BOOK OF ABSTRACTS

This Book of Abstracts provides a comprehensive overview of the session content and is structured into three main sections:

I. Session Description – an introduction to each session, including its objectives and expected outputs
II. Session Program – a detailed schedule for each session, including speakers and timing
III. List of Abstracts – a complete compilation of all accepted abstracts

I. SESSION DESCRIPTION

ID: B1a

Coastal and Marine Ecosystem Accounting: gaps, challenges, and future perspectives

Hosts:

	Name	Organisation	E-mail
Host (s):	Miguel Inácio	Mykolas Romeris University, Lithuania	miguel.inacio@mruni.eu
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Abstract:

Over the past few decades, there has been a growing effort to map, assess, and value coastal and marine ecosystem services (CMES), resulting in a comprehensive body of scientific knowledge, a wide array of tools and methods, case study examples, and guidelines. All this knowledge has been crucial in supporting the implementation of marine policies and directives (e.g., Marine Spatial Planning). However, achieving a nature- and people-positive future for Europe's coastal and marine environments requires strategies that provide a deep understanding of ecosystems and their impact on socio-ecological systems, both spatially and economically. It is necessary to go beyond simply mapping, assessing, and valuing to understand the condition of ecosystems and their capacity to supply CMES and benefits in a sustainable and resilient manner. In this sense, ecosystem accounting offers an opportunity to link the spatial distribution of coastal and marine ecosystems, their condition and the services and benefits they provide.

Coastal and marine ecosystem accounting is a rapidly developing field, primarily driven by the adoption of the System of Environmental-Economic Accounting – Ecosystem Accounting (SEEA-EA) by the United Nations in 2021, as well as initiatives like those developed under the Global Ocean Accounts Partnership (GOAP). The SEEA-EA was created as an international framework to quantify ecosystems' contribution to

human well-being in a consistent and transparent manner, structured into physical (extent, condition, and services) and monetary (services and assets) ecosystem accounts. The application of SEEA-EA in coastal and marine areas is still in its early stages, with numerous knowledge and data gaps, alongside challenges and pitfalls that must be addressed for its operationalisation. This can be facilitated through capacity and knowledge development by sharing experiences, case studies, methods, and tools.

We invite contributions on methodologies, tools, case studies and best practices, focused on implementing the ecosystem accounting framework in coastal and marine ecosystems across Europe and globally. Contributions are welcome on any of the topics under the SEEA-EA, including ecosystem extent, condition, and ecosystem services (both physical and monetary).

Goals and objectives of the session:

1. Synthesise advances on the implementation of ecosystem accounting in coastal and marine ecosystems.
2. Identify, through case studies and examples, recent advances, gaps, and challenges associated with operationalising ecosystem accounting for coastal and marine ecosystems.
3. Explore policy applications of coastal and marine ecosystem accounting.

Planned output / Deliverables:

Opinion paper on persisting challenges and needs for operationalisation of the SEEA-EA in coastal and marine environments. Organisation of future workshops, webinars or training sessions based on the implementation of ecosystem accounting in the different case studies presented.

Session format:

Introduction (10 min) + Presentations (10 min + 5 min discussion) + roundtable (30 minutes).

Related to ESP Working Group:

BWG 1 – Marine systems

II. SESSION PROGRAM

Room: B1
Date of session: Tuesday, 19 May 2026
Time of session: 16:35-19:40

Timetable speakers:

Time	First name	Surname	Organization	Title of presentation
16:40 – 16:55	Valentina	Di Gennaro	University of East Anglia	Building marine natural capital accounts: conceptual and case insights
16:55 – 17:10	Camilo José	Gómez Cardona	Instituto de Investigaciones Marinas y Costeras - INVEMAR, Santa Marta	Accounting of marine and coastal ecosystems at the Ramsar Site, Estuarine Delta System of the Magdalena River, Ciénaga Grande de Santa Marta, Colombia
17:10 – 17:25	Darragh	Corcoran	University of Galway, Marine Institute, Central Statistics Office	Transparent workflows for national marine ecosystem extent accounts
17:25 – 17:40	Elina	Virtanen	Finnish Environment Institute (Syke)	Marine ecosystem extent and condition pilot accounts for Finland

