Deliverable

D6.2 Policy Briefs V1

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TABLE OF CONTENTS

EXECUTIVE SUMMARY 4

1 GUARDIAS POLICY BRIEF TEMPLATE 5

2 POLICY BRIEF #1 7

3 POLICY BRIEF #2 10

4 DISSEMINATION OF THE POLICY BRIEFS. 13

Executive Summary

Deliverable D6.2 is linked to Task 6.5 and focuses on the development of concise policy briefs aimed at communicating key policy-relevant outputs of the GuardIAS project to policy makers and other relevant stakeholder groups. The overarching objective of these policy briefs is not only to raise awareness of the challenges posed by aquatic invasive alien species, but also to foster dialogue on improved management approaches across all stages of the biological invasion process, including transport and arrival, introduction, establishment and colonization, spread and dispersal, and ecological and socio-economic impacts. The policy briefs are intended to provide targeted, evidence-based recommendations that support informed decision-making across stakeholder communities and sectors.

This deliverable presents the GuardIAS policy brief template, provides an overview of the first two policy briefs developed within the project, and outlines the communication and dissemination strategy designed to ensure effective outreach and engagement with key stakeholder groups.

The first policy brief, *Beyond Borders: Aligning Conservation Policy and Ecological Reality*, addresses the mismatch between ecological processes and governance systems that remain largely constrained by national borders. It calls for stronger supranational coordination, interoperable ecological data systems, funding aligned with ecological urgency, and enhanced international collaboration to support more effective biodiversity conservation and invasive alien species management.

The second policy brief, *The Issue of Biofouling*, highlights biofouling as a major pathway for the introduction and spread of aquatic invasive alien species, with important implications for shipping, aquaculture, tourism, renewable energy, and marine infrastructure. It recommends coordinated action to improve antifouling technologies, certification systems, stakeholder awareness, and access to reliable information and training, thereby supporting more sustainable and effective biofouling management.

1 GuardIAS policy brief template

The GuardIAS policy brief template was designed as a concise, visually accessible, and policy-oriented communication tool aimed at translating scientific knowledge into actionable, evidence-based recommendations that can support informed decision-making by policy makers, environmental managers, and other relevant stakeholder groups. The template follows a clear and consistent structure intended to facilitate readability, rapid information uptake, and the effective communication of policy-relevant messages and recommendations.

The template was developed with the aim of maintaining the visual identity and communication style of the GuardIAS project, while providing sufficient space for concise, focused, and easily accessible policy-oriented content.

To ensure consistency with the visual brand identity of GuardIAS, core design elements such as the project logo and the characteristic blue tonal palette are prominently integrated throughout the template. In addition, the URL of the official GuardIAS website is included to provide readers with direct access to further project information and related resources. In line with the contractual obligations towards the European Commission, the EU emblem and funding acknowledgement in accordance with Grant Agreement Article 17 are displayed on both pages of the policy brief.

Policy briefs follow a two-page structure combining short explanatory text with visual elements, including figures, diagrams, highlighted key messages, and graphical summaries to enhance readability and facilitate rapid understanding of complex issues. The template was intentionally limited to a maximum of two pages aiming at presenting key information in a succinct format that facilitates rapid reading and efficient knowledge uptake by policy makers and other stakeholder groups. The overall structure of the template was designed to be simple, clear, and policy-oriented, guiding the reader progressively from the identification of the issue towards evidence-based recommendations and proposed solutions.

The first page focuses primarily on introducing the issue and presenting the associated challenges, while also linking the topic to the broader objectives and activities of the GuardIAS project. The second page places greater emphasis on policy relevance and practical implications. It includes structured sections presenting the main identified gaps, challenges, and proposed policy or management solutions, enabling readers to quickly identify priority actions and response options.

The template follows a standardized format consisting of the following elements:

Title – A concise, informative, and engaging title intended to immediately capture the attention of the target audience and clearly communicate the topic of the policy brief.

Author names – The full names of all contributing authors are included to ensure transparency and proper attribution.

Blue sidebar – A visually distinct sidebar presenting:
(a) a concise summary of the key messages of the policy brief in bullet-point format, and
(b) a short description of the contribution and objectives of the GuardIAS project in relation to the issue addressed.

What is the issue? – An introductory section providing the necessary background information and establishing the context of the issue under discussion.

What are the associated problems? – A section outlining the broader implications and interconnected challenges associated with the issue, while breaking down the problem into its main components.

