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REGIONAL STRATEGY ON BIOFOULING MANAGEMENT IN THE EAST ASIAN SEAS (EAS) REGION

IMO | PEMSEA

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1. INTRODUCTION

BIOFOULING

The UN World Ocean Assessment has confirmed the role of Invasive Aquatic Species (IAS) as a major driver for biodiversity change in the world's freshwater, coastal and marine ecosystems¹. Globally, about 2,000 marine species have been introduced to new locations through human-mediated movements. When they become invasive, most of them have had negative ecological, socioeconomic and human health impacts. With increased trade and climate change, biological invasions are likely to increase. The main vectors for unintentional transfer of invasive aquatic species are ships' ballast water, biofouling of mobile marine structures and aquaculture. The definition of ballast water and biofouling are as follow:

- Ballast water means “water with its suspended matter taken on board a ship to control trim, list, draught, stability or stresses of the ship” as defined by the IMO Ballast Water Convention.² When ballast water is taken up, so are the plants and animals that live in that water, and when ballast water is discharged, there is a risk that these species transferred to new locations could become invasive.
- Biofouling means the “accumulation of aquatic organisms such as micro-organisms, plants, and animals on surfaces and structures immersed in or exposed to the aquatic environment. Biofouling can include microfouling and macrofouling” as defined by the 2011 International Maritime Organization's (IMO) Guidelines for the Control and Management of Ships' Biofouling to Minimize the Transfer of Invasive Aquatic Species (referred to as the IMO Biofouling Guidelines hereafter).³ For ships, this occurs not only on their hulls, but also in the niche areas, i.e. sea chests, bow thrusters, gratings, propeller shafts, etc. When ships travel to new locations, any species attached to their hull can be released and become invasive.

As countries slowly recover from the global pandemic, the East Asian Seas (EAS) Region is also reclaiming its position as the centre of the ocean economy in the world. Prior to the COVID-19 pandemic, the region has been a significant player in shipping, ports, ship building and repair, fisheries and aquaculture, and marine cosmetics, among other marine and maritime based industries. The region hosts high marine biodiversity areas in the seascapes and large marine ecosystems (LMEs), including the Coral Triangle. The six LMEs of the EAS Region such

¹ The Second World Ocean Assessment. United Nations, 2021.

² International Convention for the Control and Management of Ships' Ballast Water and Sediments 2004, Article 1: Definitions.

³ International Maritime Organization (IMO), Resolution MEPC.207(62): *IMO Guidelines for the Control and Management of Ships' Biofouling to Minimize the Transfer of Invasive Aquatic Species*, Definitions, 15 July 2011,

as the East China Sea, South China Sea, Yellow Sea, Gulf of Thailand, Sulu-Sulawesi Seas and Indonesian Sea support millions of fishers and coastal dwellers who rely on subsistence and artisanal fishing. Maintaining healthy marine ecosystems is therefore a prerequisite for sustainable coastal and ocean development in the region.

Research over the last 20 years has confirmed that biofouling had been underestimated as a possible vector for invasive aquatic species and may in fact be one of the main mechanisms for their introduction or expansion into new marine or freshwater habitats. Improving or minimizing biofouling on ships has the added benefit of improving their energy efficiency. According to one study⁴, up to 80-90% of the total drag of very large crude carriers or cruise liners is caused by the skin friction so that significant amount of fuel is used purely to overcome the skin-friction drag. As such, the management of biofouling has been identified as one of the potential key factors that could contribute to the reduction of greenhouse gas emissions from the shipping industry, in the short term.

In order to improve the management of biofouling, minimize its role as a potential vector for the introduction of IAS and help maritime industries to reduce their carbon footprint, the IMO, the United Nations Development Programme and the Global Environment Facility have launched the GloFouling Partnership Project (GloFouling Project) in 2019. This initiative includes a conscious effort to seek the expertise and experience of the private sector, through the Global Industry Alliance (GIA) for Marine Biosafety, a cross-sectoral platform that brings together global industries from maritime shipping, ocean energy, aquaculture and other ocean-based industries to help identify common difficulties and solutions, facilitate technology development and break the barriers for its uptake with the ultimate goal of improved biofouling management.