17:40 – 17:55	Miguel	Inácio	Mykolas Romeris University	Marine ecosystem condition: assessing spatio-temporal changes in the Lithuanian Exclusive Economic Zone
17:55 – 18:10	Vincenzo	Maccarrone	Italian National Research Council, Institute for Marine Biological Resources and Biotechnology (CNR-IRBIM)	From Night Lights to Policy Metrics: ALAN as a Practical Condition Indicator for Coastal and Marine Ecosystem Accounting (Sicily, 2016–2023)
18:10 – 18:25	Umberto	Grande	International PhD Programme / UNESCO Chair/Parthenope University of Naples	Applying Ecosystem Accounting to *Posidonia oceanica* Meadows: Assessing Ecosystem Condition and Carbon Sequestration Along the Italian Coast
18:25 – 18:40	Yosuke	Horie	NIPPON KOEI CO.,LTD.	A Case Study of Quantification of Ecosystem Services of Seagrass in SEEA-EA
18:40 – 18:55	Jūratė	Lesutienė	Marine Research Institute, Klaipėda University	Cultural ecosystem services and environmental perceptions of the Curonian Lagoon SE Baltic Sea
18:55 – 19:10	Eglė	Baltranaitė	Mykolas Romeris University	Mapping and assessing the supply of recreation ecosystem services: A case study of Klaipėda (Lithuania)
19:10 – 19:25	Yeajin	Jung	Korea Maritime Institute	Integrating Ecosystem Services Assessment into Marine Invasive Species Risk Evaluation: A Paradigm Shift for Climate-Adaptive Management
19:25 – 19:40	Discussion			

III. LIST OF ABSTRACTS

The first author is the presenting author unless indicated otherwise

1. Building marine natural capital accounts: conceptual and case insights

First author: Valentina Di Gennaro
Other author(s): Alice Bartolini, Vittoria Reas, Rosa Anna Mascolo, Alessandra La Notte, Alessio Capriolo , Silvia Ferrini
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The System of Environmental-Economic Accounting—Ecosystem Accounting (SEEA EA) is a spatially-based, integrated statistical framework which integrates biophysical and economic data to evaluate ecosystem services and the ecosystem-economy dependencies and impacts. However, the complexity of coastal and marine ecosystems challenges the application of this approach. Limited coordination and lack of data required for measuring marine ecosystem services, tracking changes in ecosystem extent and condition, valuing ecosystem services and assets, and integrating this information with economic and human activity data have resulted in experimental marine accounts being rare and limited.
This work applies the SEEA EA to Posidonia oceanica, a marine habitat in the Mediterranean Sea which provides essential ecosystem services. We compile extent and condition accounts for multiple years and assess three fundamental ecosystem services provided by such habitat, i.e., fish provisioning, recreation and blue carbon sequestration. Physical and monetary supply and use tables are developed at both national and local levels in Italy.

The study contributes to the ongoing development of ecosystem accounting by identifying structural and methodological barriers that impede good marine accounting practices. Results highlight key factors that hinder the integration of physical and monetary assessments within the accounting framework. By testing the marine accounts at both local and national scales, the study examines these limiting factors in greater depth, offering insights that can support more effective implementation and policy integration in marine ecosystem management. By addressing the challenges in aligning ecological and economic data, the study contributes to the development of more effective marine ecosystem accounts, supporting informed decision-making and policy implementation for sustainable marine resource management.

Keywords: SEEA-EA, marine ecosystem, Posidonia Oceanica, ecosystem services, marine policy

2. Accounting of marine and coastal ecosystems at the Ramsar Site, Estuarine Delta System of the Magdalena River, Ciénaga Grande de Santa Marta, Colombia

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The Cienaga Grande de Santa Marta Ramsar Site (CGSM) is the most important Caribbean estuarine wetland in Colombia. The site represents a strategically important ecosystem supporting the national and local economy. However, their ability to provide ecosystem services has been seriously affected mainly due to changes in land use, disturbances of water flows, man-made climate change and interannual climatic variability. These circumstances led to its inclusion in the Montreux Record, a register of wetland sites on the 'List of Wetlands of International Importance' where variations in ecological character have happened, are happening or are likely to happen as an outcome of technological developments, pollution or other human interference. This study presents the first account of marine and coastal ecosystems developed in Colombia at the Cienaga Grande de Santa Marta. Following the principles for ecosystem accounting of the System of Environmental-Economic Accounting—Ecosystem Accounting (SEEA EA), we developed accounting tables of extent and condition of ecosystems, biophysical and monetary flows of climate regulation and fishing supply and the monetary account of ecosystem assets. Results of the ecosystem account allow visualising the importance of ecosystem services of the wetland, its capacity to provide economic benefits, social welfare and livelihoods at local and national level. Finally, we identify main gaps of information, highlight the applicability of ecosystem accounting to policy- and decision-making on economic and environmental issues and evaluate the challenges to implement it.