Main identified gaps – A structured overview of the key policy, governance, management, research, or implementation gaps associated with the issue under consideration. This section is intended to highlight existing limitations, barriers, and priority areas requiring attention.

Proposed solutions / recommendations – A policy-oriented section presenting evidence-based recommendations, management actions, and potential response options aimed at addressing the identified gaps and supporting informed decision-making across stakeholder groups and sectors.

References – A list of the scientific publications, reports, or other sources cited within the policy brief, including the primary publication or study upon which the brief is based.

Overall, the template was designed to ensure consistency across all GuardIAS policy briefs while maintaining a balance between scientific credibility, visual clarity, accessibility, and policy relevance for multidisciplinary stakeholder audiences.

2 Policy brief #1

The first GuardIAS policy brief, *Aligning Conservation Policy Beyond Borders* (Phillip J. Haubrock et al.; Figures 1-2), addresses the growing mismatch between ecological processes and existing governance frameworks for biodiversity conservation and invasive alien species management. The brief highlights how current conservation policies and management approaches remain largely constrained by national administrative borders, despite the fact that ecological systems, species distributions, and biological invasions operate across transboundary scales.

The policy brief identifies several key challenges arising from this misalignment, including fragmented governance structures, inconsistent species classifications and management approaches between countries, limited accessibility and interoperability of ecological data, and uneven research and conservation capacity across regions. These limitations reduce the effectiveness of coordinated responses to biodiversity loss and aquatic invasive alien species, while also reinforcing broader geographical and scientific inequities.

To address these challenges, the brief proposes a series of policy-oriented recommendations focused on strengthening supranational coordination mechanisms, improving open-access and interoperable ecological data systems, prioritising funding according to ecological urgency rather than administrative boundaries, and enhancing international research collaboration and capacity building. The policy brief ultimately advocates for conservation and invasive species management approaches that are better aligned with ecological realities and capable of supporting coordinated, evidence-based action across borders.

GuardIAS

Policy Brief

Beyond Borders: Aligning Conservation Policy and Ecological Reality

by Phillip J. Haubrock, Teun Everts, Antonín Kouba, Ismael Soto, Stefano Mammola, Ronaldo Sousa, & J. Robert Britton

Key points

- Current EU invasive species policy remains reactive and fragmented, limiting effective prevention and long-term impact.
- Scientific evidence and risk assessment are inconsistently translated into listing, prioritization, and management decisions.
- Socioeconomic drivers, trade pathways, and implementation gaps continue to undermine management success despite existing regulation.

GuardIAS aims to:

- ✓ Enable coordinated, cross-border action by harmonizing European IAS data and strengthening a pan-European Early Warning capability to support transboundary management.
- ✓ Strengthen evidence uptake and policy coherence through open, interoperable data workflows, AI-supported decision tools, and stakeholder co-design that support consistent implementation of EU biodiversity and IAS policies.

What is the issue?

Biodiversity conservation is increasingly constrained by a structural mismatch between governance frameworks and ecological reality. Species distributions and environmental processes operate across political boundaries (Figure 1), yet conservation policy, biodiversity assessments, funding allocation, implied management actions, and access to ecological data remain largely national.

What are the associated problems?

A recent analysis by Haubrock and colleagues published in Conservation Biology shows that this misalignment not only fragments management, distorts conservation priorities, and limits scientific collaboration, but also reinforces global inequities in conservation capacity.

Fragmented governance and restricted data access can reduce the efficiency of conservation spending and may hinder coordinated responses to biodiversity loss, including the management of aquatic invasions. This is particularly relevant for transboundary pressures such as biological invasions that inherently operate across political borders. As conservation increasingly relies on integrated datasets and AI-based analyses, existing geographic and taxonomic biases risk being amplified if structural inequities persist.

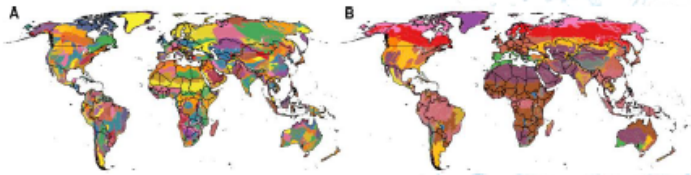


Figure 1: Global distribution of ecozones (A) and biomes (B)

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1/2

Figure 1. First page of the Phillip J. Haubrock et al policy brief.

