ENVIRONMENTAL QUALITY IN THE ADRIATIC IONIAN REGION

THREAT TO COASTAL AND MARINE BIODIVERSITY: OVERVIEW AND CASE STUDY FOR IPA ADRIATIC BALMAS AND SPEEDY PROJECTS

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1 Contents

2 THE ENVIRONMENTAL QUALITY PILLAR

2.1 Overview

The Environmental Quality is the third thematic pillar of the EU Strategy for the Adriatic and Ionian Region (EUSAIR). The coordinators are Slovenia and Bosnia Herzegovina. The specific objectives of this pillar(EC 2014) (EC, 2014) are:

- to ensure a good ecological and environmental status of the coastal and marine environment by 2020 in line with the relevant EU directives (principally Water Framework Directive (WFD) and Marine Strategy Framework Directive (MSFD)) and the ecosystem approach of the Barcelona Convention;
- to contribute to the goal of the EU Biodiversity Strategy to halt the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, and restore them in so far as feasible, by addressing threats to marine and terrestrial biodiversity; and
- to improve waste management by reducing waste flows to the sea, and to reduce nutrient flows and other pollutants to the rivers and the sea.

Two topics are identified as pivotal in relation to Environmental Quality in the Adriatic-Ionian Region, the first related to the marine environment, and the second to transnational terrestrial habitats and biodiversity. This report will consider only the marine environment topic.

The Environmental Quality pillar strongly supports the Europe 2020 Strategy (EC, 2014) by:

- contributing to **smart growth** by strengthening of technical and scientific capacities, and establishment of common platforms and innovative solutions for research, observation and monitoring;
- contributing to **sustainable growth**, in particular to the objectives of 'A resource-efficient Europe – Flagship initiative under the Europe 2020 Strategy'. The actions

under the pillar are expected to support efficient and sustainable use of natural resources including fish stocks, materials and water, preservation of biodiversity, habitats and ecosystems, and will contribute to minimising the impact of climate change on marine and terrestrial ecosystems;

- contributing to **inclusive growth** by promoting stakeholder involvement in exploring sustainable options, including the involvement notably of fishermen and farmers, thereby ensuring the economic and social sustainability of actions.

Taking appropriate actions to address environmental issues faced by the macro-region will contribute to the implementation of the EU Environmental directives, particularly: MSFD, WFD, Maritime Spatial Planning, Urban Waste Water, Nitrates, Waste, Birds, Habitats Directives, and Green Infrastructure Strategy. The Environmental Quality pillar will also contribute to achieve the goals set out in the Common Fisheries Policy, the EU Adaptation Strategy and the EU Biodiversity Strategy.

In the Commission working document (EC, 2014) it is also stated that the Adriatic and Ionian Region is vulnerable to disasters and to the impact of climate change and comprehensive actions to adapt to those circumstances are needed. Enhancing cooperation in this area, through different actions such as conducting adequate comprehensive risk assessment, implementing a disaster risk management policy, as well as developing a regional strategy on adaptation to climate change, will make the Region more resilient to such changes. Moreover, the third pillar also contributes to the South East Europe 2020 Strategy of the Regional Cooperation Council, in particular to the Environment Dimension of its Sustainable Growth Pillar, by addressing issues related to water quality, disaster risk reduction and climate change mitigation and adaptation. Eventually, the involvement of a wide range of stakeholders in the implementation of all actions proposed under this pillar and, more specifically, the social partners and private sector actors from fisheries and producers of packaging, as well as the scientific community and civil society, will further contribute to an integrated approach.

2.2 The marine environment topic

Within this first topic, two issues can be identified as particularly relevant for the Adriatic-Ionian marine environment, namely threats to coastal and marine biodiversity and pollution of the sea (EC, 2014).

2.2.1 Threats to coastal and marine biodiversity

The Adriatic-Ionian Region is rich in biodiversity; however there is a lack of habitat maps from the Adriatic and Ionian Seas. The high biodiversity of the two seas is the basis for tourism, recreational and fishing activities and contributes to the cultural heritage of the macro-region. Overfishing, habitat degradation and incidental catches pose serious threats to marine biodiversity, including fish, sea turtle, cetacean, seabird and other species. In addition, uncontrolled and illegal coastal development often leads to destruction of habitats. Invasive non-indigenous species, arriving mainly with aquaculture and ballast water discharges also threaten ecosystem functions, while the illegal collection of sponges, corals and bivalves is a further cause for concern. Moreover, the increased human use of the marine and coastal space, in particular for fishing, maritime transport, tourism, and construction, has intensified pressures on coastal and marine ecosystems. The Ecosystem-based approach to coordination of activities is needed within the framework of Integrated Coastal Management (ICM) and Marine Spatial Planning (MSP), in order to ensure sustainable use of resources. Both frameworks are important stimulants for trans-boundary collaboration and stakeholder cooperation across different coastal and maritime sector activities, and have potential for bringing together ecosystem services and Blue Growth opportunities in a sustainable way.

According to the Commission working document (EC, 2014), the Adriatic and Ionian Seas are home to almost half of all the recorded marine species found in the Mediterranean

Sea. However, a complete inventory of this rich biodiversity and marine habitat maps are still missing. The highly indented eastern coast of the Adriatic also acts as a breeding ground and nursery to a large number of marine taxa. At the same time, the Adriatic and Ionian Seas are subjected to intense fishing activity, aquaculture and coastal development that pose serious threat to this natural capital. There is a general lack of information on small-scale fisheries, illegal fishing gear is not uncommon, and monitoring and enforcement are insufficient. Aquaculture is a rapidly growing industry which is not regulated in all countries so as to ensure sustainability. Raising the awareness of fishermen regarding marine species and fishing nets minimising by-catch, is needed for improving compliance and for strengthening their involvement in identifying the best measures for meeting sustainable fishing targets.

Moreover, the illegal and uncontrolled construction is a widespread phenomenon across much of the macro-region, with the demand for additional construction stemming from tourism further exacerbating the problem. The coverage in terms of offshore Marine Protected Areas (MPAs) beyond 12 nautical miles is the lowest of all EU marine regions, while existing MPAs are often not adequately managed. Invasive marine alien species with possible detrimental effects to aquaculture and fisheries are introduced by shipping vectors (EC, 2014).

2.2.1.1 *Proposed Indicative Actions*

The actions proposed by the Commission working document (EC, 2014) for the marine environment topic are:

1. ***Increase marine knowledge:*** To ensure a sound basis for actions related to Maritime Spatial Planning (MSP), Integrated Coastal Management (ICM) and implementation of the MSFD, it is important for the Region to: *a)* make an inventory of marine biodiversity and detailed habitat mapping in coastal and offshore areas; *b)* agree on a common approach to be applied across the Adriatic and Ionian sea basin for monitoring diversity descriptors on the status of the marine environment the two seas, and for determining Good Environmental Status indicators and targets; *c)* establish a common infrastructure platform in terms of data collection, marine research, lab analysis through common survey programs, research vessels and laboratories, and *d)* develop a Web-GIS Observatory Network to gather and process geographical and statistical data related to sustainable development and the marine environment.
2. ***Enhance the network of Marine Protected Areas***: By a possible designation of new areas in coordination with the process of designation of Specially Protected Areas of Mediterranean Importance under United Nations Environment Programme – Mediterranean Action Plan (UNEP MAP); by establishment of Fisheries Restricted Areas under the General Fisheries Commission for the Mediterranean (GFCM), by completing marine NATURA 2000 network under Birds and Habitats Directives; by designating further protected areas to form a coherent and representative network of MPAs according to the MSFD, and by ensuring their joint or coordinated management, also in relation to maritime spatial planning and integrated coastal management.
3. ***Exchange best practices among managing authorities of Marine Protected Areas:*** Aiming to achieve and/or to maintain the Good Ecological Status of marine waters

and to preserve biodiversity also by integrating a fishing component in each MPA (e.g. Fishing Protected Areas).

4. ***Implement Maritime Spatial Planning and Integrated Coastal Management:*** By ensuring coordination of different projects/initiatives with the frameworks provided by the Maritime Spatial Planning Directive and the Priority Action Plan of UNEP/MAP. The latter plays an important role in supporting ICM by Mediterranean countries and in implementing the ICZM (Integrated Coastal Zone Management) Protocol of the Barcelona Convention.

According to the Commission working document (EC, 2014) several actions related to the environmental impact of fisheries and aquaculture are included under the Blue Growth pillar of the EUSAIR. These actions make a strong contribution to preserving marine biodiversity, by supporting enhanced cooperation on data collection, scientific study, policy planning, monitoring, control and enforcement.

2.2.1.2 Proposed examples of targets

The Commission working document (EC, 2014) reported five targets for the marine environment topic:

1. the establishment of a common infrastructure platform with the participation of all countries for data collection, research, and laboratory analysis by end of 2015;
2. a 10% surface coverage of Adriatic and Ionian Seas by Marine Protected areas;
3. the adoption of maritime spatial planning and integrated coastal management strategies by EU Member State by 2017 and for coastal candidate and potential candidate Countries by 2018;
4. the achievement of Good Ecological Status of the Adriatic and Ionian Seas by 2020;

5. the enhancement of a marine NATURA 2000 network and a coherent and representative network of MPAs under the Marine Strategy Framework Directive by 2020.

2.2.2 Pollution of the sea

The sea pollution originates from a number of different sources, such as intense maritime transport activities and hydrocarbon exploration and exploitation result in oil spills, including large scale pollution events, and noise pollution (EC, 2014). Insufficient waste water treatment in several countries leads to pollution from rivers, exacerbated by the use of nitrates on agricultural lands. Ecologically-unsound aquaculture practices, that entail discharge of nutrient and chemicals into the sea, also led to sea pollution. Moreover, marine litter affects human safety and health, as well as marine wildlife, stemming both from land-based sources and from the loss and discard of fishing gears. Coastal and recreational activities account for more than half of the litter found on beaches. Poor management of solid waste and a large number of illegal landfills including hazardous waste result from a combination of scarce funding for solid waste treatment infrastructure, lack of awareness on the part of the general public, weak enforcement and increasing urbanisation of the coastlines. Waste water treatment plants are equally poor in many places.

According to the Commission working document (EC, 2014), the Adriatic Sea is highly vulnerable to anthropogenic pressures. Its waters are exchanged with those of the open seas of the Mediterranean only once every 3 or 4 years. The northern Adriatic is the shallowest part of the entire Mediterranean Sea. Industrial accidents on land and maritime accidents can potentially cause large damage to these marine ecosystems. The Ionian Sea is less vulnerable to such impacts as it is part of open Mediterranean waters. However, the pollution coming from the Adriatic is exchanged with the Mediterranean through the Ionian Sea. The high vulnerability of the Adriatic is further compounded by high levels of human activity. With the increase of the maritime traffic and of the interest for exploring seabed

mineral resources, raising levels of marine noise will seriously threaten endangered marine wildlife like cetaceans and sea turtles.

2.2.2.1 Proposed Indicative Actions

The actions proposed by the Commission working document (EC, 2014) for the pollution of the sea topic are:

1. ***Implement a life cycle approach to marine litter by*** **:** a) establishing a coordinated monitoring system and database on marine litter and marine pollution, including sources and types of litter and pollution and a GIS database on the location and sources of marine litter; *b)* strengthening collaboration between sectors for the development of new possibilities for marine litter recycling including production of packaging waste and fishing gears to enable recycling; *c)* the preparation of a joint strategy for the assessment, prevention and reduction of marine litter, building on the work of MED POL programme and in line with the Regional Plan of the Barcelona Convention on Marine Litter Management in the Mediterranean, including an economic assessment of the costs and benefits of different options for reducing marine litter, as well as actions intervening at different stages of production, sources, transmission and loss; and *d)* supporting the preventative measures to address Abandoned, Lost or otherwise Discarded Fishing Gear (ALDFG), implementing gear marking and gear registration, marine spatial management, codes of practice for fishermen.
2. ***Support clean-up programmes:*** for both floating and sunken litter, integrating these activities with recycling programmes, and investing in necessary infrastructure.
3. ***Draft and implementation of a joint contingency plan*** for oil spills and other large-scale pollution events, building on the work on the sub-regional contingency plan developed by the Joint Commission for the protection of the Adriatic Sea and coastal areas, and on the forthcoming Action Plan for the Offshore Protocol of the Barcelona

Convention. Implementation of measures to enable joint contingency planning and coordinated emergency response.

4. ***Identify hotspots*** and investing in reducing emissions of pollutants by realising a Hot Spot Inventory and aiming to reduce the pollution of the sea.
5. ***Ensure prioritisation of investments to reflect the contribution to reducing pollution of the sea*** in the catchment area of the Adriatic and Ionian Seas. Aligning existing funding instruments, including funding from the European Regional Development Fund, the Cohesion Fund and the European Agricultural Fund for Rural Development, to support investment in waste management, waste water treatment and environmentally-friendly agricultural practices.
6. ***Address diffuse sources*** (e.g. nitrates from agriculture) by decreasing fertiliser use and by enhancing the recycling of nutrients through e.g. awareness raising among farmers on the impacts of excessive use of fertilisers, education and training activities on the implementation and financial aspects of environmentally friendly farming practices.

2.2.2.2 Proposed examples of targets

The Commission working document (EC, 2014) reported three targets for the pollution of the sea topic:

1. reduction of marine litter in line with the MSFD and the 7th Environment Action Programme targets by 2020;
2. reduction of anthropogenic nutrient flows to the Adriatic and Ionian seas to ensure that by 2021 the eutrophication is minimised;
3. a joint contingency plan for oil spills and other large scale pollution events adopted by 2016 and measures to enable joint and coordinated emergency response implemented by 2020.

3 ENVIRONMENTAL QUALITY AND STRATEGIC ENVIRONMENTAL ASSESSMENT – OVERVIEW

3.1 What is SEA? Definition and objectives of SEA for strategic thinking

In 1989 SEA was introduced as a concept, and a term, in the context of a European research project as "the environmental assessments appropriate to policies, plans and programs [...] of a more strategic nature than those applicable to individual projects [...] likely to differ from them in several important respects" (Partidário, 2012).

According to Partidário (2012), "**strategic**" is an attribute that qualifies ways of thinking, attitudes, actions related to strategies. Many definitions and understandings of strategy exist, but they all relate to long-term objectives. This guidance follows a strategic thinking model, which is understood as having a vision over long-term objectives (the distant points we want to reach), flexibility to work with complex systems (understanding systems, the links and lock-ins, and accepting uncertainty), adapting to changing contexts and circumstances (changing pathways as needed) and be strongly focused on what matters in a wider context (time, space and points of view). In line with the above, an understanding of SEA has been argued over the last decade which takes SEA as an environmental assessment instrument with a strategic nature, conceived as a flexible framework of key elements, acting strategically in a decision process to enable a facilitating role, ensuring an added-value to decision-making.

SEA acts strategically by:

- positioning itself flexibly in relation to the decision-making process, ensuring strong interaction and frequent iteration from earliest decision moments, and following decision cycles;
- integrating relevant biophysical, social, institutional and economic issues, keeping a strategic focus in very few but critical themes;

- assessing environmental and sustainability opportunities and risks of strategic options to help drive development into sustainability pathways;
- ensuring active stakeholders engagement through dialogues and collaborative processes towards conflict reduction and win-win achievements.

In the guidance of Partidário (2012), SEA is defined as a strategic framework instrument that helps to create a development context towards sustainability, by integrating environment and sustainability issues in decision-making, assessing strategic development options and issuing guidelines to assist implementation. The purpose of SEA is therefore to help understand the development context of the strategy being assessed, to appropriately identify problems and potentials, address key trends, and to assess environmental and sustainable viable options (i.e. that act cautiously or prevent risks and stimulate opportunities) that will achieve strategic objectives.

In a strategic thinking approach, SEA has three very concrete objectives:

- **encourage environmental and sustainability integration** (including biophysical, social, institutional and economic aspects), setting enabling conditions to nest future development proposals;
- **add-value to decision-making**, discussing opportunities and risks of development options and turning problems into opportunities;
- **change minds and create a strategic culture in decision-making**, promoting institutional cooperation and dialogues, avoiding conflicts.

Through these objectives, SEA can contribute to:

- ensure a strategic, systemic and broad perspective in relation to environmental issues within a sustainability framework;
- contribute to identify, select and discuss major development options towards more sustainable decisions (intertwining biophysical, social, institutional and economic issues);
- detect strategic opportunities and risks in the options under analysis and facilitate the consideration of cumulative processes;
- suggest follow-up programmes, through strategic management and monitoring;
- ensure participative and transparent processes that engage all relevant stakeholders through dialogues, and foster more integrated decisions in relation to the array of relevant points of view.

International experience and the literature on SEA have agreed to IAIA (International Association for Impact Assessment) 2002 SEA performance criteria, deemed to be axiomatic of SEA good practices.

The strategic-thinking model in SEA developed in this guidance fully acknowledges all of these performance criteria. Part III in this guidance provide full recognition on how these performance criteria can be expressed in practical terms.

4 SHARED PROJECT FOR ENVIRONMENTAL EVALUATION WITH DYNAMIC GOVERNANCE (SPEEDY)

4.1 The background and the problems addressed

The Strategic Environmental Assessment (SEA) Directive is an important step to forward in European environmental law, by requiring that the environmental effects of a broad range of plans and programmes have to be assessed. Whilst the concept of strategic environmental assessment is relatively simple, the implementation of the Directive sets Member States in a hard challenge. It goes to the heart of much public-sector decision-making. In many cases it requires more structured planning and consultation procedures. There are difficult questions of interpretation, but when properly applied, these assessments can help produce decisions that are more sustainable, now and for future generations. As described in the report from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions on the application and effectiveness of the Directive on Strategic Environmental Assessment (Directive 2001/42/EC) (COM (2009) 469 final) there is a need to develop capacity in the Member States so as to ensure effective implementation of the SEA Directive. In order to do this, the capacity building must be strongly encouraged, in particular through targeted campaigns for the recruitment and training of SEA experts and guidance documents inparticular on the interpretation of certain key concepts of the Directive (screening criteria, identification of alternatives, coordination mechanisms and/or joint procedures for fulfilling the requirements for assessment under other Directives, specific guidance on the link between SEA and EIA and Natura 2000 Assessment). Overall, it can be concluded that strategic environmental assessment is a tool that is still evolving and changing. Indeed, current SEA practice is still limited with regard to methodological issues, participatory approaches, quality control as well as general procedural and institutional deficits.

The main technical and institutional problems of SEA are summarised as:

- considerable differences in terms of the institutional and legal arrangements of the SEA procedure;
- difficult to integrate planning and programming procedures to SEA ones;
- limitations of information and training;
- difficult in the coordination of the joint procedures for fulfilling the requirements governing assessments under other directives (EIA, Habitat and Birds, IPPC, Water Framework).