Keywords: ecosystem extent, ecosystem condition, marine and coastal ecosystem services, Ramsar Site, Cienaga Grande de Santa Marta

3. Transparent workflows for national marine ecosystem extent accounts

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Despite growing international adoption of ecosystem accounting frameworks, national-scale marine ecosystem extent accounts remain underdeveloped relative to their terrestrial counterparts. Many existing marine maps are produced at coarse spatial and thematic resolutions, rely on single-source inputs, or do not always provide the transparency and reproducibility required for ecosystem accounting. This can limit comparability and confidence in coastal and marine ecosystem accounting, where spatial structure, ecosystem heterogeneity, and methodological traceability are central.
This study presents a fully documented, high-resolution workflow for producing national marine ecosystem extent accounts, using Ireland as a demonstration case. The workflow integrates multiple national and European spatial datasets into a unified one-hectare grid through a hierarchical, rule-based overlay process that prioritises ecologically specific inputs over broader classifications. Ecosystem types

are assigned consistently across alternative classification schemes using explicit crosswalks, allowing the same spatial baseline to support multiple analytical contexts. All processing steps are scripted and reproducible.
Application of the workflow substantially increases the ecological detail represented in both coastal and offshore waters compared with generalised seabed maps. Fine-scale features such as raised seabed structures, submarine canyons, coarse sediment systems, and mixed substrate mosaics are consistently resolved rather than aggregated away, improving the attribution of ecosystem assets across the marine domain. The workflow also identifies remnant unmapped areas, quantifies classification uncertainty, and documents how aggregation choices influence the structure of extent accounts and their suitability for condition and service assessments.
By providing a transparent and reproducible approach to marine ecosystem extent mapping, this study demonstrates a practical pathway for strengthening coastal and marine ecosystem accounting using existing data sources. The workflow supports the construction of consistent extent baselines over time, underpins subsequent condition and service accounts, and offers a transferable template for other countries seeking to advance national marine ecosystem accounting.

Keywords: ecosystem accounting, ocean accounting, marine mapping, ecosystem extent, reproducibility

4. Marine ecosystem extent and condition pilot accounts for Finland

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Ecosystem accounting provides a standardised framework for evaluating the economic value of ecosystems to society. Following the international accounting standard, System of Environmental Economic Accounting – Ecosystem Accounting (SEEA EA), we present first marine ecosystem extent pilot accounts for Finland, based on three habitat classification systems: the Marine Strategy Framework Directive (MSFD), the EU Habitats Directive (HD) and the IUCN Red List of Ecosystems (RLE). We assess their condition using indicators from the Water Framework Directive, which measure ecosystem quality through biological, ecological and physico-chemical parameters.

We found that MSFD habitats have the largest extent, exceeding the areas covered by HD and RLE habitats. A large portion of the assessed habitats, particularly in the inner archipelago and shallow areas close to shore, were in poor condition, reflecting the eutrophication status of coastal waters. We identify considerable challenges in reporting marine ecosystem extent and condition accounts, which most likely recur across (European) countries. For instance, MSFD habitats are rather coarse for accurately reporting ecosystem extents, potentially overlooking declines in ecosystem condition, while HD habitats cover only a subset of habitats. RLE habitats provide more ecological detail, although they may be less compatible with classifications used in other countries.

Our research provides a baseline for future ecosystem accounts and emphasises the need for improved data and methods to enhance the accuracy and comparability of marine ecosystem assessments. Additionally, we discuss the compatibility of SEEA EA with EU policy reporting requirements, the spatial scale of reporting ecosystem extents and condition and highlight the limitations of current habitat classifications in representing the full diversity of marine ecosystems. The findings underscore the importance of integrating multiple habitat classification systems, development of crosswalks between habitat classifications and monitoring frameworks to ensure comprehensive and accurate ecosystem accounts.