Since the biofouling issue is complex and multi-sectoral in nature, it is difficult to address IAS solely by individual states at a national level as it runs the risk of creating a multiplicity of different requirements that may hamper compliance.⁵ Therefore, the most efficient response would be to develop a harmonised regional approach that coordinates actions applicable to all ships, oil and gas platforms, aquaculture nets or cages, ocean energy equipment and others, where relevant. For this reason, the GloFouling Project promotes the establishment of a Regional Strategy in collaboration with the Regional Coordinating Organization (RCO).

As the RCO of EAS Region, PEMSEA is tasked to support the EAS countries in their efforts to craft a Regional Strategy on Biofouling Management including building capacity at national and regional level, mobilizing human and financial resources, knowledge and technology exchange, and providing a platform for collaboration on biofouling management, among

⁴ Utama, I,K.A.P. and Nugroho, B. (2018) Biofouling, ship drag, and fuel consumption: A brief overview. *Journal of Ocean Technology*, vol. 13, no. 2, 2018

⁵ IMO (2018) Building Partnerships to Assist Developing Countries to Minimize the Impacts from Aquatic Biofouling (GloFouling Partnerships), a GEF/UNDP/IMO Project Document

others in collaboration with the Regional Task Force (RTF), experts from research and academe in the region as well as experts from IMO.

PURPOSES

The Regional Strategy is a regional policy instrument for addressing biofouling issues among the EAS countries in a concerted and integrated way. The purposes of the Regional Strategy on Biofouling Management in the EAS Region are to:

- Provide guidance to the EAS countries in establishing the national strategies in accordance with the vision and mission on biofouling management;
- Align efforts of the EAS countries in managing biofouling through the strategic objectives for attaining the vision and mission of the region;
- Assist the EAS countries in building capacity and mobilizing resources for implementing actions for effective biofouling management;
- To establish a framework for a harmonized approach in the EAS Region on biofouling management practices which is consistent with the IMO Biofouling Guidelines and other best management practices; and
- To initiate some preliminary activities related to biofouling management practices in the EAS Region

TIME FRAME AND COVERAGE

The time frame of the Regional Strategy is set to achieve its objectives in a long-term response, i.e., 20 years. The strategic actions are implemented in four time frames according to their urgency, namely: immediate, short-term, medium-term and long-term actions. Suggested time frame for the strategic actions will be elaborated in the succeeding sections.

The Regional Strategy is intended to cover the countries in the EAS Region including the ASEAN Member States as well as PEMSEA countries. However, this Strategy may be used in the neighbouring countries outside of the EAS Region due to the comprehensive and complementary nature of this Strategy.

2. VISION AND MISSION

VISION

Harmonised biofouling management practices across the EAS region to maintain healthy marine ecosystems, free from disruption of Invasive Aquatic Species, and to enhance the energy-efficient operation of ships

MISSION

To protect and maintain healthy marine ecosystems and reduce greenhouse gas emissions from ships through integrated efforts and a systematic implementation of the IMO recommendations on biofouling management across the region

STRUCTURE OF THE STRATEGY

Figure 1 shows the structure of the Regional Strategy on Biofouling Management in the EAS Region. The implementation of five strategic objectives and actions will ensure the attainment of the long-term vision and mission of the Strategy.