4.2 The SPEEDY overall objective

The SPEEDY overall objective is to **favour transnational cooperation** between Public Administrations aimed to develop and apply an efficient environmental assessment process in the Adriatic space. This goal fitted very well with the Candidate Countries/Potential Candidate Countries' (CC/CCPs) efforts to transpose the EU acquis in order to approximate their legislation and policies with European Standards in the environmental topic. The desired synergic action between the various neighbouring countries was still linked to the consideration that common environmental problems can only be solved through coordinating interventions and sharing knowledge rather than acting on restricted territories. The increasing use of electronic communication always provides opportunities for reaching this goal in direct ways through the establishment of international forum.

All beneficiaries have been given the opportunities to be engaged in lively debates in some of the more popular fields on environmental impact assessment. In detail, the above objective was supposed to be achieved through the development of SEA web platform aimed to promote and extend knowledge and share information about SEA. Thanks to this advanced web platform each beneficiary was trained and obtained in real time information on events, legislation and procedures, becoming a part of SEA critical issues management.

SEA web platform facilitates transnational consultations on international plans and programmes according to SEA Directive, such as the New Adriatic cross-border Cooperation Programme 2014-2020.

In details the project's **specific objectives** were the following:

- draw up shared suggestions useful to modify and update European SEA Directive;
- create a useful tool able to allow Public European Institutions to contribute to the debate about SEA procedural weaknesses;
- introduce innovative participatory management approaches and tools improving institutional capacity, strengthening public involvement, and creating an effective replication strategy;
- create a permanent Environmental Assessment Network;
- develop approaches and practices for comprehensive and integrated impact assessment;
- improve assessment procedures and methods for practical application;
- review existing regulations, key components, and applications of Strategic Environmental Assessments (SEA);
- assess SEA requirements, including the authorizations, applications, initiatives, and relevant existing conditions of SEA;
- identify lessons learned and challenges in implementing SEA.

4.3 Seven WPs of the SPEEDY project

The project combined theoretical work with the practical application and it was based on the collaboration of Public Administrations and Scientific Institutions (Mazzocca and Iagnemma 2016).

The cooperation aimed at:

- technical-scientific and institutional validation;
- Technical and political guidance;
- consolidation of the institutional relationships between the Countries of the Adriatic area.

WP1 and **WP2** were left for transversal activities. The first one guaranteed the coordination of the projects' activities and the second one ensured the continuous exchange of information among beneficiaries and institutions operating in the interested territories.

The 5 technical WPs allowed reaching the aim of the project through the shared construction of a methodology on environmental evaluation activities.

In the **WP3** the analysis of local and national regulations of the different participants has allowed the realization of Comparative Dynamics Analysis in order to evaluate the state of the art and compare the currently procedures of SEA (Strategic Environmental Assessment), better identifying gaps and critical issues about them that influence the achievement of the EU objectives.

WP4 was focused on the definition of a method for identifying and discussing shared ITEMS' that should be taken into account in the phase of web advanced platform SKP (Shared Knowledge Platform) development.

In **WP5** SKP (Shared Knowledge Platform) was realized: web platform an advanced online tool, with different accessibility's levels, that allows working on documents in an assisted revision and in streaming. WP5 started simultaneously with WP4 in order to coordinate and validate the elaboration phase of the model with the implementation of the web tool.

WP6 has foreseen the use of the platform (SKP) including the activation and management of working groups that will work on the preparation of documents that will be published online.

WP7's objective put forward a contribution in setting-up operative suggestions on processes providing some clear information on how face and solve some critical issues of the

Environmental Assessment Procedure, in order to get to SEA useful tool to reach the objectives set by EU legislation.

4.4 The project basic facts

The project proposal was prepared within the second call for ordinary project proposals, with a project title: "Shared Project for Environmental Evaluation with DYnamic governance" and the acronym "SPEEDY". Priority: 3 Accessibility and Networks, Measure: 3.3 Communication networks. Lead Beneficiary was Region of Abruzzo, Directorate for Bureau Affairs, Legislative and EC Policies, External Affairs, Parks, Land, Environment, Energy from ITALY. The project started in September 2012 with a duration of 36 months and a total budget of 2.406.206,13 €.

The partnership of the SPEEDY project comprises 10 beneficiaries and 2 associated institutions that correspond to five Adriatic countries: Albania, Serbia, Croatia, Italy and Greece.

LEAD PARTNER

Abruzzo Region-Directorate for Bureau Affairs, Legislative and EC Policies, Programming, Parks, Environment, Energy (IT)

PARTNERSHIP

1. FIRA S.p.A. (IT)
2. Marche Region-Infrastructures, transport and Energy Department (IT)
3. Molise Region-Environmental Protection and Prevention Service (IT)
4. G. d'Annunzio University-DART Department (IT)
5. Municipality of Rakovica (RS)
6. Dubrovnik Neretva County Regional Development Agency DUNEA (HR)
7. Centre for Research and Development (AL)
8. Region of Ionian Islands/regional - unit of Corfu (CR)

9. National Territorial Planning Agency (AL)
10. Italian Ministry of Environment-DVA Environmental Assessment Directorate (IT) and
11. Agency for Environmental Protection, as a body Within the Ministry of Energy, Development and Environment (RS) are public body associated.

The SPEEDY overall objective to favor transnational cooperation between Public Administrations fits very well with the Candidate Countries/Potential Candidate Countries (CC/CCPs) efforts to transpose the EU directive in order to approximate their legislation and policies with European Standards in the environmental topic.

The SPEEDY project was carried out in four years, has produced a large number of national and international meetings which allowed the comparison among the beneficiaries on issues of SEA. As dissemination activities training and information events have been realized, which they were also attended by professionals and practitioners from various regions of Europe(Mazzocca and Iagnemma 2016).

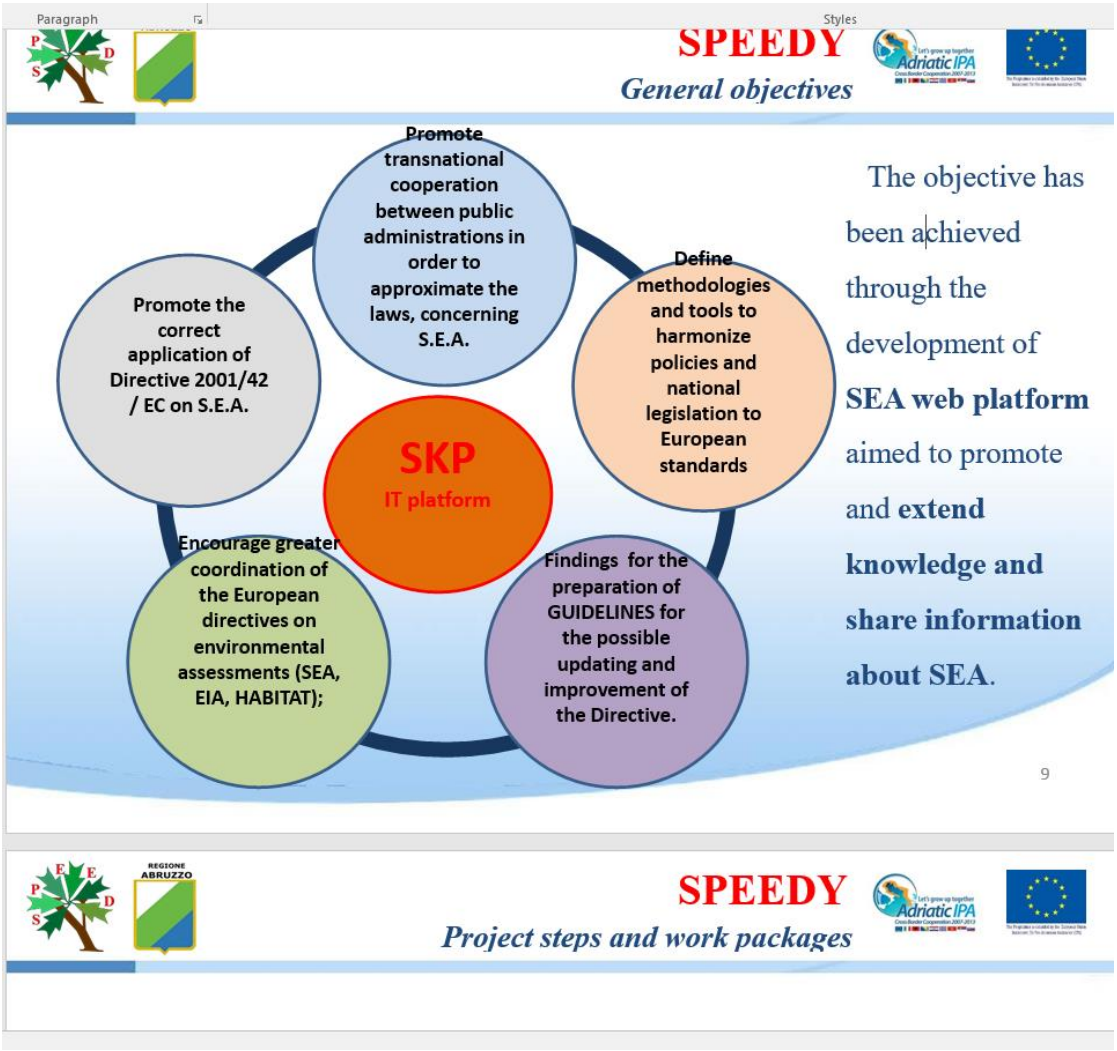


Figure 1. Project SPEEDY schematic general overview as presented in the Bratislava conference on 22nd of September 2016 by Mazzocca and Iagnemma (2016).

4.5 Final Event and Communication of Results

With the meeting held last July 15 on "*The Strategic Environmental Assessment (SEA) of plans and European programs. Understanding to participate, participating to decide*", ended the experience of Speedy (Shared Project for Environmental Evaluation with DYnamic governance).

The final meeting results, published in a special newsletter, have shown the work done and analyses performed during the project. After examining the number of VAS (SEA) procedures performed between 2001 and 2015 in Italy and the affected districts (325 of regional SEA processes in only 2015 against 6 national), it emerged that about 81% of cases concern the urban planning on a small scale, followed, by the 9% related sectoral plans while the remaining 10% have interested European Programs and Plans for large scale area.

Three main themes were subject of discussion:

- SEA monitoring of plans/programmes, Experience gathered from Competent Authorities;
- duration of procedures (efficiency/effectiveness);
- use of screening.

The careful considerations on issues have revealed that the difficulty of monitoring SEA procedures is due to three main problems:

- SEA monitoring carried out only since 2012/2013 plans / programs, the reported difficulties on data gathering and the reported difficulties on cooperation among Involved institutions;
- however, can be reported two important positive aspects emerged from the survey, the environmental issues are more considered in the planning process and environmental offices are more involved in the planning process. The analysis of the duration of SEA procedures, highlighted instead, as the times instructors are still long on average;
- finally, the analysis showed that the screening has been used 8 times at the state level and at the regional level has been used 684 times, of which about 10% has resulted in a subjection to VAS and about 60% in exclusion with a prescription.

During the meeting the results of the Study Concerning the preparation of the report on the application and effectiveness of the SEA Directive (Directive 2001/42 / EC) have been presented.

The study first of all has sought to understand whether the SEA in Europe has succeeded in changing the P / P and how; of the Member States analysed, 16 have pointed out that change has only been observed in some cases rather than universal changes across the spectrum. Some Member States have also expressed about the length of the SEA process/procedure, by responding that it depends on the type of Plan/Program or specific circumstances, and others, while giving lengths of time taken for an SEA, did not explicitly say if the SEA prolongs the Plan/Program -decision process.

Moreover, the European states are fairly divided in considering the cost-effective mechanism of VAS, as useful for assessing and addressing environmental impacts. Of the 28 states surveyed, about 46% was evenly divided between those who think that the procedure is useful and who thinks that depending on the situation.

The reasons contributing to SEA cost-effectiveness are:

- early identification of environmental issues during the SEA process that can be tackled, with measures taken to mitigate or prevent effects;
- the focus on environmental impacts, namely they can be cost-effectively identifying, evaluate and mitigate;
- SEAs contribute to future benefits, thus while they are potentially expensive in the short term, in long term SEAs are cost-effective.

While the main reason that hinders to SEA cost-effectiveness is related to high costs of the SEA process challenge the SEA cost-effectiveness.

It is worth noting that over a third stated that costs depend greatly on the type of plan/programme, making accurate estimates difficult.

The costs are often excessive because, are undergo VAS also plans and minor programs. The study, presented by Mr. J. Parker of the DG Environment, has seen ask to MS if they had defined or interpreted in their legislation, the meaning of "small areas at local

level" and "minor modifications to plans and programs", as well as identified in Article 3 paragraph 3 of Directive 42/2001. Only 4 of 28 MS has defined what is meant by small areas or minor changes. Further critical analysis of the state of advancement of the SEA procedure in Europe, has led to consider whether, between Member States, someone have warned the risk of duplication between the SEA Directive and other Directives and EU level policies (For instance: EIA Directive, Habitats and Birds Directives, Industrial Emissions Directive, the Waste Framework Directive, Flood Risk Directive, Water Framework Directive, the Seveso II Directive, Nitrates Directive).

The replies of Member States they have changed, according to different understandings. In the data given here, "risk identified" also included Member States who have provisions in place to mitigate duplication, following the logic that a Member State must think there is a risk if it takes steps to mitigate, even if there is now currently no risk of duplication (due to legislation or policy changes).

The Member States identified specific examples of duplication risks in other EU Directives, among those mentioned there are:

- Flood Risk Directive (2007/60/EC)
- WFD -Water Framework Directive (2000/60/EC);
- Birds and Habitats Directives (2009/147/EC and 92/43/EEC);
- EIA Environmental Impact Assessment Directive (2011/92/EU).

Furthermore, the Member States cited several concerns regarding the scope of the SEA Directive among which:

- public participation and the scale on which the public is informed and invited to participate;
- lack of emphasis on sustainable development and the sustainability of assessments and analysis;
- development regarding the definitions of plans/programmes requiring SEAs (whether that be developing the list of plans/programmes with mandatory SEAs or shortening it).

The Lead Partner underlined that what regards cross-border planning and environmental thematic, the institutional approach is totally inadequate; the simple European Union membership is not enough, but it is important to consider the cultural aspect and the collective identity, namely that which springs from the process of participation to the choices both of programmatic implementation of that nature. The approach of the cooperation extended to the design mode, explained in his speech Mazzocca, it is the natural evolution of a process that has as its the starting point is to systematize all the experiences on topics of interest.

The environmental issue is the main issue on which to develop a community project for its intrinsic characteristics:

- to be a cross-cutting issue (for the development effort and protection);
- to be a general rule (everyone can express a legitimate interest);
- to be a shared vision for long-term projected (strategic vision);
- to be a proposal of change (proposed improvements).

Among the major challenges that the Adriatic Community will support for a sustainable and consistent growth we find:

- the protection of biodiversity;
- the use of land and sea (mining and coasts);
- the reduction of pollution and waste (civil / industrial wastewater treatment);
- The common fight against climate change (adherence to protocols and agreements).

The SEA Directive, concluded the Secretary, integrating and evaluating programmatic and planning strategies, it is the ideal place to build together the rules for sustainability.

4.6 Tangible Outputs of the SPEEDY project (Abruzzo_region, 2016)

4.6.1 The methodological process of the SPEEDY project

The research project has developed through several steps, some of which were performed in parallel. Step 1 and 2 (WP1 and WP2) have been horizontal activities, carried out throughout the project, with the goal of good management and a good and efficient dissemination of results and the project activities. The other steps (WP) had technical and scientific purposes, with the aim of defining a web platform for the collection of all information, best practices and easily accessible operating procedures, trying to share the views on the issue of SEA. The project has combined a theoretical work with practical application and was based on the cooperation between public authorities and scientific institutions.

The cooperation has been the aim:

- technical-scientific and institutional validation;
- technical and policy guidance;
- the consolidation of institutional relations between the countries of the Adriatic.

4.6.2 The SKP platform and its advantages

The SKP (Shared Knowledge Platform), it is a platform to harmonize European procedures concerning SEA (Strategic Environmental Assessment) and you can achieve it through the website http://www.speedyproject.eu. It was created by the project partners Fira SpA and harmonized by all the other partners. This SKP is based on the sharing model of knowledge, as such knowledge and content are the main product/output of this platform, which will stimulate discussion and action among stakeholders at regional level.

It was created an organizational structure responsible for the management of SKP platform and its content.

This organizational structure will take into account the needs of employees and their ability to contribute to the platform with valuable contributions. The platform presents the following physical structure:

- Home Page
- SEA Guides
- Legislation
- International / national legislation
- Assessment tools
- SEA Best Practices
- Digital Archive
- Useful Links
- Forum
- E-Learning

The platform is an innovative and dynamic tool, the result of years of work among the partners, that incorporates the procedures and processes related to the topic of the Strategic Environmental Assessment, encourages cross-border cooperation and also the operators training. It will also serve to allow the construction of a database of information and experiences in which professionals and public administration can meet.

4.6.3 The strategic role of forum

The activated “Forum tools” consist of two instruments:

- the asynchronous forum, hosted in the SKP as “FORUM” section, organized into categories that aggregate threads on the same thematic;
- the synchronous forum, a videoconference module hosted in the SKP as “VIDEOCONFERENCE” section, to support the debate on specific issues implemented within the Forum.

Marche Region was the coordinator for forum activities and it organized 5 thematic forums that have involving SPEEDY partners. The Forum topics were the following:

- Quality assessment of SKP;
- Dynamic Updating of the Comparative Analysis;
- Assessment tools;
- Improvement of public participation in SEA contest;
- Improvement of public participation in SEA through interactive e-learning.

Each forum started with a document «ANNOUNCEMENT OF FORUM LAUNCH" (sent to partners and available on SKP). Going to the www.speedyproject.eu/it/forum-tematico page, one can see threads and new threads. Different tests were performed on the "Shared Knowledge Platform", including the use of the tool for the consultation phase of SEA procedures applied to cross-border EU Programmes. The test saw analyse on the "SEA consultation phase on ADRION Programme 2014-2020".

This test was developed on three levels:

- SKP forum section for debate;
- Resource section, to collect relevant documents to be discussed (that could be directly linked to the forum threads);
- Online questionnaire linked to SKP.

The test resulted in the following results:

- Only 50% was aware of SEA public consultation on ADRION Programme;
- Only 53% considers cross-border consultation steps clear.