Keywords: ecosystem accounting, benthic habitats, MSFD, WFD

5. Marine ecosystem condition: assessing spatio-temporal changes in the Lithuanian Exclusive Economic Zone

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Ecosystem condition (EC) is a relatively new concept in marine ecosystem accounting, integrated into the United Nations System of Environmental-Economic Accounting – Ecosystem Accounting (SEEA-EA) framework. EC encompasses the physical, chemical, functional, structural, and landscape characteristics of ecosystems, as well as anthropogenic pressures. Since its adoption in 2021, several efforts have been made to implement the SEEA-EA. However, in marine ecosystems, this process remains in a very early stage, and most available studies do not compile information on EC accounts for several reasons, including a lack of guidance or data availability. Moreover, almost no studies track spatio-temporal changes in EC, an essential aspect of the SEEA-EA. This study aims to address existing research gaps by mapping and assessing EC in the Lithuanian marine area across two periods (2021 and 2024). First, we defined 12 condition variables, two for each category of the EC Typology, and compiled data from national, European and global databases. Second, we tested for multicollinearity among all variables, and none was discarded. Third, we defined reference condition areas as the overlap of several environmental/spatial protection frameworks (e.g., Natura 2000, National Parks). Fourth, based on this, we rescaled the variables from 0 to 1 (following SEEA-EA) and compiled the marine EC index for 2021 and 2024. The results showed higher EC values in both periods in the coastal areas of Lithuania's marine area and lower values in the offshore areas. The results also showed nearly no change in EC between 2021 and 2024, with only a minor increase in the central-eastern part of the exclusive economic zone and a decrease in the offshore areas. This study is one of the very few efforts in the Baltic Sea and Europe, thus contributing to the operationalisation of marine EC and the implementation of the SEEA-EA worldwide.

Keywords: SEEA; ecosystem condition; ocean accounting; Baltic Sea; EEZ

6. From Night Lights to Policy Metrics: ALAN as a Practical Condition Indicator for Coastal and Marine Ecosystem Accounting (Sicily, 2016–2023)

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Operationalising ecosystem accounting in coastal and marine settings requires condition indicators that are consistent in space and time and, crucially, meaningful for management and policy. In this contribution we propose Artificial Light at Night (ALAN), derived from VIIRS-DNB annual composites, as an operational proxy of nocturnal pressure/alteration to be integrated into SEEA-EA condition accounts and disaggregated by ecosystem types and protection regimes.
The analysis focuses on the Sicilian coastal zone (Italy) over 2016–2023, adopting three accounting domains that capture land–sea interactions: the terrestrial strip within 1 km of the coastline, the sea up to 1 km offshore, and the sea between 1 km and 1 nautical mile. ALAN metrics (nW/cm^2/sr) are combined with Corine Land Cover, Natura 2000 boundaries and the distribution of Posidonia oceanica meadows to derive synthetic indicators (zonal statistics) and comparisons across classes and protection conditions.
Results reveal a clear coast–offshore gradient, with higher mean values on land and progressively lower values at sea. A robust contrast is also observed between protected and non-protected areas: within Natura 2000, ALAN is consistently lower (for example, 2.25 versus 12.82 nW/cm^2/sr in the land domain; 1.53 versus 5.63 nW/cm^2/sr in the 0–1 km sea domain), while the 1 nautical mile domain shows overall low levels (approximately 0.38 vs 0.58). Posidonia meadows are associated with lower ALAN than areas without seagrass.
From a policy perspective, the approach illustrates how ALAN can strengthen condition reporting and support management prioritisation under MSP/MSFD. Are discuss operational challenges for systematic uptake in ecosystem accounting—offshore baselines, coastal spillover, and harmonised processing—and indicate how ALAN indicators could be progressively connected to ecological thresholds and, where feasible, to ecosystem service accounts.

Keywords: Ecosystem accounting, Coastal and marine ecosystems, Artificial Light at Night (ALAN), Maritime Spatial Planning (MSP), Marine Strategy Framework Directive (MSFD).