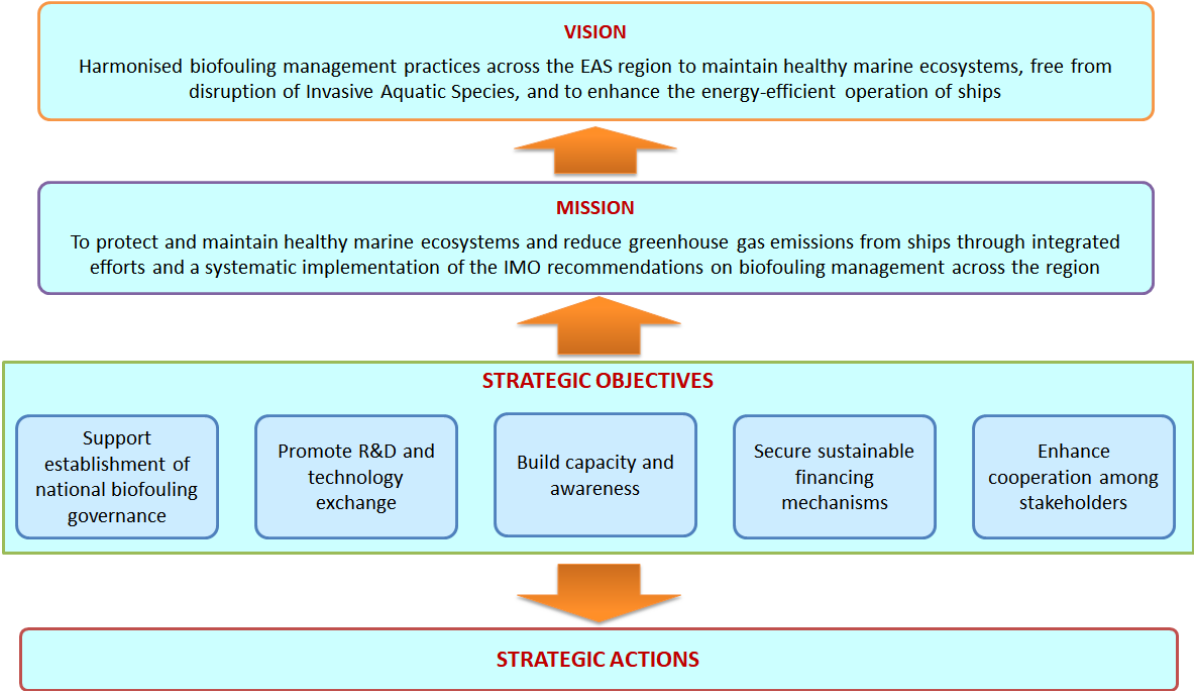


Figure 1. Structure of the Regional Strategy on Biofouling Management in the EAS Region

3. STRATEGIC OBJECTIVES

OVERALL STRATEGIC OBJECTIVES

The overall strategic objectives are to:

- Build national governance and capacity to effectively manage biofouling issues in the countries of EAS Region in accordance with the IMO Biofouling Guidelines; and
- Promote collaboration among the countries of EAS Region in responding to complex and multi-sectoral issues of biofouling in a concerted and integrated way

The overall strategic objectives are supported by the five (5) specific strategic objectives as shown in Figure 2.

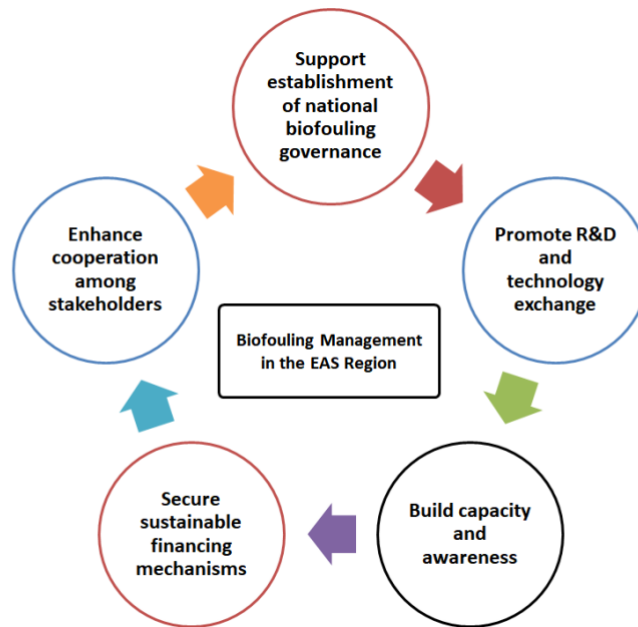


Figure 2. The 5 strategic objectives of biofouling management in ASEAN Region

STRATEGIC OBJECTIVES

The following presents summaries of the five strategic objectives:

STRATEGIC OBJECTIVE 1. SUPPORT ESTABLISHMENT OF NATIONAL BIOFOULING GOVERNANCE IN THE EAS REGION

The countries of EAS Region are committed to manage IAS under the framework of Multilateral Environmental Agreements (MEAs) including the Convention on Biological Diversity (CBD), the International Convention on the Control of Harmful Anti-fouling Systems on Ships (AFS), the IMO Ballast Water Management Convention (BWM) as well as IMO Biofouling Guidelines, among others. Although these international instruments provide good basis for managing the IAS, biofouling management remains largely voluntary in nature and majority of EAS countries has not established or implemented any biofouling policies or measures at a meaningful level.

Identifying a responsible agency among the government agencies are often times challenging in the EAS countries due to complex and multi-sectoral nature of biofouling issues. Biofouling governance measures at the national level may include establishing national legal foundation and institutional arrangements for biofouling management, developing national biofouling strategy and action plans as well as monitoring and evaluation mechanisms, and national coordinating mechanism for inter-agency dialogues and overseeing the implementation of the national strategy and action plans. An inter-agency coordinating mechanism is a key to success for national policy and strategy development since biofouling issues affect multi-sectoral development agendas.

Strategic Objective 1 aims to encourage the EAS countries to establish national biofouling governance in their respective countries with which national interagency coordinating mechanism and legal and institutional arrangements will be established. The effective national biofouling governance would enable the EAS countries to prepare the upcoming global regulatory development on biofouling issues from voluntary to possible legally binding nature in the long-term aspect.

STRATEGIC OBJECTIVE 2. PROMOTE RESEARCH AND DEVELOPMENT (R&D) AND TECHNOLOGY EXCHANGE IN THE EAS REGION

Biofouling causes significant adverse impacts to marine ecosystems through the introduction of IAS, increasing fuel consumption in vessel navigation and increasing operational costs in other maritime industries. However, the assessment of impacts of IAS to marine ecosystem and species remain largely in scientific research stage due to the complicated and challenging aspects of valuating many marine ecosystem services. Hence, the role of science and academe communities on marine ecosystem research in the EAS Region is important. Also, the need for developing technologies for prevention and removal of biofouling organisms from ship's hull as well as disposal of removed materials using advanced equipment such as In-water Remotely Operated Vehicle (ROV) and filter system is growing fast due to safety, efficiency as well as cost-effectiveness of the ship hull cleaning industries.

Research and development (R&D) for biofouling management may be directed into two directions, namely: i) IAS research and ii) technology development on biofouling control. For IAS research, R&D communities on marine ecosystems in the EAS Region will need to collaborate more closely in order to identify the baseline of indigenous species and IAS in the region. Joint research and sharing results on IAS would enhance capacity and knowledge on biofouling management in the region. For technology development on biofouling control, advanced technologies on preventing and removing biofouling species from ship's hull need to be developed in and introduced to the EAS Region in collaboration with the leading technology developers. Considering the differences in technological development levels among the countries, technology transfer and exchange should be promoted in order to support the lesser developed countries in the region.

Strategic Objective 2 aims to promote the research and development on marine ecosystem and the ecology of IAS and technological development on biofouling removal from ship's hull. Although meaningful research results on marine ecosystem and IAS and advanced technologies on ship's hull cleaning are being reported, further R&D development would provide good basis for science and technology-based management on biofouling. Safe and cost-effective as well as affordable biofouling control technologies would enable the biofouling management more applicable to the EAS countries.

STRATEGIC OBJECTIVE 3. BUILD CAPACITY AND AWARENESS ON BIOFOULING MANAGEMENT IN THE EAS REGION

According to the regional analysis, the majority of the biofouling stakeholders in the countries of EAS are not well aware of the adverse impacts of biofouling nor have implemented any measures at a meaningful level. Important sectors and stakeholders related to biofouling in the region such as shipping and port industries as well as fishing and aquaculture industries are not yet prepared to proactively respond to the biofouling issue. This implies that the biofouling issue is at the early stage of response in the EAS region and more efforts should be devoted to raise awareness on the issue as well as build capacity for adequate response and management.