GuardIAS
GUARDING EUROPEAN WATERS FROM INVASIVE ALIEN SPECIES (IAS)

Policy Brief

Beyond Borders: Aligning Conservation Policy and Ecological Reality

Main identified gaps

- **Conservation operates at the wrong scale:** Political borders rarely match ecological boundaries, so species spanning multiple countries receive uneven protection. National assessments can also misrepresent trends that occur at broader scales, leading to fragmented interventions and inefficient resource use.
- **National frameworks introduce bias:** Species classifications (including native vs. non-native) are shaped by administrative boundaries as much as ecology. This is especially problematic for invasions, where a species may be invasive in one country but protected or unmanaged in another, undermining coordinated transboundary action.
- **Ecological data remain functionally inaccessible:** Despite open science goals, most ecological datasets are unavailable after publication. Fragmentation, paywalls, and weak incentives limit reuse, restrict large-scale biodiversity assessments, and disproportionately disadvantage underfunded regions—reducing accuracy in non-native distribution mapping and management.
- **Research capacity is unevenly distributed:** Wealthier countries produce more data and attract more funding, skewing conservation priorities toward well-studied regions rather than ecological urgency. This reinforces global knowledge gaps and limits effective invasion management.

Proposed solutions

- **Strengthen supranational coordination:** Align conservation planning, funding, and monitoring with shared ecoregions or river basins (e.g., Danube, Mekong), not national borders.
- **Mandate interoperable open-access data:** Require publicly funded ecological data to be openly available and standardised, enabling horizon scanning, early detection, and rapid response.
- **Fund by ecological urgency:** Prioritise transboundary ecosystems and high-risk species; build on initiatives like the IUCN European IAS Rapid-Response Fund but reduce reliance on small competitive budgets.
- **Build global research capacity:** Support equitable international partnerships and training in underrepresented regions, especially where coordinated invasion frameworks are lacking.
- **Link local action to global standards:** Keep management locally led but guided by shared international protocols and data platforms to ensure cross-border consistency and adaptability.

Reference

Haubrock, P. J., Everts, T., Kouba, A., Soto, I., Mammola, S., Sousa, R., & Britton, J. R. (2026). Intertwined threats of nationalized nature and privatized ecological research for global biodiversity conservation. *Conservation Biology*, e70228. https://doi.org/10.1111/cobi.70228D

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2/2

Figure 2. Second page of the Phillip J. Haubrock et al policy brief.

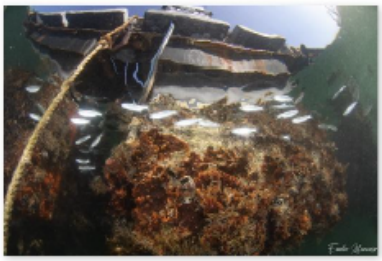
3 Policy brief #2

The second GuardIAS policy brief, *The Issue of Biofouling* (Mar Santos-Simón et al.; Figures 3-4.), focuses on biofouling as a major pathway for the introduction and spread of aquatic invasive alien species, while also highlighting its economic and environmental implications for blue economy sectors such as aquaculture, shipping, tourism, renewable energy, and marine infrastructure.

The brief explains how biofouling communities develop on artificial hard substrates exposed to aquatic environments and outlines the operational, ecological, and biosecurity risks associated with their growth. In addition to increasing maintenance costs and reducing the efficiency of marine infrastructure and vessels, biofouling facilitates the translocation of non-native and invasive species beyond their natural distribution ranges, thereby threatening biodiversity, ecosystem functioning, and local biosecurity.

The policy brief identifies several key challenges associated with current biofouling management approaches, including fragmented regulatory frameworks, uncertainty regarding the effectiveness and environmental impacts of antifouling products, the lack of an official list of approved antifouling technologies, insufficient infrastructure and services supporting biofouling management, and low awareness among certain stakeholder groups.

To address these challenges, the brief proposes a range of evidence-based recommendations, including increased investment in environmentally safe antifouling technologies, the development of certification systems and approved product lists, improved information and training systems, and stronger stakeholder engagement and awareness-raising activities. The policy brief emphasizes the need for more coordinated and sustainable biofouling management strategies capable of reducing both economic impacts and the spread of invasive alien species.