Concerning problems to participate to public consultation, nearly 50% encountered difficulties regarding:

- participation to the public consultation on time, due to technical and organizational reasons;

- lack of information on ADRION programme and related SEA cross-border participation process;
- lack of knowledge on cross-border exchange of information and communications;
- ADRION Programme appeared to be at its final stage, with no great options for modification.

The survey also gave way to suggest three aspects to consider in order to improve the public consultation:

- creation of institutional conditions for constructive public participation (such as clear procedures for stakeholders' involvement, improve the communication with authorities at all level, increasing transparency);
- creation of a unique network of information dedicated to Transnational Programmes;
- improve the conditions to enable the third-parties consulted to properly provide their contributions, focusing on general public.

4.6.4 The "Shared Platform for SEA" (SKP) designed to provide network activity E-learning, an online training model for SEA

One of the most important output and usable tool through the SKP web platform is the e-learning module, created with the aim of:

- enhance technical level of Environmental Reports;
- improve knowledge on several techniques of participation, and the most appropriate for each stage of the SEA;
- contribution of the scientific debate on SEA and of the SEA participation to e-learning.

It was also proposed to use e-learning as a technique of "informed" participation, in which it is made available to all the stakeholders a Wiki (WikiSEA) dedicated to information and training on specific topics. This tool should go together with a system of blogs and forums, appropriate to gather different views on specific issues as well as tools to supply

online surveys, so to check the level of consensus with regard to specific actions and decisions.

Based on the previous step, they were created 10 training modules that illustrate the SEA procedure in all its phases and throughout its process. This e-learning course explains SEA theory, practice and methodology. There are 10 e-lessons, and follow structured as one sections on best practices in Speedy partners.

4.6.5 The Criticality Analysis

Apart from the development of online tools, the SPEEDY project has also contributed to the knowledge of different environmental legislation and implementation of the SEA Directive in the partner countries of the project and the exchange of good practices, both downloadable from the website www.speedyproject.eu.

To support the final stages of preparation of the Guidelines, in order to send suggestions to the EC on amendments to Directive 42/2001 / EC, the University of Teramo conducted a study that focused on three topics:

- analysis of the national case-law from the Italian Administrative Courts over the years 2014-2016;
- analysis of the most relevant case-law of the European Court of Justice;
- targeting the weak points of the SEA Directive, in the light of the concrete application of its legal provisions made by Administrative Judges.

Beyond every debates on the opportunity to modify the SEA Directive, the fundamental freedom of the MS to apply the European legal provisions needs to be pointed out according to the principle of procedural autonomy left to each of them, this means:

- a remarkable number of differences among the MS in terms of administrative procedures (see BauGB in Germany Vs. Environmental Code in Italy);
- a power left to the national judiciary system, and to the ECJ as well, to fullfill the natural broadness of the European legal provisions.

The analysis has led to identifying several weaknesses of the SEA Directive, for example, there are some crucial omissions in the Directive, mostly depending on the way the provisions are expressed in their linguistic form. Main points are:

- Annex II (criteria for determining the significance of effects Likely) refers to the secondary, cumulative, cross-border nature of the effects and so on, but no mention to the indirect effects on the environment (unlike Art. 3 of the EIA Directive) [on the contrary, indirect effects are widely Recognized in EIA: see TAR Lombardia Milano Sec. IV, 07.01.2013, n. 30].
- It is not yet clear what Art. 3 par. 4 means: according to Article each such MS shall determinates what PPs, setting the framework for future development consent of projects, are likely to have significant environmental effects "(catch-all category, but?).

The study drawn to some conclusions on the opportunity to modify SEA Directive by analysing in details the case law in the most relevant actions of annulment of plans and programs. However, such operation is not always as simple as it may seem.

In the meeting of July 15, they were presented two emblematic cases of breach required by the SEA Directive for which the European Court of Justice has expressed:

- breach of the obligation laid down by SEA directive to carry out a prior environmental assessment. The case of a plan «for development within an urban area», which is subject, according to Art. 13-bis Par. 1 BauGB (Germany), to an accelerated procedure not requiring SEA. The incorrect assessment of the qualitative condition does not affect the legal validity of the plan in question (art. 214 par. 2-bis). On the contrary, ECJ stated that the plan cannot be considered valid (Case C-463/11, Judgment of 18 April 2013);
- concept of plans and programmes (Case C-567/10, Judgment of 22 march 2012. The municipal council of Brussels Town according to Art. 58 of Planning Code, may decide to repeal a specific land use plan in relation to all or part of the plan's area,

performing a special administrative procedure. In this case, the legislation does not oblige the State to carry out a SEA. ECJ first noted that SEA Directive refers expressly not to repealing measures but only to measures modifying plans and programmes. However, given the objective of Directive 2001/42, which consists in providing for a high level of protection of the environment, the provisions which delimit the directive's scope, in particular those setting out the definitions of the measures envisaged by the directive, must be interpreted broadly. In this regard, it is possible that the partial or total repeal of a plan or programme is likely to have significant effects on the environment, since it may involve a modification of the planning envisaged in the territories concerned.

4.6.6 The proposed amendment to the SEA Directive 42/2001/EC

All the work, critical analysis, research and comparison, in the 4-year project has allowed the creation of the "Guidelines for the revision of Directive 42/2001 / EC". The document is divided into chapters:

- INTRODUCTION - Describe briefly the Speedy project and the methodology used for guidelines;
- CRITICAL EMERGING ISSUES BY THE PROJECT - Describes briefly the issues Emerged from the different WP, on the application of the SEA Directive, in Particular by WP3 and WP6;
- EFFECTIVENESS OF THE DIRECTIVE 42/2001 / EC - Describes the analysis of the infringement procedures and Administrative Justice on the SEA Directive, highlighting the reasons that in the document is regarded as critical;
- EMERGING FINDINGS - Contains a summary of the different critical issues and their consequence for the general proposals for amendments to the SEA Directive;
- CONCLUSION - Presents the main results of the project on the amendment of the SEA Directive, in particular in relation to other evaluation tools and components, and the procedures for its amendment;

- A reasoned REVIEW OF THE SEA DIRECTIVE - Lists the specific proposals for Amendments to the SEA Directive. This significant scientific work, which can be consulted on www.speedyproject.eu website, has led to define a series of proposed.

This significant scientific work, which can be consulted on www.speedyproject.eu website, has led to define a series of proposed amendments to Directive 42/2001/EC the essential elements are summarized below:

a) Indicate the three components of sustainability, economic, social and environmental;
b) Mention the European protocols for environmental protection, in an explicit way (environmental accounting);
c) Clarify the definition of «authorities to be consulted»;
d) Define what we mean by Plan and Programme (also define which means "adoption");
e) Define the concept of «framework for future development consent of projects listed in Annexes I and II to Directive 85/337/EEC» (art. 3 c. 2 lett. a) establishing areas where the plans and programmes should be subject to SEA and projects to EIA;
f) Art. 3 c. 3 “Small areas at local level” or “minor modifications”: submit all plans and programmes to Screening, but give to the Member States the discretion to determine which of them are to be submitted to the SEA, or make the Screening checks prescribing qualitative criteria or thresholds based on the relevant significance criteria, or provide simplified procedure for plans covering small local transformations, calibrating the complexity of the assessments on the information available, both with regard to the analysis of context and with regard to available data;
g) Provide more explicitly that the Assessment of the implications on Nature 2000 sites is done in Screening methods before the SEA;
h) Clarify the concept of "submission to the legislative procedures" (Art. 4 c. 1) due to the start of the SEA procedure;
i) Insert clearly a generalized analysis of the environmental costs / benefits in the Environmental Report (it is written in the principles and not in articles);

j) Detailing the modalities of participation, in order to strengthen it and make it effective, even in relation to public consultation, communication and quality of the Evaluation, or set up an ad hoc Regulation on the theme;

k) Setting up general guidelines, manuals, guidance documents on some components of the Directive, in particular the Environmental Report and the assessment techniques, renovation of existing ones;

l) Define the term "Strategic" in the acronym SEA. It refers to a "strategic level" or "strategic choices" of planning / programming. Therefore, Operational / Detailed plans could be excluded from the SEA process if consistent with the overall strategies. Different matter for those programmes almost always have strategic content;

m) Make the SEA binding like the EIA. In this way Monitoring and Design Alternatives become “mandatory" (though already covered the Articles of the Directive). Also becomes mandatory, starting SEA simultaneously with the Plan / Programme Process;

n) Implement methods and collation tools, management, integration of institutional knowledge, planning knowledge and identity knowledge, to avoid duplication, ensure the estimation and usefulness of indicators, the quality of information, and aspects of communication with the indicators.

5 BALLAST WATER MANAGEMENT SYSTEM FOR ADRIATIC SEA PROTECTION (BALMAS)

5.1 Background and the problems addressed

As it is defined at the GloBallast Project (http://globallast.imo.org/) which is an example of direct, large-scale action taken by IMO together with other international entities:

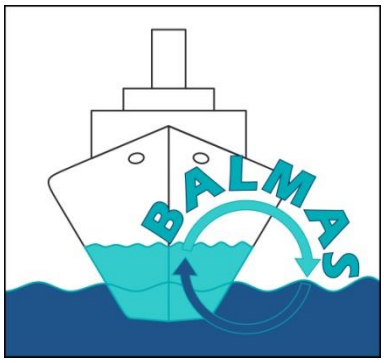
Shipping is essential to the global economy, providing the most cost-effective means of transporting bulk goods over great distances. Over 90 % of all global trade – including everything from food and fuel to construction materials, chemicals and household items – is carried by ships, with some 50,000 merchant ships sailing the world's oceans, with a combined tonnage of around 600 million gross tonnes. Ships are specifically designed and built to move safely through the water while carrying this cargo. But, when the ship is travelling either without cargo, or only partially laden, it must take additional weight on board to enable it to operate effectively and safely by, for example, keeping the ship deep enough in the water to ensure efficient propeller and rudder operation. This additional material is called ballast.

The ***IMO Ballast Water Management*** (BWM) Convention defines ballast water as water with its suspended matter taken on board a ship to control trim, list, draught, stability or stresses of the ship. The United Nations had recognized the transfer of harmful organisms and pathogens across natural barriers as one of the four greatest pressures on the world's oceans and seas, causing global environmental changes and posing a threat to human health, property and resources. Ballast water transfer by vessels was recognized as a prominent vector for such species, and was regulated by the BWM Convention. The BWM Convention sets the global standards for (BWM) requirements, while recognizing that regional and local specifics have to be considered for its effective implementation.

The Adriatic Sea is a unique and highly sensitive ecosystem. The economic development and social existence of coastal states depend strongly on a clean and preserved Adriatic Sea. However, the Adriatic Sea is also a seaway used by international shipping transporting goods to or from Europe as a hinterland, as well as by intense local shipping. An increasingly serious concern is the introduction of ***harmful aquatic organisms and pathogens*** (HAOPs) by ships' ballast water. The volume of BW discharged in the Adriatic Sea ports is above 10 million tons per year and due to foreseen projects this could soon increase considerably. In Europe the monetary impact of non-indigenous species (NIS) was estimated to exceed 12 Billion EUR annually and more than 190 NIS are recorded in the whole Adriatic region (Zenetos *et al*., 2010).

Adriatic countries recognised that the BW issue is very critical and complex, and that a key barrier is the ***lack of data*** (e.g. the presence and invasiveness of HAOP in Adriatic ports, BW uptake and discharge activities, sediment disposal, chemical pollution with BW) ***and knowledge*** (e.g. port baselines and monitoring, BW sampling for compliance control, risk assessment, how to deal with non-compliant vessels, early warning system, effectiveness of BWM systems and measures) ***to enable Adriatic countries to implement the BWM Convention requirements*** through a common BWM plan, and provide support to responsible authorities for faster and effective decision making with a decision support system (DSS). By developing a joint Adriatic BWM DSS, the Integrated BWM Plan for the Adriatic and BWM Strategy for the Adriatic, we would ensure uniform BWM requirements to ease shipping and at the same time to maximize the environmental and economic protection of all sea users.

5.2 BALMAS overall objective



The general BALMAS objective is to establish a common cross-border system that will link all researchers, experts and responsible national authorities from Adriatic countries in order to avoid unwanted risks to the environment from the transfer of HAOPs.

This can be achieved through the control and management of ships' ballast waters and sediments. Further, long-term effective BWM in the Adriatic will be set at the cross-border level utilizing this project's related knowledge and technology.

BALMAS specific objectives include:

- to provide BW and BWM state-of-the-art information and related developments in research and regulatory areas at Adriatic and the wider European levels;
- to identify Adriatic BW operations and vessel patterns, BWM options and innovative treatment solutions, and conduct port baseline surveys and monitoring to obtain information about the presence and negative effects of HAOP. This is important in order to understand the source of pressure to enable appropriate BWM decisions;
- to consider possible multiple uses of data obtained for BWM purposes, e.g. port baseline surveys and monitoring provide useful data for the MSFD, Descriptor 2, NIS, and other, which are now not available at all although ports are hotspots of NIS transfer;
- to prepare an integrated electronic BWM DSS, which will allow vessel reporting on intended BW operations; including
    - ***early warning system*** (EWS) to alert vessels and environmental protection authorities when HAOP are identified in ports;

- **DSS** for vessel compliance monitoring;
- ***risk assessment*** (RA) DSS to enable BWM solutions according to the risk identified;

- to develop an integrated BWM Plan for the effective implementation of the BALMAS DSS in all Adriatic ports and enable a safer and more effective BWM measures according to international regulations, European-wide developments and local specificities, resulting in continued minimization and ultimate elimination of HAOP transfer in the Adriatic;

- to develop a BWM Strategy, considering financial, institutional and political sustainability in the region for a long-term effective BWM in the Adriatic;

- to prepare different guidelines for the implementation of common methods and approaches in different actions related to BWM, and provide for cross-border training and capacity building;

- to provide for pilot actions to enable transfer of knowledge to all Adriatic areas.

Short term changes to be achieved by BALMAS include a better protection from unwanted impacts of HAOP. By developing a joint Adriatic BWM DSS, plan and strategy, BALMAS will ensure uniform BWM requirements to ease shipping and at the same time to maximise environmental and economic protection of all sea users.

5.3 Nine WPs of the BALMAS project

Overall there were nine work packages in the BALMAS project. They will be presented according to the general project goal and tasks within the individual WP.

WP1: Crossborder management and coordination. AIM: careful planning, allocation and administration of the resources, assessment of the risks and anticipation of the difficulties that may arise, constant monitoring of progress and respect of deadlines, quality control, reporting, and communication:

- 1.1: Coordination of all scientific and technical activities;
- 1.2: Administrative and financial coordination;
- 1.3: Internal communication: scientific meetings and targeted workshops, webpage;
- 1.4: Methods for monitoring progress and reporting.

WP2: Communication and dissemination. AIM: effective external communication to key stakeholders and public for understanding the pressures to environment from ballase water discharges and to support the selection of the most appropriate ballast water management methods to be used for the Adriatic:

- 2.1: Creating the BALMAS logo, establishment of efficient communication channels towards the users;
- 2.2: Preparing the BALMAS website for project dissemination;
- 2.3: Other dissemination actions: press, radio, TV, creating a documentary, public lectures, workshops;
- 2.4: Scientific and professional dissemination: regional and international conferences, scientific journals, project reports.

WP3: Capitalization and sustainability. AIM: to provide a detailed overview of the state-of-the art in the field of ballast waters and ballast "waters management to enable capitalization, avoid duplication of efforts and reinventing the wheel":

- 3.1: Literature search for past and ongoing projects related to ballast water management in Adriatic, Europe and worldwide;

- 3.2: Study the possibilities of self-financing mechanisms, independent from governmental or regional resources;

- 3.3: Organize national capacity building seminars based upon the IMO and GloBallast ballast water management training seminar package.

WP4: Ballast water discharge in shipping. AIM: to provide a detailed overview of the state-of-the art in the field of ballast waters and ballast water management from the shipping perspective, with the focus on the Adriatic area:

- 4.1: Analysis of shipping patterns in the Adriatic Sea. We will prepare an internet GIS application for analyses and presentation of shipping and related data;

- 4.2: Identification and improvement of ballast water discharge assessment. Support the identification of false reporting;

- 4.3: Ballast water management systems methods analysis for vessels: technical aspects, application requirements, safety aspects, costs;

- 4.4: Ballast water and sediment management. Review of options for ports, collection and analysis of best sediment management practices.

WP5: Harmful aquatic organisms and pathogens (HAOP). AIM: to provide information about the presence and possible negative effects of harmful aquatic organisms and pathogens in ports and surrounding areas as hotspots of ballast water discharges:

- 5.1: Review of protocols for port baseline survey for harmful aquatic organisms and pathogens: abiotic water parameters, chemical analysis of relevant contaminants, taxonomy;

- 5.2: Port monitoring protocol / strategy on biological parameters;
- 5.3: Comprehensive summary of impacts of harmful aquatic organisms and pathogens in Adriatic;
- 5.4: Creation of BALMAS database: results of monitoring, sampling activities, linkage to other European databases addressing harmful aquatic organisms and pathogens.

WP6: Early warning system for ballast water control. AIM: to increase the control of ballast water by developing an early warning system for vessels as well as for warning local relevant maritime authorities and environmental protection agencies to enable an implementation of remediation measures:

- 6.1: Review of previous early warning systems;
- 6.2: Review of EU member states reports of non-indigenous species with respect to initial assessment;
- 6.3: Potential impact of species;
- 6.4: Rapid responses and remediation measures; review of European activities;
- 6.5: Development and testing of the early warning system.

WP7: Integrated BALMAS decision support system. AIM: to provide an integrated cross-border BALMAS decision support system to help Adriatic states authorities to enable safe and effective ballast water management measures:

- 7.1: Revision of risk assessment approaches and establishing the BALMAS risk assessment;
- 7.2: Review of ballast water sampling and analysis methods;
- 7.3: Review of existing port state control measures, tools, procedures and systems;

- 7.4: Establishing the BALMAS ballast water management decision support system;
- 7.5: Integrated ballast water management plan for Adriatic considering national legislations and regional plan.

WP8: Establishing a cross-border information system. AIM: to provide a cross-border electronic Adriatic ballast water management decision support system to enable fast reporting from vessels, exchange of information between different responsible authorities, stakeholders and vessels:

- 8.1: Developing and testing the ballast water reporting system;
- 8.2: Developing and testing an early warning system for warning Authorities;
- 8.3: Ballast water management decision support system interfacing with early warning and reporting systems;
- 8.4: Adriatic ballast water management web-based application.