7. Applying Ecosystem Accounting to Posidonia oceanica Meadows: Assessing Ecosystem Condition and Carbon Sequestration Along the Italian Coast

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Posidonia oceanica meadows are among the most valuable coastal ecosystems in the Mediterranean Sea, delivering key regulating ecosystem services, including carbon sequestration that is crucial for climate change mitigation. Despite their high ecological and socio-economic relevance, this habitat remains poorly integrated into national accounting systems. In this context, this study applies the System of Environmental-Economic Accounting-Ecosystem Accounting (SEEA-EA) framework to establish a spatially explicit national baseline of ecosystem extent, condition, and carbon sequestration service for Posidonia oceanica meadows along the Italian coast, which hosts one of the most extensive and representative distributions of this habitat in the Mediterranean. Spatial information on meadow extent and rhizome primary production, derived from previously developed machine-learning models, is used as baseline input data. Building on these spatial predictions, an integrated ecosystem accounting model is developed to quantify both ecosystem condition and ecosystem service supply. Ecosystem condition is assessed through a composite indicator that combines biotic variables, including shoot density and rhizome production, with pressure-related proxies such as proximity to ports and river mouths. Carbon sequestration is quantified in biophysical terms using rhizome production as a proxy for long-term carbon accumulation and subsequently expressed in monetary terms. Three complementary economic valuation approaches are applied to capture different policy-relevant perspectives: (i) Social Cost of Carbon, reflecting avoided climate damages; (ii) carbon credit values, representing potential market-based mitigation mechanisms; and (iii) replacement cost, estimating the costs required to offset lost sequestration capacity through restoration or reforestation. Our findings provide a robust reference for future monitoring, temporal comparisons, and the assessment of changes in Posidonia oceanica condition and ecosystem service provision. Beyond demonstrating the ecological and socio-economic value of Posidonia oceanica meadows, this study could support marine spatial planning, conservation strategies, and climate-related policy reporting.

Keywords: Ecosystem Accounting, Ecosystem services, SEEA-EA, Posidonia oceanica, Climate mitigation

8. A Case Study of Quantification of Ecosystem Serivices of Seagrass in SEEA-EA

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Recentlly, ecosystem services of a coastal area have been paid more attention to, especially seagrass' contribution to decarbonization as "Blue Carbon". In order to evaluate seagrass ecosystem services, not only quantification of its ecosystem services but also economic evaluation of seagrass should be considered in order to facilitate blue carbon projects all over the world. Therefore, this study demonstrates a case study of evaluation of seagrass in Seto inner sea in Japan from the view point of its carbon sequestration amount and its economic value following UN-SEEA EA. Quantification of carbon sequestration in seagrass is identified based on its abundance and Habitat Suitability Index(HSI), which shows potential of seagrass growth considering various water environment factors such as water temperature, sea bottom material, nitroge, phosphorus and solar radiation. These factors are obtained by using observation data, satellite image data and DELFT-3D, which is a defact-standard hydrological and water quality simulation model. The current extent and condition of seagrass in the target area is calculated and quantified and its ecosystem service as carbon sequestration amount is evaluated and is converted to economic value by using market price of blue carbon. Futhermore, the future evaluation of seagrass extent, condition and ecosystem service under climate change is conducted by reflecting water

environment factors simulated by DELFT-3D to HSI, and its change of seagrass extent, condition and ecosystem service and its economic value between current and future is compared as stock and flow of UN-SEEA EA.