GuardIAS
GUARDING EUROPEAN WATERS FROM INVASIVE ALIEN SPECIES (IAS)

Policy Brief
The issue of biofouling

by Mar Santos-Simón, Ainhoa F.-G de la Yedra, Maren Ortiz-Zarragoitia, Agnese Marchini

Key points

- Biofouling impacts blue economy industries
- Biofouling is an important vector for aquatic alien and invasive species
- Multiple antifouling solutions exist; none is perfect.
- Biofouling remains unregulated

GuardIAS aims to tackle biofouling from various key aspects:

1) *innovation and research*, with the development of new alternative antifouling solutions and AI-based tools
2) elaboration of *shipping-related biosecurity risk models* for management purposes,
3) creation of *educational content and online training* for free, accessible to everyone interested,
4) *engagement of key agents* (boat owners, marina managers) through tailored open lab events.

What is the issue?

Hard substrates exposed to aquatic environments are prone to be colonized by a wide range of organisms following a succession process. The process starts with chemical conditioning and biofilm formation, and culminates with the development of complex three-dimensional communities. When this phenomenon occurs in artificial hard substrates, it is called **biofouling**.

What are the associated problems?

Artificial hard substrates in aquatic environments often fulfil a purpose. In fact, blue economy industries (aquaculture, transportation & tourism, extractive industry, renewable energy, etc) carry out their activities in such environments and often see their costs increased due to the growth of biofouling communities. Biofouling is, indeed, known to reduce operability and functioning of affected systems, increase operational costs and even pose risks for the integrity of the structures. Besides, biofouling poses important environmental and biosecurity risks related to the introduction and spread of IAS. The translocation of organisms outside their natural range is considered one of the main threats for global biodiversity. In particular, the introduction of IAS poses a risk to the intrinsic value of biodiversity itself, impacts ecosystem services and local biosecurity, with effects that can go as far as pathogen translocation, and public and domestic or farmed animal health concerns.

To control its growth, there are multiple products in the market, from coatings to cleaning devices and other type of measures. Yet, biocide-based coatings are by far the most widespread option, which rely on the release of active compounds into the environment, a fact that raises environmental concerns.

Preventing biofouling is of all interests, but currently there is no panacea for its control. There is a plethora of antifouling (AF) products and solutions, each with their advantages and disadvantages, but there is no regulation on the topic and the existing legal instruments appear fragmented.

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1/2

Figure 3. First page of the Mar Santos-Simón et al. policy brief.



GuardIAS
GUARDING EUROPEAN WATERS FROM INVASIVE ALIEN SPECIES (IAS)

Policy Brief
The issue of biofouling

To support effective management of biofouling, here we summarized some learnings and proposals, from Santos-Simón et al., 2025:

Main identified gaps

- Uncertainty of the performance of some AF products and their environmental effects.
- Uncertainty on the required biocidal load, generally too high.
- Uncertainty on their effects in non-target species.
- Uncertainty on the influence of location and associated environmental factors and the operational profile of the boat.
- Lack of approved AF technologies, rather than just substances listed in Annex 1 of Anti-fouling Systems Convention (IMO, 2011).
- Lack of roadmap to suitable AF strategy selection, particularly for recreational boats.
- Lack of services and facilities for enhanced management of biofouling.
- Feasibility of some products and services for the sector of recreational boats.
- Scarce knowledge on the topic in certain sectors or stakeholders.

Proposed solutions

(✓ marks solutions addressed within GuardIAS)

- ✓ Finance research and innovation focused on developing effective and environmentally safe AF solutions.
- Create lists of approved products.
- Develop environmental safety certifications and periodical revisions on available solutions using an evidence-based approach.
- Set requirements that include suitability of a product, i.e., information on environmental conditions, geographical location, boat area, etc.
- Develop a certification system for sellers, appliers, and managers to improve suitability of product selection and application, waste reduction and management, thereby extending durability of the selected systems and minimising environmental risks.



Main challenges to be faced for effective biofouling management. Arrows represent interactions amongst compartments.

- ✓ Establish an information network and support dissemination activities to enhance awareness and foster stronger commitment among boat owners.
- ✓ Ensure access to information and education on the matter.

Santos-Simón, M., de la Yedra, A. F. G., Ortiz-Zarragoitia, M., & Marchini, A. (2025). Past, present and (possible) future of biofouling regulatory instruments within the international marine environmental protection framework. *Environmental Sciences Europe*, *37*(1), 127. doi: https://doi.org/10.1186/s12302-025-01178-7

Photo credits: Emilio Mancuso

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2/2

Figure 4. Second page of the Mar Santos-Simón et al. policy brief.