WP9: Ballast water management strategy for the Adriatic region. AIM: ballast water management strategy for the Adriatic region with the key elements that help addressing the long-term implementation of the ballast water management system (including the BALMAS decision support system):

- 9.1: Legal sustainability, analysis of national and local regulations;
- 9.2: Institutional sustainability of the ballast water management system in the Adriatic;
- 9.3: Strategy for the long-term cross-border ballast water management in the Adriatic;
- 9.4: Ballast water sampling and analysis methods training;

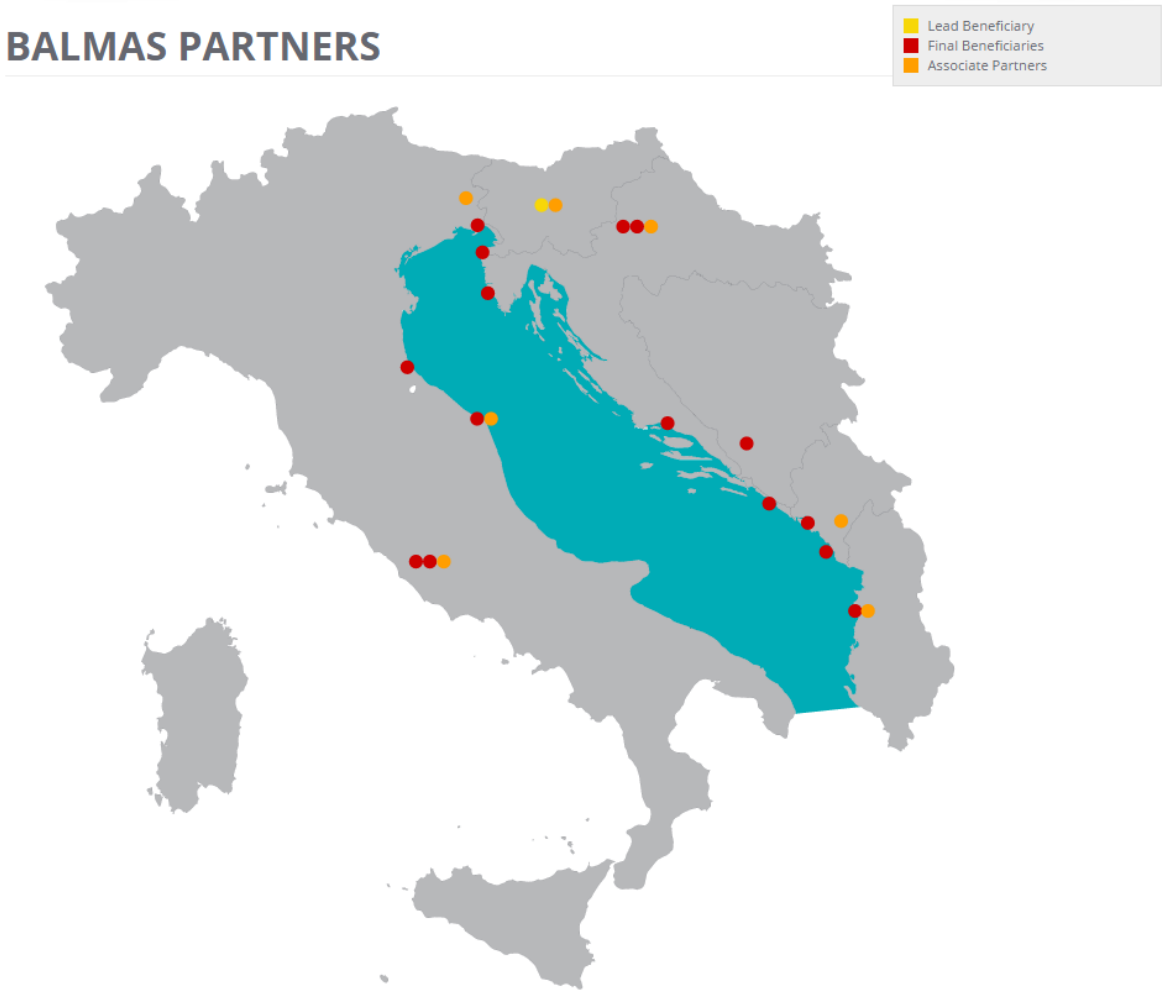
- 9.5: Risk assessment decision support system simulations;
- 9.6: Testing the early warning systems;
- 9.7: Testing the BALMAS decision support system.

5.4 The project basic facts

The project proposal was prepared within the second call for ordinary project proposals. BALMAS addressed the strategic theme Protection from ballast water pollution in the Adriatic area, Priority/Measures 2. “Natural and Cultural Resources and Risk Prevention” and 2.1 “Protection and enhancement of the marine and coastal environment”.

The partnership of the BALMAS project comprised 16 beneficiaries and 6 associated institutions that correspond to five Adriatic countries: Albania, Bosnia and Herzegovina, Croatia, Italy, Montenegro and Slovenia.

BALMAS PARTNERS



LEAD PARTNER

Institute for water of the Republic of Slovenia - SI

PARTNERSHIP

1. National Institute of Biology (unit - Marine Biology Station) - SI
2. Italian Ministry of Infrastructure and Transport - Coast Guard Headquarters - IT
3. Italian National Institute for Environmental Protection and Research – IT
4. Marine Research Centre Foundation – IT
5. National Research Council (CNR) - Institute of Marine Sciences (ISMAR) – IT

6. OGS National Institute of Oceanograohy and Experimental Geophysic – IT
7. Ministry of the Maritime affairs, Transport and Infrastructure – HR
8. University of Dubrovnik – HR
9. Institute of Oceanography and Fisheries – HR
10. Rudjer Boškovic Institute – Center for Marine Research – HR
11. MARE NOSTRUM- Association of Croatian employers - shipowners in International trade – HR
12. Faculty of Civil Engineering University of Mostar – BA
13. Maritime Safety Department – ME
14. University of Montenegro – ME
15. Agriculture University of Tirana – AL
16. Italian Ministry of Environment, Land and Sea – IT (associate)
17. ARPA FVG Regional Environmental Protection Agency of Friuli Venezia Giulia – IT (associate)
18. Croatian Environment Agency – HR (associate)
19. Ministry of Sustainable Development and Tourism – ME (associate)
20. Interinstitutional Maritime Operational Centre – AL (associate)
21. Ministry of agriculture and the environment – SI (associate).

5.5 Final event and communication of results

The Final Conference of the BALMAS Project was held at the National Institute of Biology – Marine Biology Station, Piran, Slovenia from September 21st to September 22th, 2016. Aims of the Final BALMAS Conference:

- Presentation and discussion of the main achievements of the BALMAS Project: Results of the Port Baseline Surveys, Port Monitoring and Ballast Water Sampling in 12

Adriatic ports, the BALMAS GIS Application, the Integrated Electronic Ballast Water Management Decision Support System for the Adriatic, the Integrated Operational Plan for Ballast Water Management in the Adriatic and the Ballast Water Management Strategy for the Adriatic.

- Discussion on the next steps for Adriatic countries regarding implementation of the IMO Ballast Water Management Convention in the Adriatic Sea based on the regional approach to ballast water management as used in the BALMAS Project.

A day before the final conference (September 20th, 2016) the BALMAS Ballast Water Management Capacity Building Seminar was held in the same location (download the programme here). Aims of the BALMAS Capacity Building Seminar:

- To bring the main findings on the BALMAS Project closer to relevant policy and decision makers and other stakeholders, including the expert community in each participating country.

- To build capacity of the stakeholders in the Adriatic region in the implementation of the Ballast Water Management System developed on the BALMAS Project according to IMO Ballast Water Management Convention.

5.6 Tangible outputs of the BALMAS project

5.6.1 Five BALMAS goals - recommendations

The implementation of the BALMAS project's deliverables cannot be seen in isolation from the wider context in which they are going to be used. National authorities, as well as regional and sub-regional cooperation, can benefit from the project results, which aim at facilitating the effective and smooth implementation of the BWM Convention's obligations within the Adriatic basin. In reaching their decisions and assessing the practical tools provided by the project, the responsible national authorities are cordially invited to consider the following recommendations:

5.6.1.1 GOAL 1 – TOWARDS A SUSTAINABLE BWM SYSTEM IN THE ADRIATIC AREA: SET THE PRE-CONDITIONS FOR AN EFFECTIVE IMPLEMENTATION OF THE BWM CONVENTION, 2004

***Suitable national legal frameworks*.** Developing a suitable national legal framework is one of the basic preconditions for the effective implementation of the BWM Convention. Another equally important precondition is to establish a proper functional administrative structure that would enable the co-operation of different institutions on the national and regional level. Due to the technical complexity of the global measures on BWM, ratification or other adhering instruments alone are not sufficient to properly implement global standards and to protect the Adriatic marine environment from the threats posed by HAOPs transfer. Suitable legal frameworks are needed, complemented by relevant administrative procedures. The more consistent the procedures and systems implemented across the region, the better the results will be in terms of protection of the environment and of related economies.

On the basis of these considerations, the following recommendations may apply:

- In developing national legal frameworks giving effect to the BWM Convention, the competent authorities are invited to take into account the results of the BALMAS Project, particularly when addressing intra-Adriatic traffic.

- In developing and implementing legal and administrative measures, the competent authorities could benefit from the consideration of legal developments, action programs, monitoring measures and information networks on HAOPs at the relevant levels (i.e. global, national, regional and sub-regional), as applicable. Connections with current initiatives in the environmental and biodiversity sectors should facilitate coherence and the integration of different policies, avoiding duplications and maximising synergies (i.e. CBD Guidelines, UNEP/MAP EcAp and Integrated Mediterranean Monitoring and Assessment Program, etc.).

- Legal frameworks should include coherent and consistent sanctions, penalties and/or fines severe enough to discourage infringements, in order to disincentive the presence of sub-standard ships and to avoid unfair competition within the Adriatic basin.

- The legal and administrative measures adopted should include those necessary to put into operation, at the national level and, where appropriate, through regional and sub-regional cooperation, the tools and methodologies developed by the BALMAS project.

Institutional arrangements and communication. In general, maritime authorities are primarily responsible for the implementation of global standards preventing pollution from vessels, as well as for undertaking related control and enforcement actions. Their environmental knowhow is not specialized to the required

extent. So additional capacities in a variety of subject areas are required (*i.e.* transport research and development, oceanography, marine biology and ecology, taxonomy, port reception facilities, compliance monitoring and enforcement, etc.). Even if global standards do not differentiate within the HAOPs category, related information is still important to implement a number of the BWM Convention's provisions, as well as to carry out assessments targeting the Adriatic threats.

Moreover, the presence of IAS and/or HAOPs may be relevant for different categories of stakeholders representing interests mentioned by the BWM Convention, such as fishery or tourism organizations. Public awareness and the wider participation of interested stakeholders would enhance the effective implementation of the agreed measures.

Taking into account the challenging technical complexity of the matter, in order to pursue the effective implementation of the BWM Convention obligations and of the BALMAS project tools, national competent authorities are invited to consider:

- sharing within existing maritime regional and sub-regional arrangements and organizations, as appropriate, relevant environmental knowledge gathered on the presence of IAS in Adriatic Sea ports and areas;

- developing and establishing adequate arrangements with authorities and/or public bodies entitled to the protection of the marine environment as appropriate;

- to appoint national technical focal points responsible for the exchange of information among Adriatic States and the coordination of actions dealing with marine environment monitoring and protection from HAOPs, also using international, regional or sub-regional organizations, where appropriate;

- to support every effort to increase their institutional capacities through knowledge sharing, knowledge build-up (for example, through learning by example approach), regional networking, staff exchange, common actions, etc.

- to develop consistent support for all projects aiming to increase public awareness of HAOPs introduced through ballast water, also with joint programs or allowing citizens from other Adriatic countries to participate, as appropriate.

The availability of resources. The implementation of the BWM Convention's measures would require a significant investment both for public organizations and for the shipping sector. Resources in terms of personnel and/or staff costs, material, software maintenance for recurrent activities such as port state control, port monitoring, training on ship's equipment, performance and crew training.

Current environmental policies and instruments could provide options to integrate, through proper adjustments, the already funded activities with different objectives (i.e. HAOP monitoring). Consideration should be given to the application of the "polluter pays" principle.

The responsible national authorities are invited to consider ensuring adequate material and human resources, assigning responsibilities to government offices/officers and providing for the case of exceptional circumstances caused by or in connection with HAOPs, either within their jurisdictions or anywhere in the Adriatic Sea region.

5.6.1.2 GOAL 2 – A HARMONIZED ADRIATIC IMPLEMENTATION OF MEASURES AND PROCEDURES THROUGH THE USE OF BALMAS BWM TOOLS

Harmonized monitoring procedures and warnings. Data and

information on the presence of HAOPs in Adriatic ports are an essential prerequisite for implementing a number of obligations of the BWM Convention. The BALMAS project carried out baseline surveys in selected Adriatic ports, gathering a first set of information and developing a joint port monitoring protocol useful for the detection of HAOPs and IAS. The implementation of these activities by coastal States will help to provide a common knowledge basis that might inform the development of consistent measures in the basin, even additional to those provided by the BWM Convention. Such a knowledge basis is also crucial for the functioning of the Adriatic BWM Plan, as well as for the associated Decision Support System, also enabling states to put into operation early warning systems, whose procedures have been tested within the project, in order to prevent HAOP uptake while protecting the areas where the ballast water will next be discharged.

Responsible national authorities are therefore invited:

- to jointly discuss, modify and agree on a sub-regional basis on the proposed BALMAS list of IAS to be complemented with other HAOPs and on related port monitoring protocols;
- Tto share this process and related information at the wider regional Mediterranean level, as well with other regional and international organizations and programs, including the EU and other regional seas;
- to establish national and sub-regional programs for the regular monitoring of HAOPs in marine waters where ballast water uptake and discharge is more frequent, gathering the relevant information and sharing data in order to produce comparable information;
- to focus on the specific needs for early warnings, consistent throughout the basin, also by establishing coordinated national early warning systems, procedures and arrangements, in line with the EU regulation on IAS and other relevant instruments;
- to endeavour to include this work within the Integrated Monitoring and Assessment Program of the Mediterranean Sea, currently under development within the UNEP/Mediterranean Action Plan Framework, as well as with the European Commission and

to share related results within the IMO and other relevant global and regional organizations and agreements;

- to base relevant national, bilateral or multilateral risk assessments on consistent information gathered.

***Harmonized ballast water reporting*.** In the BWM Convention, there is no obligation regarding mandatory reporting on ballast water quantities and sources before the ship enters into a port, thus such reporting has been recognized at the Mediterranean level as an essential source of information to control and manage ballast water transfers.

Adriatic authorities involved in the BALMAS project, introduced the voluntary ballast water reporting of ships calling at selected Adriatic ports within their standard procedures, based on a form developed by the project. The Adriatic BWM Plan and the Decision Support System are based on the information gathered from such voluntary reporting.

The responsible national authorities are invited:

- to consider the implementation of a harmonized BWM mandatory reporting, requiring ships calling at national ports to use the BW Report Form in accordance with notification requirements already in place;

- to jointly submit to the IMO a proposal for amending the existing Adriatic Sea Mandatory Ship Reporting System (ADRIREP), including specific obligations on ballast water reporting.

Harmonized compliance monitoring and enforcement procedures. Existing Port State Control regional agreements and EU

legislation in force do not target specifically those ships more at risk of transferring HAOPs. The BALMAS project developed a number of tools to better assess Adriatic risks, including in terms of facilitating controls on ships. Sampling methodologies and technical solutions to control the ships' compliance were tested. Such tools work together in a Decision Support System, a well-known and proven method used to facilitate simple and straightforward decision-making in complex, time critical and/or hazard processes. The consistent use of the DSS by maritime port authorities helps harmonize the decision-making processes carried out by officials of different Adriatic countries, ensuring consistent responses and supporting uniform controls under similar circumstances. Furthermore, the establishment of sanctions adequate enough to discourage any breach of the BWM Convention's obligations in the area, once these will be in force, would support enforcement actions improving the quality of shipping activities in Adriatic ports (see Goal 1 above).

In that respect, the responsible national authorities are invited:

- to consider the national implementation of the Decision Support System in accordance with the procedures, standards and protocols described in the Adriatic BWM Plan;

- to jointly discuss, develop and propose amendments to PSC procedures, within relevant competent fora, as appropriate, stressing the role of unexpected factors in the management of ballast water risks during PSC activities (i.e. the Paris MoU Agreement on PSC, the EU Directive No. 2009/16/EC).

***Improving reception options for Adriatic ports*.** Consistent implementation of the Adriatic BWM Plan may require further BW management port options for ballast water when on-board systems do not satisfy the required standards. These additional measures must ensure the full implementation of the agreed international standards and at the same

time provide economic viability for those who offer such services.[1] Consequently, if port equipment is used to treat ballast water from ships with no operational equipment (for whatever reasons) or with no equipment at all, it is assumed that ships bear the primary responsibility to cover the costs of such services.

In that respect the responsible national authorities are invited:

- to consider implementing or approving alternative/additional methods for treating ballast water in ports, taking into account all the advantages and disadvantages of these methods as outlined in the project.

Permanent Adriatic consultation on additional measures eventually needed for the management of ballast water risks to the Adriatic Sea. The BWM Convention offers the possibility for States to develop additional measures on ballast water management in certain areas or at the national level, consistent with international law. A number of the recommendations included in this Adriatic BWM Strategy, once adopted by formal decisions, may be considered as additional measures for Adriatic Sea protection. The joint discussion of further additional measures to be taken at the national level would improve the protection of the basin as a whole, avoiding in advance transboundary impacts and preventing regional discussions.

In that respect, the responsible national authorities are invited to establish a regular consultation process, with decision making and/or technical levels, to share views on additional measures needed to protect the Adriatic Sea environment as a whole against ballast water risks.

5.6.1.3 GOAL 3 - THE IMPLEMENTATION OF BWM ON SHIPS FLYING THE FLAGS OF PARTNER COUNTRIES

[1] The BWM Convention, 2004, assumes that the costs of ballast water treatment are carried by shipping companies. The assumption is based on the fact that ballast water is part of the ship's processes.

***Knowledge exchange*.** Measures to control the transfer of HAOPs in ballast water on ships in international trade are in many instances highly demanding. Although there are a large number of different treatment systems available on the market, a properly designed and maintained knowledge database providing information on different technologies and ballast water treatment systems may provide indispensable support for the shipping industry and other interested stakeholders.

In that respect, the responsible national authorities are invited to consider further support of the website developed as a part of the BALMAS project as a tool offered to ship owners, port operators and other non-governmental users as a data, knowledge and experience exchange platform.

***Measures to support implementation on ships*.** Certain ships, particularly those solely trading among Adriatic ports, may need additional support to fully implement BWM measures. Additional support by their flag states may take several different forms – from purely technical support to financial or organizational support, depending on the prevailing circumstances.