As human capital is what drives the management interventions, capacity and awareness building is considered as one of the most important aspects of the strategic directions and management plans. The capacity and awareness building activities on biofouling management may include training of officials and experts on biofouling management interventions, knowledge exchange and sharing on good practices on biofouling management, publication and media exposure on impact of IAS caused by biofouling to marine ecosystem, among others. Acknowledging that efforts on establishing a national data centre on IAS are being developed in some EAS countries, a regional data centre may be useful for integrated management of data and information on IAS and biofouling such as recent IAS research results, baseline assessments on IAS at country level, impacts of IAS on major marine industries, etc. across the region.

Strategic Objective 3 aims to promote capacity and build awareness on IAS and biofouling management among the relevant sectors and stakeholders in the EAS Region. Increased awareness and enhanced capacity of the officials and experts dealing with IAS and/or biofouling would support the definition of policies, development of technologies as well as other research and development. Therefore, it is imperative to make the general public and stakeholders well aware of the issue to gain momentum to establish a sound basis for policy development and implementation.

STRATEGIC OBJECTIVE 4. SECURE SUSTAINABLE FINANCING MECHANISMS WITHIN NATIONAL AND REGION LEVELS

Securing financial resources for policy development and implementation has always been a challenging and critical issue among government agencies in the EAS countries. At the same rate, implementation of national strategy and action plan for biofouling management would be a daunting task without the sustainable financing mechanisms in the country. Therefore, mainstreaming the IAS and biofouling issues in the national budget process is an imperative for proper and effective policy and management interventions on IAS and biofouling.

Opportunities for financial assistance for a kick start of the IAS and biofouling management are available at various sources. Since biodiversity protection and sustainability of marine ecosystems is one of the leading global agenda, the official development assistance (ODA) and programs of the multilateral development banks (MDBs) are now actively supporting marine

issues. These financial institutions may provide opportunities for the EAS countries as majority of the EAS countries are eligible for ODA and MDB programs. Also, blue economy support programs of MDBs may be pursued for funding biofouling management projects in their blue economy trust fund and bond portfolios as biofouling management can be considered as one of the blue economy strategy objectives.

Innovative financing instruments of MDBs and ODA programs as well as impact investors in the EAS Region and around the world are seeking relevant and bankable investment projects. The ODA agencies such as USAID, JICA, KOICA and EU, to name a few, may be of support to technology development and capacity building for biofouling management in the region. Also, blue economy programs of the MDBs such as Asia Development Bank (ADB)'s Blue Southeast Asia Finance Hub and the World Bank Group's Blue Initiative may be utilized for funding biofouling management projects in the form of direct funding support or guarantee. Aiming at the financial support from the Global Environment Facility (GEF), PEMSEA, as a RCO, may develop a regional program on biofouling management in the EAS Region to support the capacity building and knowledge exchange of the EAS countries.

Strategic Objective 4 aims to support the EAS countries in securing sustainable financing mechanisms for fuelling the implementation of the biofouling policy and strategic programs in the national and regional levels. The countries of EAS are recommended to mainstream biofouling management program in the national budget process. Identifying and evaluating opportunities for financial support from ODA programs and utilizing available financial instruments of MDBs are possible options for the EAS countries for a kick start of the biofouling management in the countries.

STRATEGIC OBJECTIVE 5. ENHANCE COOPERATION AMONG STAKEHOLDERS

Biofouling is a complex and multi-sectoral issue which requires involvement of a wide range of stakeholders. As adverse effects of the IAS and biofouling are creating far reaching impacts to wider society, communities and sectors in the country, important sectors in biofouling management include marine biodiversity conservation, fisheries and aquaculture, shipbuilding, shipping and ports, among others will need to be consulted in developing and implementing a national biofouling strategy. Research and academe sector as well as industries and private sectors should also be included in consultation and implementation of a biofouling management strategy.