Keywords: Seagrass, SEEA-EA, decarbonization, habitat suitability index, DELFT3D

9. Cultural ecosystem services and environmental perceptions of the Curonian Lagoon SE Baltic Sea

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The Curonian Lagoon, Europe's largest lagoon, is a predominantly freshwater, non-tidal estuary shaped by Nemunas River discharge. Shared by Lithuania (413 km^2) and Russia (1,171 km^2), it is separated from the Baltic Sea by the Curonian Spit—a UNESCO World Heritage Site. The Lithuanian part is fully designated as NATURA 2000, supporting protected habitats, fish spawning grounds, and commercial fisheries, while the Nemunas Delta is a Ramsar wetland. Despite its ecological and cultural importance, socio-cultural ecosystem services remain underrepresented in ecosystem accounting.
This study examines public perceptions of socio-cultural benefits and their link to perceived ecosystem condition using qualitative data from a survey (144 respondents: 60 online, 84 onsite) conducted May–October 2025. The survey explored experiences, values, and activities associated with the lagoon. It also included questions such as: how healthy is the Curonian Lagoon's environment (rate 1–5)? What factors influence its health? Have changes occurred in the past decade? Describe changes and impacts on your use and benefits.
The lagoon is primarily valued for aesthetic enjoyment and psychological well-being. Respondents highlighted calmness, stress relief, emotional restoration, and escape from urban life. A strong sense of uniqueness and place attachment emerged, with the lagoon seen as an irreplaceable natural and cultural landscape shaped by water, dunes, biodiversity, and seasonal dynamics. Emotional ties—childhood memories, family traditions, fishing, and community life—underscore its role in regional identity and heritage.
Recreational uses include fishing, sailing, kiting, walking, cycling, and birdwatching, enabled by shallow waters and stable winds. Wildlife appreciation, especially birds and fish, reinforces ecological value. While perceptions were largely positive, concerns about eutrophication, ecosystem degradation, and tourism pressure indicate that ecosystem condition affects socio-cultural benefits. Main scenarios that would contribute to the loss of the value include: unplanned development, litter, intensive tourism, loss of biodiversity, and collapse of fisheries resources.

Keywords: Socio-cultural ecosystem services, Public perceptions, Environmental changes

10. Mapping and assessing the supply of recreation ecosystem services: A case study of Klaipėda (Lithuania)

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Recreational cultural ecosystem services (CES) contribute to human well-being by improving physical, psychological and emotional health. However, in an urban context, anthropogenic pressures pose a risk to their supply. Mapping and assessing CES can help improve local planning and management by identifying recreation hotspots and areas that would benefit from nature-based interventions. Quantitative approaches for mapping and assessing CES remain scarce, as CES are primarily assessed qualitatively. This work aimed to map and assess recreation CES supply in the Klaipėda municipality (Lithuania), an urban coastal city where nature (e.g., Curonian Spit) and anthropogenic activities (e.g., port industry) overlap. To achieve this, we developed and applied a quantitative modelling framework that combined natural (e.g., waterways, imperviousness) and cultural (e.g., hiking trails, accommodation) recreational

components. The methodological framework included (1) the analysis of each component's input variables' multicollinearity, (2) normalisation, (3) spatial overlay using ArcGIS Pro 3.6, and finally (4) combining both components to generate the recreational CES supply. The results showed that natural recreation CES supply was clustered in the northern part of the municipality, near a dense forest area and in the western part of the municipality, in a nature-protected area within the Curonian Spit National Park (UNESCO World Heritage Site). Cultural recreation CES results were clustered along the Curonian Lagoon coastline. The developed modelling approach yielded valuable spatial insights that can inform planners and decision-makers, as tourism and recreational activity development is a priority objective of the municipality.

Keywords: Cultural; Baltic Sea; CICES; urban; coastal

11. Integrating Ecosystem Services Assessment into Marine Invasive Species Risk Evaluation: A Paradigm Shift for Climate-Adaptive Management

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Climate change-induced ocean warming and current shifts are accelerating marine species range expansions, challenging traditional eradication-focused approaches to marine invasive species management. This study develops an integrated marine risk assessment framework that evaluates both negative impacts and positive ecosystem services provided by non-native marine species. Through literature review, expert Delphi surveys, and Analytic Hierarchy Process analysis, we constructed a comprehensive assessment tool comprising 20 evaluation elements across six domains: biological characteristics, ecosystem impacts, socio-economic-health effects, ecosystem services (provisioning, regulating, cultural, and supporting), management feasibility, and data reliability. The ecosystem services domain explicitly evaluates positive contributions including blue carbon sequestration, water purification, and fishery resources. Pilot testing on three species (Asterias amurensis, Carcinus maenas, and Spartina anglica) validated the framework's practicality. This integrated approach enables risk-tiered management strategies: high-risk species for eradication, moderate-risk for active management, low-risk for monitoring, and beneficial species for utilization. The framework has been adopted for national policy development in South Korea, representing a pioneering model for climate-adaptive marine biodiversity governance that balances ecological integrity with socio-economic benefits.

Keywords: Marine invasive species, climate change adaptation, integrated risk assessment, adaptive management