4 Dissemination of the policy briefs.

In line with the GuardIAS dissemination and communication strategy, both policy briefs were distributed to all members of the GuardIAS consortium following their release, who further disseminated them through their networks. In addition, the policy briefs were made publicly available through the official GuardIAS project website and disseminated via the project's social media platforms, including the GuardIAS Bluesky and LinkedIn platforms (Figure 5), to maximize visibility, outreach, and stakeholder engagement.

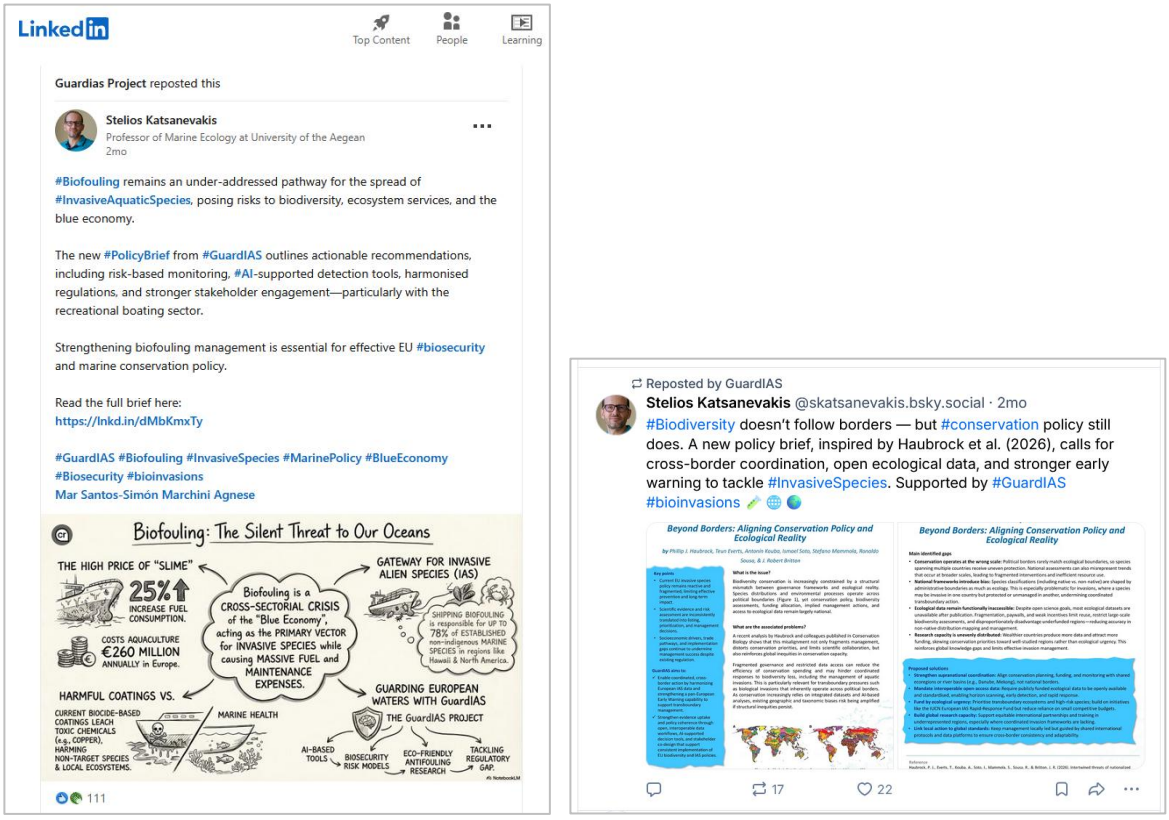


Figure 5. Snapshots showing posts regarding the two policy briefs in GuardIAS Linkedin (left) and BlueSky (right) accounts.

Moreover, all members of the GuardIAS consortium were invited to contribute lists of policy-related stakeholder groups from their respective countries and beyond, with the aim of establishing an international network of policy-relevant stakeholders. This stakeholder pool currently includes contact information for more than 80 stakeholders across 11 countries, encompassing representatives from policy, environmental management, conservation, fisheries, research, and other relevant sectors.

All identified stakeholders were contacted via email and provided with the GuardIAS policy briefs as part of the project's dissemination and stakeholder engagement activities. The consortium expects this stakeholder network to continue expanding throughout the duration of the project, thereby increasing the outreach and impact of the policy briefs. Through this growing network, GuardIAS aims to facilitate

policy-related dialogue among stakeholders and broader communities, while also supporting the integration of evidence-based recommendations into environmental policy and management frameworks.