In that respect, the responsible national authorities are invited:

- to consider supporting the implementation of BWM systems on board ships or in ports in a way that equals or exceeds the standards adopted in the Adriatic BWM Plan and other relevant documents;

- to inform all other Adriatic countries about measures adopted to support the implementation of the Adriatic BWM Plan such as tax relaxation, incentive schemes or similar.

5.6.1.4 GOAL 4 - ADDRESSING INTRA-ADRIATIC TRADE THROUGH SPECIFIC SOLUTIONS

As the BALMAS project data has shown, approximately half of the ships transiting the Adriatic Sea call at two or more ports of the area. This consideration suggests the need to address intra-Adriatic trade with specific assessments and tools.

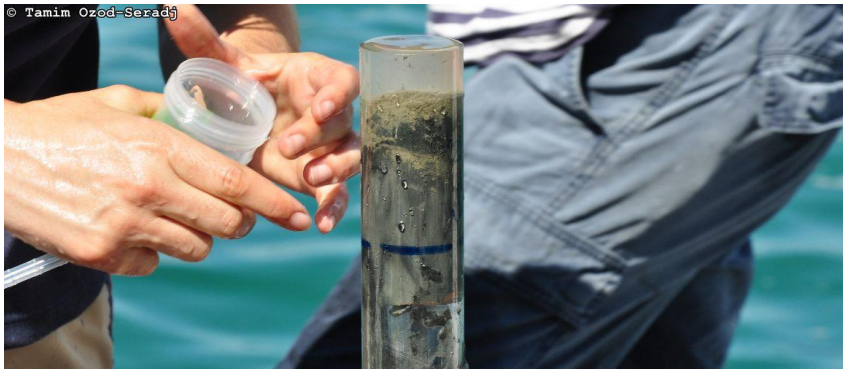
***Risk-assessments*.** Risk assessment is a logical process for assigning the likelihood and consequences of specific events, such as the entry, establishment or spread of harmful aquatic organisms and pathogens. As such, according to the BWM Convention, it is a necessary prerequisite for any exemption granted to ship(s) on a voyage or voyages between specified ports or locations, or operating exclusively between specified ports or locations. The risk assessment for selected Adriatic ports and marine areas has been carried out as a part of the BALMAS project.

In that respect, the responsible national authorities are invited:

- to consider risk assessment methods developed and the results acquired within the BALMAS project as a basis for exemptions of ships from requirements on ballast water management;

- to further co-operate in the process of assessment of exemptions, fully integrating the process with environmental data considerations and, as feasible, simplifying the overall procedures;

- considering the proximity of the Adriatic coastal areas as well as relevant oceanographic features, to regularly share information on any exemption granted at the national level.



Sediment management. Sediment in ballast water tanks is a known vector capable of transferring HAOPs between different ports. Sediment is removed from ballast tanks in most cases while ships are carrying out maintenance work, mostly in shipyards. And there are several shipyards where this kind of work is regularly carried out along the Adriatic coasts.

In that respect, the responsible national authorities are invited to introduce a harmonized legal framework regulating the removal and storage of sediments from ballast water tanks to be followed by shipyards and any other persons who may be responsible for the safe handling of sediments, as is proposed in the Adriatic BWM Plan. To this end, an in-depth review of the EU waste legislation performance in respect of ships' ballast sediment production, collection, treatment and disposal should be carried out and fully supported, taking into consideration port service specificities.

5.6.1.5 GOAL 5 – ENHANCE CAPACITIES IN THE ADRIATIC BASIN

Harmonized training programmes. Effective implementation of the BWM Convention's obligations, as well as of the Adriatic BWM Plan, depends heavily on a thorough understanding of the goals, measures and BWM procedures by all stakeholders with responsibilities for their implementation. Consequently, it is necessary to train sufficient people with direct or supervisory responsibilities for procedures, as required by

the Adriatic BWM Plan. In order to secure the uniform level of implementation, the harmonized training courses should be followed.

In that respect, the responsible national authorities are invited:

- to consider agreeing on common training programs for personnel with direct or supervisory responsibilities for procedures required by the Adriatic BWM Plan;

- to consider supporting designated training centres where personnel from all Adriatic countries can attend appropriate training, thus ensuring adequate expertise and maintaining the operational costs of such training at an acceptable level;[2]

- To specifically consider harmonized training for Port State Control Officers, following the draft outline developed by the BALMAS project and with integrated information specifically targeted at the Adriatic, with the financial support, where appropriate, of relevant regional agreements and organizations.

***The exchange of information and knowledge transfer*.** On-going implementation of the Adriatic BWM Plan requires continual monitoring, data collection, verification and data analyses. These activities are expected to be accomplished by responsible institutions in all partner countries to various extents, as they deem appropriate. In order to build as complete a picture as possible, the data and resulting insights need to be made available to all responsible institutions.

[2] A similar approach has already been applied within the HAZADR project (the project partners are from the same countries as in the BALMAS project). The Adriatic Training and Research Centre (ATRAC) is planned as part of this project. It was established in Rijeka, Croatia, and it provides the training of personnel responsible for the protection of the marine environment from oil & HNS pollution. The Centre can also provide adequate training required by the Adriatic BWM Plan if the responsible national authorities agree accordingly.

In that respect, the responsible national authorities are invited:

- to consider giving full authorization to all responsible institutions to exchange data, knowledge and experience that may be essential for the on-going implementation of the Adriatic BWM Plan;

- to consider authorizing BWM National Focal Points for the exchange of data, knowledge and experience, as may be appropriate;

- to consider further support for the website developed as a part of the BALMAS project in order to use it for the exchange of data, knowledge, training and on-line courses.

5.6.2 Integrated Operational Plan for Ballast Water Management in the Adriatic

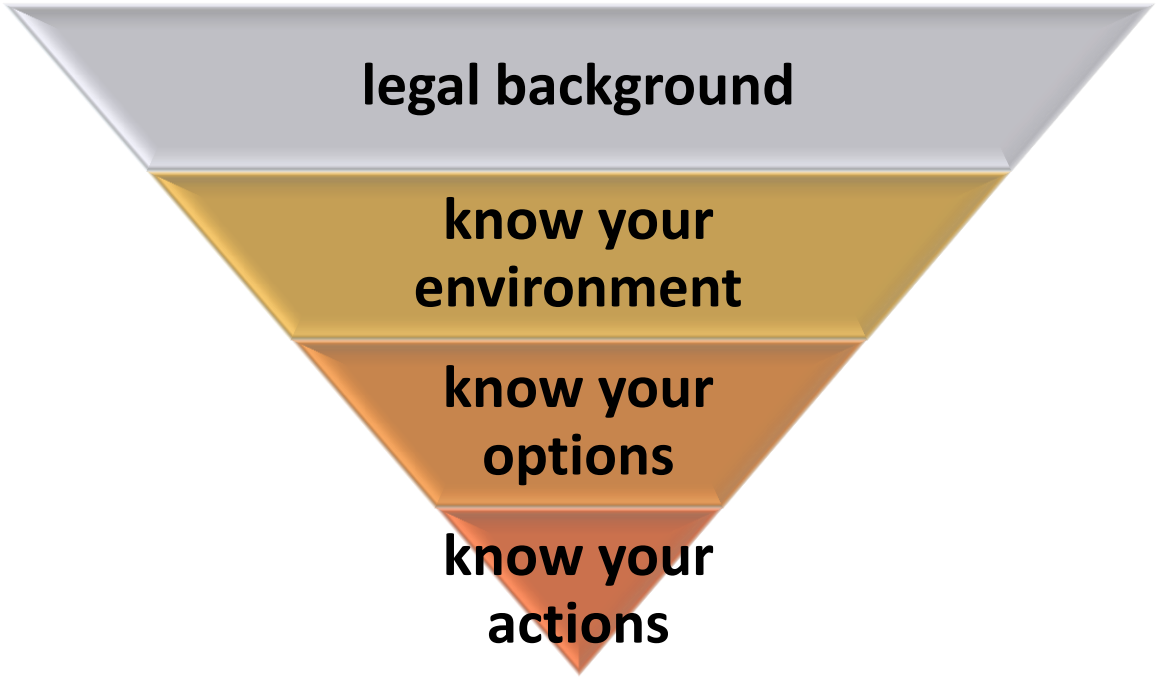


Figure 2: The integrated operational plan for BWM in the Adriatic

Figure 2 represents the workflow needed to establish and integrated operational plan for the BWM in the Adriatic. The following sections will present each of the four pillars (legal background, know your environment, know your options and finally know your actions).

5.6.3 Ballast Water Management Legal and Policy Background

5.6.3.1 IMO Convention

The importance of ballast water as a vector for transferring non-indigenous species from one sea area to another was initially addressed in a 1973 International Maritime Organization (IMO) resolution (IMO, 1973). Subsequently, IMO worked towards the finalization of the *International Convention for the Control and Management of Ships' Ballast Water and Sediments* (BWM Convention), which was adopted in February 2004 at a diplomatic conference in London. This Convention´s aim is to prevent, minimize and ultimately eliminate the risks to the environment, human health, property and resources that arise from the transfer of HAOPs via ships' ballast waters and related sediments (David *et al.,* 2015a).

The BWM Convention consists of 22 Articles and an Annex, including 24 Regulations for the Control and Management of Ships' Ballast Water and Sediments. In addition, two Appendices provide standard formats and requirements regarding the form of International Ballast Water Management Certificates, as well as recording operations for reporting and verification in a Ballast Water Record Book.

The Regulations for the control and management of ships' ballast water and sediments are presented and organized into in five sections:

- Section A: General provisions: Definitions, General applicability, Exceptions, Exemptions, Equivalent Compliance;

- Section B: Management and control Requirements for Ships: Ballast Water Management;
- Section C: Special Requirements in Certain Areas;
- Section D: Standards for Ballast Water Management, and
- Section E: Survey and Certification requirements for Ballast Water Management.

The BWM Convention will enter into force twelve months after the date on which not less than 30 States, with combined merchant fleets representing not less than 35% of the gross tonnage of the world's merchant shipping, have ratified the Convention. As of July 2016, 51 States whose merchant fleets constitute the 34.87% of the world's tonnage are parties to the Convention[3].

In total, 15 guidelines support the uniform implementation of the BWM Convention (see

[3] Source: http://www.imo.org

Table 1) by providing technical guidance to implement the BWM Convention's principles. Guidelines are constantly updated and kept under review and, at the moment of writing this Plan, the G8 Guidelines for the Approval of Ballast Water Management Systems are undergoing a revision process.

Table 1: Guidelines for the BWM Convention (Enhanced after David et al., 2015a).

Title	Adopted
Guidelines for Sediment Reception Facilities (G1)	RESOLUTION MEPC.152(55), Adopted on 13 October 2006
Guidelines for Ballast Water Sampling (G2)	RESOLUTION MEPC.173(58), Adopted on 10 October 2008
Guidelines for Ballast Water Management Equivalent Compliance (G3)	RESOLUTION MEPC.123(53), Adopted on 22 July 2005
Guidelines for Ballast Water Management and Development of Ballast Water Management Plans (G4)	RESOLUTION MEPC.123(53), Adopted on 22 July 2005
Guidelines for Ballast Water Reception Facilities (G5)	RESOLUTION MEPC.153(55), Adopted on 13 October 2006
Guidelines for Ballast Water Exchange (G6)	RESOLUTION MEPC.124(53), Adopted on 22 July 2005
Guidelines on Risk Assessments under Regulation A-4 (G7)	RESOLUTION MEPC.162(56), Adopted on 13 July 2007
Guidelines for the Approval of Ballast Water Management Systems (G8)	RESOLUTION MEPC.174(58), Adopted on 10 October 2008
Procedure for Approval of Ballast Water Management Systems that make use of Active Substances (G9)	RESOLUTION MEPC.169(57), Adopted on 4 April 2008
Guidelines for Approval and Oversight of Prototype Ballast Water Treatment Technology Programmes (G10)	RESOLUTION MEPC.140(54), Adopted on 24 March 2006
Guidelines for Ballast Water Exchange Design and Construction Standard (G11)	RESOLUTION MEPC.149(55), Adopted on 13 October 2006
Guidelines for Sediment Control on Ships (G12)	RESOLUTION MEPC.150(55), Adopted on 13 October 2006
Guidelines for Additional Measures Including Emergency Situations (G13)	RESOLUTION MEPC.161(56), Adopted on 13 July 2007
Guidelines on the Designation of Areas for Ballast Water Exchange (G14)	RESOLUTION MEPC.151(55), Adopted on 13 October 2006
Guidelines for Port State Control (G15)	RESOLUTION MEPC.252(67), Adopted on 17 October 2014

5.6.3.2 Ballast Water Management in the Mediterranean Sea

The BWM arrangements are of a voluntary interim nature and are applicable from 1st January 2012 until the time that the BWM Convention enters into force. This regime will no longer apply when a ship is in position to meet the ballast water performance standard contained in regulation D-2 of the Convention, or when the Convention comes into force and a ship has to apply the D-2 standard in accordance with the application dates set out in regulation B-3 of the Convention.

In short, the requirements for ships entering the waters of the Mediterranean Sea area from the Atlantic Ocean (Straits of Gibraltar), or from the Indian Ocean through the Red Sea (Suez Canal) or leaving the waters of the Mediterranean Sea area to the Atlantic Ocean (Strait of Gibraltar) or to the Indian Ocean through the Red Sea (Suez Canal), include:

- undertake BWE before entering the Mediterranean Sea area or after leaving the Mediterranean Sea area, as applicable, according to the standard set out in the D-1 standard of the BWM Convention, and at least 200 NM from the nearest land and in waters at least 200 m in depth;
- (b) in situations where this is not possible, either due to deviating from the ship's intended voyage or delaying the ship, or for safety reasons, BWE should be undertaken before entering the Mediterranean Sea area, or after leaving the Mediterranean Sea area, as applicable, according to the standard set out in the D-1 standard of the BWM Convention, as far from the nearest land as possible, and in all cases in waters at least 50 NM from the nearest land and in waters of at least 200 m depth.

From the 1st of October 2012, vessels leaving the Mediterranean Sea and sailing to destinations in the North-East Atlantic or the Baltic Sea, and vessels sailing from these areas to the Mediterranean Sea, should conduct BWE in the North-East Atlantic area at least 200 NM from the nearest land and in waters at least 200 m in depth. If this is not possible for operational reasons, then BWE should be conducted as far as possible from the nearest land,

and in all cases in waters at least 50 NM from the nearest land and in waters of at least 200 m depth.

Exceptions from BWM requirements under the Regulations A-3 may apply and Exemptions from BWM requirements under the regulation A-4 may be granted. BWE should not in any way jeopardise the vessels' safety. Vessels should have a Ballast Water Management Plan and keep record of all ballast operations.

In the Adriatic Sea sub-region, the initiative on establishing common BWM measures is being carried through the Commission for the Protection of the Adriatic (members: Croatia, Italy, Montenegro and Slovenia, and observers Bosnia and Herzegovina and Albania). There are also other regional frameworks for ballast water policies (e.g., the Adriatic-Ionian Initiative, the Adriatic Partnership).

5.6.3.3 EU Marine Strategy Framework Directive

The Marine Strategy Framework Directive (MSFD; Directive 2008/56/EC) is the main pillar of a common policy for the protection and sustainable use of European seas, including different marine regions and sub-regions. It requires that EU Member States take the necessary steps to achieve or maintain the Good Environmental Status (GES) of their marine waters by the year 2020. More specifically, every six years from 2012, Member States shall carry out an initial assessment of their waters (Art. 8), determine the Good Environmental Status (Art. 9), and set environmental targets (Art. 10), taking into consideration 11 Descriptors.

For each Descriptor, monitoring programmes (Art. 11) should have been established by 2014 and updated at least every six years. Programmes of measures (Art. 13) were scheduled by 2015, should become operational by 2016 and will follow the six years cycle.
Member States have completed the initial assessment for each of the Descriptors, based on available data and information, and selected indicators for the GES and environmental targets. A National Report on Articles 8, 9 and 10 of the MSFD has been sent by MS to the EC by April 2013.

Descriptor 2 on 'Non-indigenous species' (NIS) is of particular relevance for the activities of BALMAS, since it is well-known that ballast waters are one of the main vectors for introduction of NIS. The Commission Decision 2010/477/EU (currently under revision) provides a definition of Descriptor 2 and of its associated criteria and indicators as follows:

Descriptor 2: "Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystem".

- **Criterion 2.1.** The abundance and state characterisation of non-indigenous species, in particular invasive species

— Trends in the abundance, temporal occurrence and spatial distribution in the wild of non-indigenous species, particularly invasive non-indigenous species, notably in risk areas, in relation to the main vectors and pathways of spreading of such species (**Indicator 2.1.1**);

- **Criterion 2.2.** The environmental impact of invasive non-indigenous species

— The ratio between invasive non-indigenous species and native species in some well-studied taxonomic groups (e.g. fish, macroalgae, molluscs) that may provide a measure of change in species composition (e.g. the displacement of native species) (**Indicator 2.2.1**)

— Impacts of non-indigenous invasive species at the level of species, habitats and ecosystems, where feasible (**Indicator 2.2.2**).

For the Adriatic Subregion, the Member States Italy and Slovenia have submitted a Report to the EC as per Art. 8, 9 and 10 of the MSFD.

Data has been reported on the ***abundance and spatial distribution of NIS***. The initial assessment highlighted many gaps to be filled, mainly on impacts and pathways. Knowledge about the effects of non-indigenous species on the environment and an additional series of long-term field data are required to properly assess the impacts of NIS on native species and

habitats. The main pathways/vectors identified in both countries are shipping (specifically ballast waters in Slovenia) and aquaculture.

5.6.4 Know Your Environment

5.6.4.1 Port Baseline Surveys

Convention reference: Port baseline surveys (PBS) and monitoring activities could serve several purposes:

i) monitor the effects of ballast water management in waters under the country's jurisdiction (Article 6 – Scientific and Technical Research and Monitoring);
ii) provide data for risk assessment in order to grant exemptions to ships from BWM requirements (Regulation A-4 Exemptions);
iii) provide data to eventually support additional measures (Regulation C-1);
iv) provide data for warnings concerning ballast water uptake in certain areas (Regulation C-2).

The BWM Convention does not provide any specific obligation to Port States for carrying out port baselines surveys. However, according to article 6, Parties shall endeavour to monitor the effects of ballast water management in waters under their jurisdiction and shall promote the availability of relevant information to other Parties who request it on the effectiveness of BWM deduced from any monitoring and assessment programmes. The PBS should be the first step of such monitoring. Furthermore, in order to grant exemptions to ships under the Convention (Reg. A-4 and G7), an appropriate knowledge of a port's biological baseline conditions is essential (i.e. in order to conduct environmental matching risk assessment comparing donor and recipient ports, in order to assess the biogeographical overlapping of species, etc.).