The EAS Region hosts various regional organizations whose functions are relevant to biofouling management, such as the ASEAN Biodiversity Centre (ACB), PEMSEA, GIA, Shipbuilders Association, Shipping Association, research communities, etc. Also, international organizations such as IMO, Convention on Biological Diversity, GEF, and ADB among others, are willing to support the regional and national actions for biofouling management. Collaboration and joint implementation of the action plan with these organizations will create meaningful impacts on the ground.

Strategic Objective 5 aims to enhance collaboration and cooperation between national and regional as well as international organizations for effective implementation of the strategic actions on biofouling management. Importance of engaging and collaborating private sectors and industries should be taken into account. It is noted that a regional mechanism for monitoring and reporting on the progress of the Regional Strategy implementation should be established in the EAS Region.

4. STRATEGIC ACTIONS

A summary of the strategic actions to achieve the long-term objectives is shown in Figure 3. The five strategic objectives contain some tangible actions for short- to long-term implementation. The details are explained in the Action Plan table below.

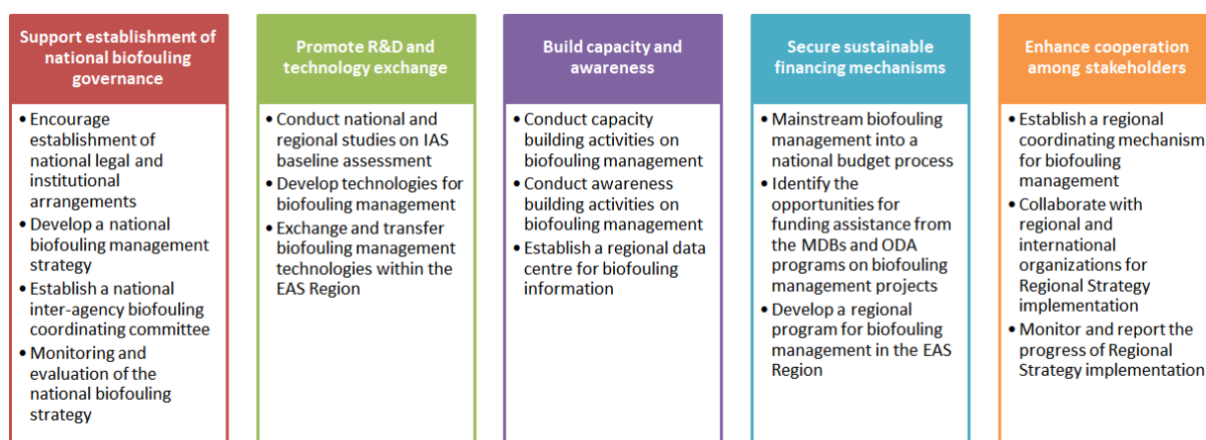


Figure 3. Strategic objectives and their respective actions

ACTION PLAN

The following action plan is proposed in line with the Strategic Objectives of the Regional Strategy. It is noted that ‘immediate’ implies a timeframe of a year; ‘short-term’ a 2-5 years; ‘medium-term’ a 5-10 years; and ‘long-term’ a 10-20 years of implementation. RCO means the Regional Coordinating Organization, i.e., PEMSEA in the EAS Region.

STRATEGIC OBJECTIVE	ACTIONS / ACTIVITIES	TARGETS AND INDICATORS	TIMEFRAME	RESPONSIBILITY
Support the establishment of national biofouling governance in the EAS countries	Encourage the establishment of national legal and institutional arrangements on biofouling management	<ul style="list-style-type: none"> Relevant national policy established 	Medium-term	EAS countries
		<ul style="list-style-type: none"> Laws and regulations on biofouling management enacted 	Long-term	EAS countries
		<ul style="list-style-type: none"> Legal mandates of the national biofouling management institute established 	Long-term	EAS countries
	Develop a national biofouling management strategy	<ul style="list-style-type: none"> A national biofouling management strategy developed An implementation plan for the national strategy developed and implemented 	Short-term	EAS countries
	Establish a national inter-agency biofouling coordinating committee	<ul style="list-style-type: none"> An inter-agency coordinating committee established National Task Force (NTF) established 	Immediate	EAS countries RCO

