Measure #1: Comprehensive biosecurity & early detection
- Measure #2: Standardized, Multi-Parameter Monitoring at Sentinel Sites

Appropriate measures for the eradication, control and management of NIS:

- Measure #3: Localized eradication and control in priority sites
- Measure #4: Protect ecosystems & native predators
- Measure #5: Adaptive harvest / fisheries
- Measure #6: Market valorisation & promotion of NIS products
- Measure #7: Legislative reforms & socio-economic cost–benefit analyses

Transversal measures:

- Measure #8: Education & Public Awareness
- Measure #9: Transboundary collaboration & stakeholder co-management

5 ANNEXES

List of Participants

ALBANIA

Ms Artenida DURAKU

BOSNIA AND HERZEGOVINA

Mr Admir ALADZUZ

CROATIA

Ms Martina MARIC

Ms Tanja MIHINJAC

CYPRUS

Mr Periklis KLEITOU

Mr Demetris KLETOU

EGYPT

Mr Mohamed Said ABDELWARITH ATTEA

FRANCE

Mr François DELAQUAIZE

Ms Margot DENTAN

Mr Guillaume MARCHESSAUX

Ms Marie GARRIDO

GREECE

Ms Argyro ZENETOS

Ms Roxani Naasan AGA SPYRIDOPOULOU

ISRAEL

Ms Edna GUK

ITALY

Ms Daniela ALUNNO MANCINI

Ms Sasa RAICEVICH

Ms Cristina FARCHI

Ms Silvia SARTORI

Ms Annalisa PATANIA

Mr Ernesto AZZURRO

Ms Carlotta SANTORINI

Mr Stefano LELLI

Mr Luca BOLOGNINI

Ms Stefania CHIESA

Mr Tommaso PETOCHI

Ms Maria Vittoria BRISCOLINI

LEBANON

Ms Lara SAMAHA

Mr Michel BARICHE

LIBYA

Ms Sarra AL MABRUK

Mr Mohamed Miled Mukhtar HAJAJI

MALTA

Ms Myra BUGEJA

MONTENEGRO

Ms Slavica KASCELAN

SPAIN

Ms Lydia PNG

TUNISIA

Ms Samia HLEL KCHOUK

Mr Sassi ALAYA

Mr Mohamed Anis BENGHALIA

Ms Olfa BEN ABDALLAH

Ms Jamila BEN SOUISSI

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Mr Elyes Mahmoud HAMZA

Ms Cyrine BOUAFIF

Ms Dorra MAAOUI

Ms Emna DEROUICHE

Ms Imtinen KEFI

Ms Naziha BEN MOUSSA

Agenda Overview

Time	Session
08:30-09:00	Registration
09:00-09:15	Opening of the Workshop
	Welcome speeches and workshop objectives overview by:
	- Ms. Maria Vittoria BRISCOLINI , the Italian Ministry of Agriculture, Food Sovereignty, and Forestry (MASAF)
	- Mr. Mahmoud Eyles HAMZA , Director, UNEP/MAP-SPA/RAC
	- Mr. Atef OUERGHI , Programme Officer, UNEP/MAP-SPA/RAC
Session 1	Status of NIS in the Mediterranean and Strategic Initiatives
09:15-09:30	MedQSR 2023 Findings on NIS by Marika GALANIDI
09:30-09:45	Italian activities on NIS in the framework of MSFD by Annalisa PATANIA (MASE)
09:45-10:00	Italian NIS marine monitoring programmes: status and perspectives by Luca CASTRIOTA (ISPRA)
10:00-10:15	GFCM pilot study on NIS in the eastern Mediterranean by Stefano LELLI (GFCM)
10:30-11:00	Coffee Break
Session 2	Appropriate Measures for the Reduction of New Introductions of NIS
11:00-11:15	Developing and Assessing Fishing-Related Strategies to Manage Aquatic Invaders by Ernesto AZZURO (CNR-IRBIM)
11:15-11:30	Mediterranean NIS Action Plan and associated Guidelines for the control of vectors and risk analyses by Marika GALANIDI
Session 3	Appropriate Measures for the Eradication of NIS
11:30-11:45	Engaging Communities and Using Social Media to Tackle Lionfish in Libya by Sara AL MABRUK (Marine Biology in Libya)
11:45-12:00	Invasive Species Control Through Targeted Removals and Market-Based Approaches in Cyprus by Demetris KLETOU
Session 4	Appropriate Measures for the Control and Management of NIS
12:00-12:15	Pick The Alien project: Promoting responsible seafood consumption by Roxani NAASAN AGA SPYRIDOPOULOU (iSea - Greece)
12:15-12:30	Marine aliens as a source of innovative products by Paraskevi K. KARACHLE & Ioannis NENGAS
12:30-12:45	Le Puffer: Transforming Threats into Treasures with Eco-Positive Invasive Pufferfish Leather Products by Aylin ULMAN (CEO, Olta Azul - Türkiye)
12:45-13:00	The Growth of Invasive NIS in Lebanese Waters: Opportunities for the Local Market by Michel BARICHE (AUB)
13:00-15:00	Lunch Break
15:00-17:00	Roundtables: Challenges and Responses
	- Appropriate measures for the reduction of new introductions of NIS
	- Appropriate measures for the eradication, control, and management of NIS by Periklis KLEITOU
17:00-17:30	Conclusions and Recommendations



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