Activity description: The PBS and the subsequent monitoring activities should form an integral part of ballast water management. The general goal of the PBS is to provide information about the presence and possible negative effects of HAOPs in ports and areas surrounding hotspots of BW discharges.

In order to accomplish this goal, the sampling protocol for PBS, including biological and chemical parameters, has been developed through mutual agreement and harmonization among the partners, taking into account the different methods used in different laboratories. Chemical baseline surveys have been conducted to provide a baseline concentration of common by-products of disinfection by ballast water treatment systems prior to the entry into force of the BWM Convention.

Sampling for biological PBSs were carried out according to the BALMAS protocol in twelve ports to provide equal geographical coverage along the Adriatic coast, and to cover the main Adriatic ports in all participating countries.

The results obtained through the PBSs are delivered as a PBS Report for each port and a list of all recorded species is provided. The PBS report contains: information on the port features including climate and hydrodynamic conditions, shipping movement, and the results of all performed analyses (according to protocol). An Excel file contains the list of all identified species with HAOP species marked. The Final report on the PBS is based on twelve PBS reports and contains information on all ports including similarity and dissimilarity in consideration to abiotic parameters and HAOP presence.

Instrument/tool: The BALMAS sampling protocol (Ninčević *et al*., 2014) is based on the CRIMP protocol (Hewitt and Martin, 2001), which is successfully applied in tropical and temperate marine environments, guidelines for ballast water sampling (IMO, 2004) and requirements of risk assessment (IMO 2007). Reports are based mostly on results obtained through the PBS activities in the frame of the BALMAS project and earlier national studies. The Sampling protocol could be used for PBSs in ports other than the 12 investigated in BALMAS and as a basis for monitoring activities. The results obtained can be used for risk assessment and monitoring activities.

Action time frame: PBS activities could be performed before the entry into force of the BWM Convention to facilitate the implementation of the Convention and create a platform for monitoring HAOP spreading or new introductions. In ports where it was not performed, it could be done after the entry into force of the BWM Convention.

Organisational aspects: The scientific community, national research institutes, universities, local environmental authorities, national environmental authorities.

Human resources: A small team of experts including scientists, taxonomists, technical staff and divers. A team of 8-10 individuals in most cases should be sufficient to sample a medium-sized commercial port. For taxonomic analyses, it is useful to be connected with an international network of taxonomists in order to determine the HAOP organisms correctly at the species level.

Financial resources: The costs depend on the distance from the ports to the research institute, the size of the port, the cost of the ship, and the taxonomists involved in the species identification.

Legal aspects: Port Baseline Surveys are pre-conditions for effectively implementing a number of provisions of the BWM Convention activities. The results should be considered in preparing national measures and decisions. For States that have to implement the Marine Strategy Framework Directive, PBSs could provide information useful to populate Descriptor 2 on non-indigenous species and to determine the Good Environmental Status of marine waters in this regard. The more the Port Baseline Surveys methodology is consistent for marine sub-regions in the Adriatic, the more relevant national decisions on ballast water exemptions will be consistent and non-conflicting. To this end, the presentation of BALMAS PBS results to the UNEP/MAP Secretariat and to the DG ENV of the European Commission should be highly recommendable in order to agree further common work and legal decisions in this field.

5.6.4.2 Monitoring

Convention reference: Port baseline surveys and monitoring activities could serve several purposes:

i) monitor the effects of ballast water management in waters under the country's jurisdiction (Article 6 – Scientific and Technical Research and Monitoring),

ii) provide data for risk assessments in order to grant exemptions to ships from BWM requirements (Regulation A-4 Exemptions),

iii) provide data to eventually support additional measures (Regulation C-1),

iv) provide data for warnings concerning ballast water uptake in certain areas (Regulation C-2).

Activity description: Monitoring and surveillance activities provide an opportunity to:

- detect newly introduced populations early;
- track the expansion or spread of introduced species;
- predict the potential impacts of introductions or range expansions by gathering baseline data on pre-existing populations and habitat;
- evaluate prevention and response strategies.

The advantages/benefits of such activities can include:

- protection of biodiversity and marine resources;
- facilitating exports (by being able to certify the absence of certain species);
- the fulfillment of international obligations, including the prompt reporting of animal or plant health "events" to international organizations and trading partners;
- development of technically justifiable requirements, for instance for Import Health standards under IPPC or OIE;

- support for the development of management strategies for dealing with species.

Instrument/tool: The BALMAS project coordinated the effort of national marine institutions and agencies to develop a monitoring strategy and protocols to tackle specific Adriatic environmental issues. Most of the ports have been monitored during the project to test the protocols and cross check the results with PBS activity outputs.

A cross-border network of experts on different taxa has been created within the BALMAS community and a mailing list has been used to support the identification of some of the most critical taxa sampled in the Adriatic ports.

At a different level, some LEK (Local Ecological Knowledge) approaches have been performed in different ports of the Adriatic showing significant results concerning the timing of NIS introduction.

Action time frame: Monitoring activities should take place as soon as the Convention enters into force. In the meantime, current monitoring activities in port areas and adjacent areas, where present, should target HAOP species.

Organisational aspects: The primary institutions involved in such activities are regional environmental agencies and authorities with the scientific support of national marine institutions and the logistic and technical support of the Port Authorities.

Human resources: The most critical aspect is the high level of taxonomic expertise required by this kind of activity. Some HAOP and NIS species could easily be detected while others are cryptic and require particular efforts to locate or taxonomically identify, particularly when they are in low abundance.

Financial resources: For conducting a monitoring (spring sampling, autumn sampling and pathogens), the following working hours have been assessed:

- Sampling: 12 hours per sampling site;
- Laboratory analysis: 75 hours per site with 25 samples per sampling site;
- Data management: 4 hours per site.

Other costs to consider are the costs of underwater sampling equipment, sampling vessel, sampling kit and laboratory equipment.

Legal aspects: In general terms, according to the law of the sea as reflected in the UNC LOS (Montego Bay, 1982), as well as to international environmental law, the availability of appropriate information on the marine environment and recurrent environmental monitoring are elements to be taken into account when developing and implementing environmental legal standards and measures at all levels (international, European, national).

The BWM Convention standards and requirements refer to the risk of transfer of HAOPs. Different policy documents and legal requirements establish obligations to monitor the introduction or presence of alien, invasive or non-indigenous marine species. Although Adriatic States are not all bound by the same obligations, different IAS or NIS monitoring actions and programs that have to be implemented in the Adriatic basin should be considered when planning the HAOPs monitoring required for implementing the BWM Convention. The consistency of efforts, avoiding duplications, and a coherent use of different international, European and national funding sources would be opportune. An increased coordination of activities might support the delivery of monitoring objectives deriving from different legal obligations and related cost-efficiency. The BALMAS Port monitoring protocol and the envisaged program of future activities for the Adriatic should take advantage, to the maximum extent, of these other existing monitoring obligations. To this end, the endorsement of the same technical protocol by competent Adriatic national administrations, together with its presentation to the regional fora (EU, UNEP/MAP and regional centres), could be an option for the BWM Convention`s sustainable implementation.

The most relevant States' IAS or NIS commitments are reported below while further details are included in the BALMAS Final Legal and Policy Report (Rak, 2016).

5.6.4.3 HAOP Expert Network

Convention reference: The "International convention for the Control and Management of ships' ballast water and sediments (BMW Convention, 2004)" defines "*HAOP - Harmful Aquatic Organisms and Pathogens (HAOP)"* as "Aquatic organisms or pathogens that, if introduced into the sea, including estuaries, or into fresh water courses, may create hazards to the environment, human health, property or resources, impair biological diversity or interfere with other legitimate uses of such areas."

Activity description: In the BALMAS project, activity 5.3 accomplished two important objectives:

(1) to produce a summary of the documented and potential impact of HAOPs in the Adriatic Sea;

(2) to ensure up-to-date HAOP information for BW RA and management.

In order to achieve these objectives, it has been important to collect information from previous studies and relevant publications, to complete our knowledge through the data collected during the BALMAS port baseline (Act. 5.4), regular Port monitoring activity (Act. 5.2) and stored in the BALMAS database for HAOPs[4]. Once collected, the data / list of organisms has been produced and we have defined the impact of HAOs (i.e. high, medium, low, null, unknown) and the effect(s) of the impact (i.e. on human health, environment and economy) following the indication of the final report of activity 6.3. In the database, new HAOs from the Adriatic Sea were highlighted. The database completed with full information (e.g. species name, PBS sampling date, recipient port, etc.) with items defined as a HAO or not, as a NIS, its impact and its effect. The results of the final Report (with a catalogue of the HAOP species, their impact and effect) represent a valid and useful tool indispensable for the proper management of ballast water in the Adriatic Sea. Most of the information cover the groups of Phytoplankton and Dinoflagellate cysts, while lot of information are missing, for instance many groups of Zoobenthos, Phytobenthos or Fish communities. In the future, more work needs to be done and it is very important that additional scientific research

[4] http://balmas.izvrs.si/balmas_haop/project

contributes with its knowledge to creating and maintaining an up-to-date summary of the HAOP impacts in the Adriatic Sea.

Instrument/tool: Information on HAOPs from previous studies and relevant publications was integrated with a PBS monitoring activity during the project and will be regularly integrated through Port monitoring activity in the future. The BALMAS database for HAOPs has been produced and the list of organisms will be regularly updated in the event of introduction of new HAO species in the Adriatic Sea.

Action time frame: A HAOP expert network could be established before or around the entry into force of the BWM Convention to facilitate the implementation of the Convention. A taxonomic network has been implemented within BALMAS, but it should be further expanded with more experts from the Adriatic region and possibly beyond to support identification of species and periodically review the categorization of HAOP impacts.

Organisational aspects: Scientific community, National research institutes, Universities, Local Environmental Authorities, National Environmental Authorities.

Human resources: The BALMAS taxonomic network is already comprised of about 40 scientists. The list needs to be increased with about 10-15 more scientists in order to cover all the main taxonomic groups.

Financial resources: Costs for taxonomic identification should be covered by PBS and monitoring budget, if the experts already belong to the monitoring team. External experts belonging to the network would only be provided with travel reimbursement, when travelling is required, but they will mostly provide a voluntary contribution remotely.

Legal aspects: A HAOP expert network would greatly benefit the quality of the data acquired through PBS and monitoring activities and facilitate decision-making process. There are no legal provisions specifically dealing with such a network. Nonetheless, its establishment lies within the broader context of sub-regional dialog and cooperation that is at the core of the entire Plan. Specific agreements among the institutions involved could be made in order to render the network operational.

5.6.4.4 Port Sampling Database

Convention reference: According to the selective approach to BWM and the species-specific approach to risk assessment described in the G7 guidelines – Resolution MEPC.162(56), a knowledge of HAOP species in ports is needed. The data on HAOPs is gathered centrally in a Port sampling database. The database also serves the needs of the EWS proposed in Regulation C-2 of the BWM Convention.

Activity description: All the biological data obtained during PBS, monitoring and BWS activities in the Adriatic region is to be gathered into a Port sampling database. The database includes all the information on HAOP species needed for the functioning of the EWS, BWM, DSS and RA for exemptions.

The database structure was developed based on the AQUANIS structure and expanded according to the needs of BWM in the Adriatic region. For more information on the Port sampling database (Muha & Velkavrh, 2016).

Instrument/tool: The tool used is an ORACLE-based database. Data inputs and data views are made via a developed application based on the open source Web2project basis. Link to the database: http://balmas.izvrs.si/balmas_haop/

Action time frame: The database already includes large amounts of gathered data and is ready to be used at any given time.

Organisational aspects: Like every electronic system, the database needs skilled maintenance. Therefore the database should be run and maintained by an organisation with the required capacities and skills to manage databases, manage user access, maintain server hardware and software and that can provide internet access to the database.

Human resources: The database needs to be properly maintained, the hardware on which it will run needs to be properly serviced and user access managed. To manage these tasks, IT specialists are needed.

Financial resources: In order to maintain a working database and the needed connection to the EWS and the DSS system, a proper server with an internet connection is

needed. The required memory space is about 4TB. The database has been developed in an ORACLE 11 framework; therefore an ORACLE license is needed.

In addition to the hardware and software requirements, the Port sampling database needs expert management by an IT expert.

Legal aspects: The BALMAS database is an essential element for the functioning of the BALMAS Decision Support System, which would help countries in the coherent implementation of BWM Convention obligations in the Adriatic Sea. Unfortunately, Mediterranean experience showed very few cases where countries agree on sharing the same database and the States never regularly fed it with data. Nevertheless, the centralization of the database is not a must for the functioning of the BALMAS system as country administrations will remain the sole party responsible for organizing the national gathering processes and activities. A possible option to render the database sustainable and effective should be to agree, at least at a sub-regional level, on harmonizing databases established at the national level in a specific administrative agreement between maritime/environmental authorities. Such an agreement should also include the agreement on using the DSS at the national level. The involvement of the EU and of the UNEP/MAP should be highly recommended, including guaranteeing the identification of eventual international additional funding sources. BALMAS port sampling data should be used as a first common set of data on HAOPs and common elements of national procedures for data gathering, storage and management could be part of the agreement in order to help the consistency of the knowledge base of public actions in the future, increasing sub-regional reliability.

5.6.5 Know Your Options

5.6.5.1 Ballast Water Management Options for Vessels

Convention reference: Under the BWM Convention (IMO 2004), all ships in international traffic are required to manage their ballast water and sediments to a certain standard, according to a ship-specific ballast water management plan. All ships also have to carry a ballast water record book and an international ballast water management certificate. The ballast water management standards will be phased in over a period of time. As an intermediate solution, ships should exchange ballast water mid-ocean. However, most ships will eventually need to install an on-board ballast water treatment system.

Activity description: The BWM convention stipulates two standards for discharged ballast water. The D-1 standard covers ballast water exchange while the D-2 standard covers ballast water treatment. The BWM Convention introduces two different protective regimes as a sequential implementation regime:

- Ballast Water Exchange Standard (Regulation D-1, so-called D-1 standard) requiring ships to exchange a minimum of 95 % ballast water volume;

- Ballast Water Performance Standard (Regulation D-2, so-called D-2 standard) requires that the number of viable organisms in the discharged ballast water has to be below specified concentration limits.

Regulation D-1 Ballast Water Exchange Standard - Ships performing ballast water exchange shall do so with an efficiency of 95 percent volumetric exchange of Ballast Water. For ships exchanging ballast water by the pumping-through method, pumping through three times the volume of each ballast water tank shall be considered to meet the standard described. Pumping through less than three times the volume may be accepted provided the ship can demonstrate that at least 95 percent volumetric exchange is met.

Regulation D-2 Ballast Water Performance Standard - Ships conducting ballast water management shall discharge less than 10 viable organisms per cubic metre greater than or equal to 50 micrometres in minimum dimension and less than 10 viable organisms per millilitre less than 50 micrometres in minimum dimension and greater than or equal to 10 micrometres in minimum dimension; and the discharge of the indicator microbes shall not exceed the specified concentrations.

The indicator microbes, as a human health standard, include, but are not be limited to:

- Toxicogenic *Vibrio cholerae* (O1 and O139) with less than 1 colony forming unit (cfu) per 100 millilitres or less than 1 cfu per 1 gram (wet weight) zooplankton samples;
- *Escherichia coli* less than 250 cfu per 100 millilitres;
- Intestinal Enterococci less than 100 cfu per 100 millilitres.

Ships are required to have on board and implement a Ballast Water Management Plan approved by the Administration (Regulation B-1). The Ballast Water Management Plan is specific to each ship and includes a detailed description of the actions to be taken to implement the ballast water management requirements and supplemental ballast water management practices.

Ships must have a Ballast Water Record Book (Regulation B-2) to record when ballast water is taken on board; circulated or treated for ballast water management purposes; and discharged into the sea. It should also record when ballast water is discharged to a reception facility and any accidental or other exceptional discharges of ballast water.

The specific requirements for ballast water management are contained in regulation B-3 Ballast Water Management for Ships:

- Ships constructed before 2009 with a ballast water capacity of between 1500 and 5000 cubic metres must conduct ballast water management that at least meets the ballast

water exchange standards or the ballast water performance standards until 2014, after which time it shall at least meet the ballast water performance standard;

- Ships constructed before 2009 with a ballast water capacity of less than 1500 or greater than 5000 cubic metres must conduct ballast water management that at least meets the ballast water exchange standards or the ballast water performance standards until 2016, after which time it shall at least meet the ballast water performance standard;

- Ships constructed in or after 2009 with a ballast water capacity of less than 5000 cubic metres must conduct ballast water management that at least meets the ballast water performance standard;

- Ships constructed in or after 2009 but before 2012, with a ballast water capacity of 5000 cubic metres or more shall conduct ballast water management that at least meets the standard described in regulation D-1 or D-2 until 2016 and at least the ballast water performance standard after 2016;

- Ships constructed in or after 2012, with a ballast water capacity of 5000 cubic metres or more shall conduct ballast water management that at least meets the ballast water performance standard.

The IMO Marine Environment Protection Committee (MEPC), at its 69th session (April 2016), approved draft amendments (document MEPC 69/21 and MEPC 69/21/add.1) to regulation B-3 Ballast Water Management for Ships of the BWM Convention relating to the timescale for the implementation of the requirements. These amendments will be circulated for adoption as soon as the Convention enters into force.

Under Regulation B-4 Ballast Water Exchange, all ships using ballast water exchange should whenever possible, conduct ballast water exchange at least 200 nautical miles from the nearest land and in water at least 200 metres in depth. In cases where the ship is unable to conduct ballast water exchange as above, it should take place as far from the nearest land

as possible, and in all cases at least 50 nautical miles from the nearest land and in water at least 200 metres in depth.

When these requirements cannot be met, areas may be designated where ships can conduct ballast water exchange. This should be done in consultation with adjacent or other states, as applicable. Any such designation should follow the Guidelines on the Designation of Areas for Ballast Water Exchange – BWEA (G14 (IMO 2006)). All ships shall remove and dispose of sediments from spaces designated to carry ballast water in accordance with the provisions of the ships' ballast water management plan (Regulation B-4). BWEAs should be biologically monitored frequently to document the presence/absence of introduced species or other HAOPs. The designation of a BWEA should not require major vessel deviations.

Options for designating BWEAs in the Adriatic were considered under the BALAMS project for intra Adriatic traffic, but none of the proposals were accepted.