	Monitoring and evaluation of the national biofouling strategy	<ul style="list-style-type: none"> An annual monitoring and evaluation report on the national strategy published 	Short-term	EAS countries RCO
Promote R&D and technology exchange in the EAS Region	Conduct national and regional studies on IAS baseline assessment	<ul style="list-style-type: none"> National and regional studies on IAS baseline assessment conducted A long-term monitoring procedures and guidelines prepared 	Medium-term	EAS countries RCO
	Develop technologies for biofouling prevention and management	<ul style="list-style-type: none"> Public and private companies involved in developing biofouling removal technologies Risk assessment procedure and requirements of removed biofouling debris developed 	Medium-term	EAS countries
	Exchange and transfer biofouling management technologies within the EAS Region	<ul style="list-style-type: none"> Advanced technologies for removing biofouling introduced in the country Joint demonstration of technologies and tech-exchange fairs conducted 	Medium-term	EAS countries RCO Biofouling industries
Build capacity and awareness on biofouling	Conduct capacity building activities on biofouling management	<ul style="list-style-type: none"> A capacity building need assessment conducted National and regional trainings on biofouling and 	Short-term	EAS countries RCO

management in the EAS Region		<p>AFS management tools conducted</p> <ul style="list-style-type: none"> • A regional training hub for capacity-building and training of personnel involved in risk assessment, control, monitoring in ports, ships and other coastal facilities established 		Regional and international organizations (IMO)
	Conduct awareness building activities on biofouling management	<ul style="list-style-type: none"> • A set of policy briefs aimed at policymakers published • Best practices of biofouling management in the EAS Region published • A regular regional biofouling conference organized • Awareness building meetings and events organized 	Immediate / Short-term	EAS countries RCO Regional and international organizations
	Establish a regional data centre for biofouling information	<ul style="list-style-type: none"> • A regional data centre, similar to the Global Invasive Species Database, for linking, sharing and collecting data and information and database, established • A mechanism for sharing national and regional data and information on biofouling and IAS established 	Medium-term	RCO/IMO

Secure sustainable financing mechanisms within national and region levels	Mainstream biofouling management into a national budget process	<ul style="list-style-type: none"> National biofouling finance needs assessment and finance plan developed Biofouling management budget included in the regular national budget Biofouling management included in the national blue economy strategy 	Short-term	EAS countries
	Identify the opportunities for funding assistance from the MDBs and ODA programs on biofouling projects	<ul style="list-style-type: none"> Bankable project proposals for the MDBs such as ASEAN Catalytic Green Finance Facility (ACGFF), ADB Blue Finance and Blue Bond and World Bank Group's Blue Initiative etc., developed and submitted Project proposals for ODA funding opportunities in the EAS Region such as JICA, KOICA, USAID, EU fund etc., developed and submitted 	Short-term	EAS countries
	Develop a regional program for biofouling management in the EAS Region	<ul style="list-style-type: none"> Financial needs assessment and planning conducted A regional project document on biofouling management in the EAS Region developed and submitted 	Short-term	RCO

Enhance cooperation among stakeholders	Establish a regional coordinating mechanism for biofouling management	<ul style="list-style-type: none"> • A Regional Coordinating Committee and a Regional Task Force (RTF) formed • A regional coordinating office with staff established • A Regional Strategy implementation plan developed and implemented 	Short-term	EAS countries RCO Regional and international organizations
	Collaborate with regional and international organizations for Regional Strategy implementation	<ul style="list-style-type: none"> • Activities of National Strategies and Regional Strategy jointly conducted with regional organizations such as PEMSEA, CTI, ACB, IMO, CBD, AFS, BWM, GIA etc. 	Short-term	EAS countries RCO Regional and international organizations
	Monitor and report the progress of Regional Strategy implementation	<ul style="list-style-type: none"> • A regional monitoring and reporting system established in RCO for assessing and reporting of the progress of Regional Strategy implementation 	Short-term	RCO