Other methods of ballast water management may also be accepted as alternatives to the ballast water exchange standard and ballast water performance standard, provided that such methods ensure at least the same level of protection to the environment, human health, property or resources, and are approved in principle by the IMO's Marine Environment Protection Committee (MEPC).

At present, there are many different treatment technologies available and most of those were previously developed for municipal and other industrial applications. More than 130 BWMSs were identified and they use different treatment technologies mostly in combination to achieve the required efficiency over a large variety of ballast water flow rates. BWMSs are in different development stages, and more than 50 of them have already been type-approved by the responsible authorities. This makes certified systems available for sale to the shipping industry; however some uncertainty remains on whether the BWMS production capacities will be able to accommodate the installation needs of the shipping industry over certain short periods after the BWM Convention enters into force (David & Gollasch, 2015e).

Different BWMSs have different capacities and technical profiles, which are mainly related to the aspects of the appropriate capacity of the ballast water system of a vessel, as well as to the system space requirement and power consumption.

All systems need to be type approved by a Flag State before being sold to a client. Systems that use Active Substances according to the definition in the BWM Convention have to undergo a more thorough certification process and obtain Basic and Final Approvals by IMO MEPC (David & Gollasch, 2015e).

Based on the analysis of BWM options and ballast water discharge patterns, the main concerns for BWM options for the Adriatic are (David & Gollasch, 2015e):

- the majority of BW donor ports (and highest volumes) are within the Adriatic Sea;
- HAOPs are already present in Adriatic ports;
- an issue is also the intensive secondary transfer of HAOPs;
- BWE is not an option without BWEA;
- given the very short sailing times between Adriatic ports, the time for BWMSs to effectively treat ballast water is very short and may cause limited effectiveness.

The implementation of the BWM Convention may involve significant costs for the shipping industry, e.g., to install and operate BWMSs. However, the BWM Convention requiring their installation is not yet in force and there are no other binding regional or national requirements like the D-2 standard applying today that would force vessels to install BWMSs.

To meet the D-2 standard, it may also be considered necessary to combine BWE and ballast water treatment until BWMSs become more efficient. By doing so, the efficacy of existing BWMSs may be enhanced when the ballast water taken on board is treated during the exchange (David & Gollasch, 2015e).

Instrument/tool: The overview of BWM options for vessels in the Adriatic Sea area is developed within the BALMAS project (activity 4.3).

Action time frame: It is expected that full implementation of BWM systems for vessel`s will take place after the entry into force of the BWM Convention.

Organisational aspects: The implementation of BWM systems on ships requires coordinated actions of government representatives, port authorities, shipping companies and providers of technological solutions.

Human resources: Expertise in engineering, transport and maritime industries, as well as logistic, legal and administrative support, are required.

Financial resources: The financial costs of BWM treatment technology may vary significantly, depending on type of treatment system, vessel type and maintenance cost.

5.6.5.2 Ballast Water Management in Ports

Convention reference: Regulation B-3, paragraph 6 according to which the requirements for Ballast Water Management for Ships, D-1 and D-2 standards, do not apply to ships that discharge ballast water to a reception facility designed taking into account the Guidelines developed by the Organization for such facilities adopted by the Resolution MEPC 153(55) Guidelines for ballast water reception facilities (G5).

Activity description: Port-based BW treatment systems provided by port authorities, where present, shall be utilized by ships not equipped with on-board ballast water treatment plants (BWMS), by ships with no operational BWMS at the time, or by ships that failed to manage ballast water properly, i.e., not in line with the requirements in place.

Port BW treatment systems may serve port areas where they are located or neighbouring ports, providing that no undue delays are created for ships, as required by the BWM Convention, 2004. Port authorities have to publish data on capacities, area coverage, service priorities and requirements for each port where a port-based BW treatment facility is available.

Port authorities shall, when considering the options in a particular port, take into account technical aspects, application requirements, safety aspects and costs relevant at the time of port project development.

Instrument/tool: Barge-based systems are systems with a BW treatment plant mounted on a barge, or barges are used to accept ballast water from ships and transfer it to a land-based facility. Systems with a BW treatment facility on the barge and releasing ballast water into the sea are considered the most appropriate for ports in the Adriatic Sea region.

Mobile-based systems are systems where the BW treatment plants are mounted on trucks or similar vehicles capable of accepting ships' ballast water and (after treatment) releasing it into the sea. Mobile systems are considered appropriate for Adriatic ports, especially for ports where low ballast-dependent ships are accommodated. In addition, these units may be used as a secondary system in major ports that are usually serviced by the barge-based system, preventing delays in the case of concurrent operations.

Land-based systems located on dedicated sites close to port areas are not considered suitable for existing ports in the Adriatic region due to technical requirements (demanding pipelines, low coverage) and very low cost-effectiveness.

In order to ensure the effective implementation of the BW treatment systems in ports, Adriatic countries shall collect relevant data on cargo flow and projected ships' traffic. Also, the BW Reporting Form will be used *in continuo* to estimate and plan the required port-based capacities.

The BALMAS Report on BWM options for ports provides detailed information on the implementation modes of most currently existing technologies, including case studies based on a discrete simulation model.

Action time frame: It is expected that full implementation of the port-based BW treatment facilities will take place after the entry into force of the BWM Convention with a certain delay. Here, it is assumed that port-based BW treatment plants will be available within two years after the BWM Convention enters into force.

Organizational aspects: Implementation of BW treatment plants in ports requires coordinated actions of all bodies: government representatives, port authorities, shipping

companies and providers of technological solutions. Here, it is assumed that port authorities, either public or private, will take responsibility to ensure initial support, harmonized implementation and cooperation among stakeholders.

Human resources: Port BW treatment plants, in order to be effective, require the involvement of experts in engineering, transport and maritime industries, as well as logistic, legal and administrative support. It is assumed that the port authorities responsible for a particular port will ensure that the personnel handling port-based BW treatment plants are properly equipped and trained.

Certain technologies, in particular those using active substances, may endanger personnel and the environment. In this respect, port authorities have to ensure that sufficient knowledge, attention, skills and proper education of operators are in place in order to avoid potential risks that might arise from improper handling.

Financial resources: As there are several available BW treatment technologies for ports, capital and operational costs may vary significantly depending on the prevailing circumstances. In general, the most important factors affecting financial viability are:

- the purchase price of the core system;
- acquisition costs (i.e. land for shore-based systems, or barges for barge-based systems);
- labour costs;
- maintenance costs.

Vessels are expected to cover the costs of the service rendered. The port authorities responsible for certain port areas may require ships to cover all costs or may participate in the total costs, thus making the service more attractive.

Legal aspects: Establishing ballast water reception facilities in ports implies the involvement of national and local authorities that manage ports. Depending on the specific option eventually chosen, the port authorities may face various legal challenges i.e. building

new fixed facilities may change the relevant port plans with long amendment procedures. In any case, for all the options, port authorities will be required to adopt port regulations dealing with safety and environmental aspects related to the discharge of ballast water into facilities. Particular attention should be paid to the treatment and subsequent discharge of ballast water that has been treated on board using active substances. EU legislation on waste as well as EU legislation on port reception facilities should be carefully taken into consideration while implementing the available options in Member State ports.

5.6.5.3 Sediment Management in Ports and Shipyards

Convention reference: The proposed measures and technologies refer to Article 5 of the BWM Convention. In addition, they are in line with the principles and requirements outlined in the guidelines adopted by the International Maritime Organization, notably in line with Resolution MEPC. 152(55) Guidelines for sediment reception facilities (G1) and Resolution MEPC. 150(55) Guidelines on design and construction to facilitate sediment control on ships (G12), as amended and as applicable.

Activity description: Sediment disposal management includes measures and actions dealing with on-board sediment removal/disposal and on-shore sediment reception and storage. No discharge of sediment overboard should be allowed in the Adriatic Sea area.

It is necessary to ensure that neither water content nor dry sediment finds its way into the sea. Following removal from ships, sediment has to be dried in temporary storage facilities within the port area, sufficiently distant from the nearest shoreline, and properly protected to prevent leakage into the sea. Dry sediment may and should be permanently stored at a waste disposal facility where similar materials are stored. Alternatively, wet sediment may be transported directly to a permanent storage facility using vacuum storage containers.

Instrument/tool: It is recommended that ports/shipyards in the Adriatic area prepare a Sediment Disposal Plan. It is assumed that the Plan will be approved by authorities that are or will be responsible for implementing the BWM Convention, when it enters into force.

The model regulations of sediment disposal management in the Adriatic Sea area are developed within the BALMAS Report on sediment disposal requirements and patterns in the Adriatic and best sediment management practices for ports and shipyards (activity 4.4b).

Action time frame: National rules and regulations dealing with sediment disposal management should be in place before or at least at the time of entry into force of the Convention.

Organizational aspects: It is assumed that shipyards and ports (if allowing sediment management in ports) are responsible for implementing all the necessary measures aiming to ensure the proper handling of sediment during removal, transport and temporary storage.

National and local authorities and bodies responsible for port management, maritime safety and environmental protection should develop the capacities and procedures necessary to ensure the enforcement of the relevant rules and regulations.

Human resources: Personnel in charge of a sediment reception facility shall receive training on sediment management.

The training should include information on the international and national legal frameworks on BWM, the principles of the BWM Convention, risks to the environment and human health associated with the sediment disposal process, the equipment and process used for sediment collection and disposal, the ship/port communication interface and understanding of local disposal requirements.

Personnel employed in sediment disposal shall receive adequate familiarization of the safety procedures, tank entry procedures, human health risks and the use of personal protective clothes and equipment.

Shipyards management should be deemed responsible for ensuring adequate training and familiarization for personnel involved in sediment disposal.

Financial resources: Vessels are expected to compensate for all costs associated with sediment management. Participation in the costs is not assumed.

Legal aspects: According to the Convention, each Adriatic State should designate those ports or terminals under its jurisdiction carrying out cleaning or repairing of ballast tanks, where adequate facilities for the reception of sediments will be available.

Currently, neither EU legislation nor the national legislation of the Adriatic States provide specific standards for the collection, treatment and disposal of sediment from ships ballast tanks. Moreover, there is a general ban on dumping untreated materials and waste at sea, which may include ballast water sediments. In most Adriatic countries, the ordinary waste legislation would apply to shipyards and ports as well (including, for Member States, the EU waste legislation as transposed).

In this framework, while implementing the Convention obligations, national and local competent authorities of the Adriatic are recommended to use the model regulations developed within the BALMAS Report on sediment disposal requirements and patterns in the Adriatic and the best sediment management practices for ports and shipyards.

Bodies responsible for port management, maritime safety and environmental protection should confront the risks, procedures and protective measures when dealing with sediment collected from ballast tanks.

Amendments to EU legislation in this regard would be opportune to ensure the same level of protection.

Finally, according to the G1 Guidelines, each Party shall report to the Organization and, where appropriate, make available to other Parties information on the availability and location of any reception facilities for the environmentally safe disposal of sediments. Considering the high vulnerability of the Adriatic basin and the importance of having sufficient sediment reception facilities in the area, it would be highly recommendable if Adriatic States share this information between them, assessing the sediment treatment capacity at a basin level. A further review of the current level of implementation of the ban on sediment disposal at sea would also be useful.

5.6.6 Know Your Actions

5.6.6.1 Early Warning System

Convention reference: Regulation C-2 - Warnings concerning ballast water uptake in certain areas and related Flag State measures.

Activity description: The type of warnings considered by the BALMAS Early Warning System (EWS) are those envisaged by both the Ballast Water Management Convention (IMO) and by the EU Marine Strategy Framework Directive implementation (Directive 2008/56/EC), with different scopes. The BALMAS EWS is being designed to be used for both legal instruments, taking into consideration the different information and decision-making needs. In Regulation C-2, the BWM Convention provides the possibility to issue a warning to ships, the IMO and other potentially affected States when high concentrations of HAOPs are found in waters under the jurisdiction of the Party. BALMAS has drawn up a list of HAOP species in the Adriatic, including native species, and their potential impact levels have been categorized (low, medium and high impact), as well as the type of impact itself (economic, health, ecological). Only species in a state of bloom or mass development for which a high potential impact is known will trigger an alert to vessels by maritime authorities, and among them, only those that are relevant to the uptake and discharge of ballast water.

The threshold of abundance of HAOP species that can determine the alert has been defined as species concentration greater than 50% of the total community concentration.

The list of HAO organisms and their impact level must necessarily be subjected to periodic reviews by a panel of experts.

Regarding the alert to the environmental and health authorities, the presence of a non-indigenous species or pathogenic organism in ports or adjacent waters will be sufficient to proceed with the communication to the relevant authority.

The alert addressed to vessels is aimed at preventing the uptake of ballast water with high concentrations of harmful aquatic organisms or pathogens.

The alert to environmental and health authorities is needed to warn authorities of the presence of non-native species or pathogens in waters under their jurisdiction, including in view of timely and effective intervention, if deemed necessary.

The elements that constitute the alert system are: monitoring and surveillance, alert service, response capability.

Monitoring is the first step in the development of a warning system. The monitoring strategy and protocols for sampling and analysis have been defined within BALMAS and, in some cases, they have already been established at the national level for the implementation of specific legislative instruments (such as the Marine Strategy Framework Directive in Italy). The frequency of monitoring in ports may not be sufficient to ensure the prompt detection of all the possible alert situations. Monitoring, therefore, will have to be supplemented by appropriate surveillance activities that will be carried out, among others, by local maritime authorities, local fishermen and ordinary citizens.

The second element of the alert system is the development of an alert service. A tentative identification of the performers of the EWS and their general roles and responsibilities has been undertaken in each BALMAS country. The criteria determining the alert itself have been established as reported above. The timing and mode of transmission of the warning to ships rely on the DSS EWS tool. The specific format for the different communication needs have been agreed among the project partners and are ready to be used by Adriatic countries.

The third and last element of the EWS is the response measures/actions, which can simply be the notification of a no BW uptake area to ships, or more complex measures such as eradication, mitigation or control of the harmful aquatic species.

While testing the EWS, the need of a HAOP National Focal Point (NFP) has clearly emerged.

The role of the HAOP National Focal Point, which the BALMAS project proposes to identify, could comprise, but not be limited to, the following tasks:

- i) to support local environmental authorities in taxonomic identification;

- ii) to review and update the list of HAOP species, including categorization of the impact level and type, and

- iii) to provide support for National Environmental Authorities for consultation on control/remedial actions.

The HAOP National Focal Point could include representatives of National Environmental Authorities, National Health Authorities and national experts from Universities and Research Institutes. The HAOP NFP could be the responsible performer for the communication to the NFP of potentially affected coastal States. It is also suggested that, for the purpose of the BALMAS EWS, potentially affected States are the coastal States bordering the Adriatic Sea.

Instrument/tool: Early Warning System Decision Support System.

Action time frame: Operational by 2020.

Organisational aspects: The involvement of Local and National Environmental Authorities, Local and National Maritime Authorities, and the scientific community. Designation of a HAOP National Focal Point.

Human resources: Personnel already involved in the national monitoring of coastal waters, maritime personnel already involved in control/surveillance activities, high-level officers from Maritime and Environmental Authorities, and a panel of experts on HAOPs. The latter has not yet been established in Adriatic countries.

Financial resources: Costs for port monitoring. Costs for remedial actions when deemed necessary (to be determined case by case). Costs associated with the operation of an NFP (mostly for travel).

Legal aspects: The development of the BALMAS EWS was based on the requirements linked to different but converging legislation (BWM Convention and EU MSFD). The national implementation of the EWS will require the adoption of related national measures, as well as the establishment of appropriate institutional arrangements. In the case of Italy, monitoring programmes adopted according to art. 11 of EU MSFD included port monitoring

activities for Descriptor 2 (non-indigenous species) that could adequately address the needs of the EWS. In the same country, the development of an Early Warning System has been approved as one of the targets of the Marine Strategy and the establishment of a National Focal Point on non-indigenous species and native harmful species has been included in the programme of measures that will lead to achieving and maintain Italy's GES of marine waters.

From a legal point of view, the consistency of the BALMAS EWS implementation across the Adriatic basin would be facilitated if the MSFD Common Implementation Strategy would address this point, as the presence of HAOPs in ports is not currently tackled as such by the directive implementing acts. At the EU level, linkages could also be established with the surveillance system to be put into operation by Member States according to EU regulation on IAS, but limited to those target HAO high-risk species that would be included in the EU IAS list. This would facilitate the raising of adequate funds for monitoring, avoiding duplications of actions at the national level.

Regarding legal tools for implementing the BWM Convention Regulation C-2 in the Adriatic, notices issued to mariners can use ordinary communication channels/interface between ports and ships normally used in the Adriatic.

Specific administrative arrangements between port authorities, maritime authorities, environmental bodies and experts, including the NFP designation, are highly recommendable in order to put into operation the EWS, guaranteeing the required timing and expertise.

5.6.6.2 Ballast Water Reporting

Convention reference: The BWM Convention does not provide for mandatory reporting to the Port State Authority on the BW retained on board by ships intending to call that port.

Activity description: Ballast water reporting (BWR) is an important source for monitoring ballast water discharges since it includes in advance information on the vessel, cargo operation and the source and volume of ballast water.

A common BW Reporting Form to be used by ships calling at Adriatic ports has been adopted on a voluntary basis in selected Adriatic ports. It is based on the standard IMO form[5] with some minimal additional requirements to provide data needed to feed the BW Management Decision Support System (BWM DSS) processes. The BWRF data includes information on the ship, arrival port, BW tanks capacity, cargo operation, BW sources, BW management and BW discharges. This data is crucial for assessing both the BW risk (BW Risk Assessment) and the amount of BW (BW Discharge Assessment) that the vessel should theoretically have to discharge in the arrival port. The BWRF is submitted by the vessel or by the related Agent on paper or by electronic means[6], depending on PSA requirements.

An electronic Ballast Water Reporting System (BWRS) was implemented in order to help Adriatic State Authorities enable safe and effective BWM measures according to the BWM. The aim of the BWRS is to gather, store and redistribute information on management and operations related to the BW of vessels that call at the Adriatic Sea ports.

The adoption of a common BWRS will allow the Port State Authorities to implement a common operating procedure to automatically collect and share information about the BW operations conducted by vessels calling at their ports. In fact, a BWRS implemented as a sub-module of the BWM DSS, potentially allows the system to interface with each national Port Management Information System to automatically collect the BWRF data needed to support the system's operations.

[5] A suitable BWRF was provided by the format reported in Appendix 1 of IMO RESOLUTION A.868(20) adopted on 27 November 1997 on "GUIDELINES FOR THE CONTROL AND MANAGEMENT OF SHIPS' BALLAST WATER TO MINIMIZE THE TRANSFER OF HARMFUL AQUATIC ORGANISMS AND PATHOGENS".

[6] The BW information could be automatically collected by IT systems acting as Port Management Information Systems implemented by the Maritime Administration. In the EU countries, those systems are generally integrated in the so-called National Maritime Single Window, implemented in order to manage the ships' arrival and departure reporting formalities in accordance with the 2010/65/EU Directive. Italy and Croatia are already able to manage the BWRFs through their own IT information systems. Also, in Slovenia and Montenegro, an electronic BWFR is actually in use. It is understood that where an electronic system managing the BWRF collection is not yet implemented, the available information on the BW operations will be entered manually.

Instrument/tool: BALMAS BWRF format adopted for BALMAS (and the related electronic format *eBWRF*). The electronic BWRS has been implemented as a module of the BWM DSS and is accessible on the web (URL: https://bwmdss.guardiacostiera.gov.it/) using most common web browsers by a comprehensive Web User Interface (WUI) based on the open source PostgreSQL software.

Action time frame: National rules and regulations dealing with the obligation of BW reporting by vessels, as well as the adoption of the common BWRS, should be in place before or at least at the time of entry into force of the Convention. The BWRS is ready to be used at any given time by all authorized web users.

Organisational aspects: The involvement of Local and National Maritime and Environmental Authorities.

Human resources: Personnel from Maritime and Environmental Authorities.

Financial resources: Costs for personnel involved and for system maintenance.

Legal aspects: Currently, there are no reporting obligations on ballast water for ships calling at Adriatic ports and the BWM convention does not provide for that. Still, ballast water reporting at least 24h in advance is essential to the functioning of other BALMAS tools, including the BALMAS DSS.

There are various legal paths that can be followed in order to establish specific mandatory reporting in the Adriatic basin ports. One of them is the adoption by Adriatic countries of BW reporting as a condition for the entry of ships into their ports/terminals. In this case, it would be essential that all countries adopt the same measures. A further option would be to jointly submit for IMO approval a proposal for amending the current Mandatory Ship Reporting System in place in the Adriatic Sea (ADRIREP) according to Resolution MSC.139(76), which entered into force on the 1st July 2003 with the participation of Italy, Slovenia, Albania, Montenegro and Croatia (for further details please consult the BALMAS Final Legal and Policy Report). Consideration should be also given to the opportunity to amend or integrate relevant EU legislation accordingly.

5.6.6.3 Electronic Ballast Water Management Decision Support System

Convention reference: An electronic cross-border BALMAS BWM DSS system in the Adriatic Sea, based on BW reporting provided by the vessels, was implemented in order to help Adriatic State Authorities to enable safe and effective BWM measures according to the BWM Convention requirements. In particular, the system can support the Adriatic competent authorities in carrying out inspections of the ballast water and the related Compliance Monitoring Enforcement (articles 7-11 and Regulations in section B and D of the BWM Convention) as well as to notify the warnings envisaged in Regulation C-2.

Activity description: The DSS approach was introduced in BWM and its need primarily arose due to the introduction of the selective BWM approach. More precisely, DSS is a supporting tool that is needed to aid transparency and consistency when deciding on the most efficient BWM requirements and further to lessen the burden on vessels (David, 2007).

In the BALMAS project, the BWM DSS for the Adriatic (David & Gollasch, 2016) was developed based on previous experience and models (BWM DSS in: David (2007), and David & Gollasch (2015d)), considering the specifics of the Adriatic Sea area.

The electronic BWM DSS consists of the following software modules: BW Reporting information System (BWRS), Early Warning System (EWS), Decision Support System (DSS), and Web User Interface (WUI), also providing some specific tools for user management and system monitoring (Forte *et al*., 2014a, 2014b, 2016).

The BW Reporting System (BWRS) information system manages the reporting in advance on BW operations from vessels and information storage. BWRSs can support the Adriatic Maritime Authorities in implementing a common operating procedure to gather and exchange information on management and operations related to BWM conducted by vessels that intend to call at the ports of the Adriatic Sea. It is based on the information acquired using an agreed BW Reporting Form to be submitted by the vessels or by the related Agent.

The Adriatic Early Warning System (EWS) module allows the provision of an automated alert service for vessels and authorities, relating to the timing and mode of transmission of information, able to enhance the response capabilities relative to issuing a warning to ships

as well as to other potentially affected states according to the BWM Convention requirements. The alert addressed to vessels is aimed at preventing the uptake of ballast water with high concentrations of harmful aquatic organisms or pathogens. The alert to environmental and health authorities is needed to warn them of the presence of non-indigenous species or pathogens in waters under their jurisdiction, also in view of timely and effective intervention, if deemed necessary.

The DSS module, interfacing with the BW reporting and EWS modules, is aimed to guide and support the decision-making process to be conducted by the Maritime Authorities on the BW Management operations on board vessels intending to call at the Adriatic ports. That process, primarily affecting the Port State control activities, is based on the:

- i) Analysis of the BWRF submitted by the ship to the Port State Authority;
- ii) Ballast water discharge assessment conducted based on the total BW capacity and the cargo operations (quantities and types of goods that will be loaded and/or unloaded) that the ship intends to carry out in the arrival port;
- iii) Risk Assessment of the ballast water declared as retained on board;
- iv) Analysis of the BWM conducted by the ship.

The results of those assessments and analysis could trigger the appropriate Control Monitoring Enforcement to be carried out by the competent Authorities. All data and information collected during the decision-making processes as well as their results, will be stored in the DSS database in order to provide information on the historical BWC compliance of the ship and will also be useful for selecting vessels for CME.

Instrument/tool: The BWM DSS has been implemented as a cross-border electronic web-based IT platform based on a Service-Oriented Architecture (SOA). It is accessible on the web[7] using the most common web browsers by a comprehensive Web User Interface (WUI) based on the open source PostgreSQL software.

[7] https://bwmdss.guardiacostiera.gov.it/

The WUI includes a Home Page and an appropriate number of other web pages and it allows access for authorized web users (i.e. representing authorities and project partners) through an authentication procedure using the credentials provided. The authentication procedure will take place with direct recognition and the user's positive identification. The WUI allows web user management in order to release the access credentials (username and password) and to associate the user attributes (registries, profiles and functions enabled, filters, groups and organization membership, etc.). Through the WUI, the authorized web users are able to handle and use all the settings, tools and functionalities provided by the system.

WUI allows the creation of different user profiles. Each profile will be defined and characterized by the same set of system tools and functionalities permitted for the user the profile is associated with. The following user profiles have been defined for BWM DSS purposes:

 i) System Administrator;

 ii) Adriatic State Administrator/s;

 iii) Adriatic Port State/Environmental/Competent Authority operators;

 iv) Guest user.

BW Reporting Forms and other input data for EWS purposes may be collected through manual entry by the operators and by an automated request/delivery through a specific M2M web services to be provided by the related national/local system, if it exists (e.g. Port Management Information System and/or HAOP database).

Action time frame: The BWM DSS is ready to be used at any given time by all authorized web users.

Organisational aspects: The BWM DSS is hosted and managed by the Italian Coast Guard Headquarters within the MAREΣ platform[8]. Also, ICG HQs provides appropriate and secured internet access to the web application, the hardware and software maintenance and upgrading as well as the management of user access (Adriatic national administrators and Italian users).

Human resources: Italian Coast Guard Headquarters IT personnel are ensuring the BWM DSS is properly maintained and kept in fully operational capability.

Financial resources: The BWM DSS hardware and software were purchased by BALMAS project funds. All other costs for personnel and system operation needs will be sustained by ICG HQs.

Legal aspects: The BWM DSS has been implemented within the MAREΣ platform that was been realized under the provision of Article 9 on "Infrastructure for ship reporting systems, ships' routing systems and vessel traffic services" of Directive 2002/59/EC establishing a Community vessel traffic monitoring and information system and repealing Council Directive 93/75/EEC. It is therefore consistent with the current infrastructure in place in the ports of EU Member States.

A formal adoption of the BWM DSS as an official Adriatic IT platform supporting the Adriatic State Authorities in complying with the BWM Convention requirements by sharing data, information and actions taken on the BW management and related possible threats to the marine environment, should be needed for establishing a common regional decision support system. Also, the following issues will be addressed at least: the appointment of the BWM DSS steering group, identification of the Administrations/Bodies/Agencies authorized to have access to the system and the profile to be associated with the related web user, definition of the programs and staff for the web user training.

Such an adoption could be pursued through regional and/or sub-regional cooperation carried out in the framework of the UNEP/MAP Secretariat (supported by REMPEC and by

[8] The Mediterranean AIS Regional Exchange Server hosted and managed, since 2009, by the Italian Coast Guard HQs in agreement with the European Maritime Safety Agency (EMSA) is the main Regional system for collecting, distributing, storing and visualizing the AIS data collected by EU Mediterranean Countries' AIS networks.

RAC/SPA for relevant matters). A joint decision in this forum would help implement the DSS consistently within the Adriatic Sea countries giving a sufficient sense of reliability. Cooperation with EU institutions and agencies should also be considered as fundamental (*i.e.* EMSA).

A different option would be to adopt the DSS at the national level only, by decisions of the competent authorities in each Adriatic country. In this case, disadvantages could emerge in relation to the consistency of DSS use across the basin. This could lead to questioning the DSS level of reliability for the basin as a whole.

The adoption of the DSS should be supported by the adoption at the national level of sanctions so severe as to discourage violations of the Convention. The uniformity of sanctions across the basin would help the protection of the Adriatic Sea. This could also be pursued through the involvement of EU institutions and related amendments to the relevant EU legislation on ships' sanctions for pollution offences.

The implementation of the decision-making process is to be carried out by the Port State involving all the competent authorities for each aspect involved. The system requires employees on a national level in order to maintain, service and support the system.

5.6.6.4 Risk Assessment for Exemptions

Convention reference: Ships may be exempted from BWM requirements provided that a number of conditions are satisfied, including the assessment of the risk level of related ballast water discharges, based on the Guidelines on Risk Assessments under Regulation A-4 (G7 (IMO 2007)).

The BWM Convention requests a party to develop BWM policies, strategies or programs relating to its particular conditions and capabilities. The Convention also provides for the assessment of risks if State Parties want to identify additional measures based on Guidelines for additional measures, including emergency situations.

Exemptions from BWM requirements based on Risk Assessments (RA) can be given on the basis of Regulation A-4, while additional measures may be introduced based on Regulation C-1.

Activity description: In cases when an RA, prepared according to the G7 Guidelines, results in an acceptable low risk, exemptions from BWM requirements may be given. Any possible exemption is specific to the ship, or different ships, sailing between specified ports or locations. The exemptions may be granted for a maximum of five years, but may also be withdrawn if the risk situation changes, i.e., if the risk becomes unacceptable during this period (IMO 2007; David & Gollasch, 2010). The RA developed under the framework of the BWM Convention is the most recent and the only globally agreed RA framework for BWM purposes (David *et al*., 2015c).

Models for BALMAS activity RAs for exemptions have been developed for a uniform implementation by the Adriatic countries (David & Gollasch, 2015g). The model in the decision-making process considers different premises based on best available scientific knowledge and expertise from different knowledge fields, i.e., invasion biology, maritime transport, BWM, RA, regulatory affairs, environment and human health protection.

Instrument/tool: Adriatic risk assessment model for exemptions from ballast water management.

Action time frame: The RAs for exemption model should be implemented after the entry into force of the BWM Convention.

Organisational aspects: The involvement of maritime and port authorities.

Human resources: Personnel from maritime and port authorities.

Financial resources: Costs for personnel involved and for system maintenance.

Legal aspects: The need for a common agreed approach/model is laid down in the IMO G7 Guideline (section 6.5 Evaluation and decision-making)**.** It requires that port States that plan to grant exemptions shall, for both the evaluation and consultation processes, consider Regulation A-4.3 especially. This regulation defines that any exemption shall not negatively impact the environment, human health, property or resources of adjacent or other States.

This regulation also mandates that States that could be potentially or adversely affected need to be consulted, and that the Parties involved should refer to section 8 of the G7 Guidelines regarding this consultation (David *at al.,* 2015b).

5.6.6.5 Compliance Monitoring and Enforcement

Convention reference: A number of provisions of the BWM Convention (Articles 3.3, 9, 10, 11 and 12) and other IMO documents establish requirements and guidance for control actions and inspections.

Relevant guidance specific to ballast water include the following:

- Guidelines for Port State Control under the BWM Convention (PSC Guidelines) were adopted on 17 October 2014 by the Resolution MEPC.252(67) to provide basic guidance for conducting port State control (PSC) inspections to verify compliance with the requirements of the BWM Convention.
- Guidelines for Ballast Water Sampling (G2) (G2 Guidelines) were adopted on 10 October 2008 by the Resolution MEPC.173(58) to provide Parties, including PSC officers (PSCO), with practical and technical guidance on ballast water sampling and analysis (BWS) for the purpose of determining whether a ship is in compliance with the BWM Convention.
- Guidance on ballast water sampling and analysis for trial use in accordance with the BWM Convention and Guidelines (G2) (BWS Guidance) as per IMO BWM.2/Circ.42 of 24 May 2013 to provide general recommendations on methodologies and approaches to sampling and analysis to test for compliance with the standards described in regulations D-1 and D-2 of the BWM Convention. BWS guidance are to be considered in conjunction with the BWM Convention, the PSC Guidelines and the G2 Guidelines.

According to Article 9 of the BWM Convention, a vessel to which the BWM Convention applies may be subject to inspection in any port or offshore terminal of the port State that is party to the BWM Convention. The purpose of such an inspection is to determine whether or not the vessel is in compliance with the BWM Convention.

Activity description: Actually, taking into consideration the Port State Control procedures in force in Europe, ships are selected for inspection on the basis of priorities calculated daily by the information system managed by EMSA (Thetis) on the basis of generic and historic parameters.

When the BWMC enters into force, these parameters will most likely be amended in order to take into account the BWM Convention requirements.

It should be noted that, unlike all the other International Maritime Conventions, the BWMC establishes immediate mitigation measures to be taken by the PSC Inspector, even on the conclusion of the Initial Inspection.

In fact, in the case of evidence of non-compliance, based for example on sampling findings, the PSCO must order a halt to the discharge of ballast water or to prohibit it entirely, in the case of major non-compliance which leads to the detention of the ship.

In general, the PSC Inspection starts with a check of documents and certificates (initial Inspection) and may be followed by a "more detailed inspection" if clear grounds are detected.

Clear grounds that warrant a more detailed inspection include:

- books, manuals and plans not properly kept or updated;
- the absence of principal equipment or arrangements required by the BWMC;
- information or evidence that the captain or crew is not familiar with the essential shipboard operations foreseen by the BWMC, or that such operations have not been carried out;

- results of the indicative analysis.

It should be noted that examples of clear grounds for a more detailed inspection are included in the Guidelines for Port State Control under the BWM Convention (Resolution MEPC.252(67) adopted on 17 October 2014.

In cases when a PSC decides to carry out a more detailed inspection, ballast water shall not be discharged from that vessel until it is proven that it can discharge ballast water without risk of harm to the environment, human health, property or resources.

As stated in art. 9 of the Convention, the PSC Inspection may result in sampling ballast water.

The IMO Guidelines for ballast water sampling (G2) focus on compliance testing but do not provide a harmonized approach to the number of samples that need to be taken, the timing of sampling, the duration of sampling, the sampled water quantity or how the results of any analysis should be interpreted or used. As a matter of fact, the sampling test necessary to assess whether a ship complies with the BWM Convention is divided into two parts: the Indicative Analysis, which is helpful for establishing whether a ship is compliant or non-compliant with the Convention, then the Detailed Analysis that provides scientific evidence whether the ships are non-compliant with the Convention. The latter should normally be carried out in laboratories.

In May 2013, the MEPC approved Circular BWM.2/Circ 42 (Guidance on Ballast Water Sampling and Analysis for Trial Use in Accordance with the BWM Convention and Guidelines (G2)) to provide general recommendations on methodologies and approaches to sampling and analysis for compliance testing for the D-1 and D-2 standards.

The guidance includes information on the sampling and analysis approaches and methods for compliance testing. The methods and approaches are dependent on the type of analysis (*i.e.,* indicative or detailed analyses).

Before the BWEM Convention enters into force, vessels sailing to Adriatic Sea ports could conduct BWE to comply with the Mediterranean BWM Guidance, in this case with the D-1 Standard. However, some vessels may already have a BWM system installed and operational, meaning that it would be complying with the D-2 Standard.

After the BWM Convention enters into force, States may check the compliance of vessels with the standards of the BWM Convention according to Article 9.

Instrument/tool: The BWM CME DSS.

Action time frame: The BWM CME DSS should be implemented after the entry into force of the BWM Convention.

Organisational aspects: The involvement of maritime and port authorities.

Human resources: To conduct an inspection, a port state officer/inspector needs to board the vessel and take samples on the spot. To perform this activity, it is estimated that at least one full-time employee is needed per 2000 vessel arrivals at a port. A port state officer/inspector needs a set of tools for ballast water sampling and sample analysis for indicative tests for in-tank and at-discharge sampling.

Financial resources: Costs for personnel involved.

Legal aspects:

1. TARGETING INSPECTIONS ON ADRIATIC BWM RISKS

According to both the Paris MoU and the EU Directive 2009/16/EC on the scope of PSC inspections, frequency and priorities are largely determined by the ships' risk profile, which guides the selection of ships to be inspected (High-Risk Ships – Standard Risk Ships – Low-Risk Ships).

Currently, no parameters of the ships risk profile are directly connected to ballast water risks. In order to target for inspections those ships that would be more likely to pose a BWM risk, the "overriding or unexpected factors" defined by the agreements in force should be used.

Further developments would be needed at international and/or regional and/or subregional levels, as well as in the European Union framework.

2. ENSURE UNIFORM SANCTIONS IN ADRIATIC BORDERING COUNTRIES

According to the BWM Convention, the sanctions that are to be established under national law should be sufficiently adequate in severity to discourage violations wherever they occur.

Considering the extreme vulnerability of the Adriatic Sea, it would be important to harmonize the legislation of bordering countries to this effect, regarding violations committed by national flags and regarding violations committed within national jurisdiction.

EU legislation on ship pollution sanctions could be amended in order to facilitate harmonization and further international cooperation at the regional and sub-regional levels should be pursued.

3. ENSURE THE AVAILABILITY OF SPECIFIC TOOLS FOR SAMPLING AND ADEQUATE INSTITUTIONAL ARRANGEMENTS FOR PROVIDING ANALYSIS AND TESTS WITH LEGAL VALUE

Shipping agreements tend to reduce the carrying out of physical operations on board ships by PSCOs to the minimum. In practical terms, samplings provided for by the BWM Convention require significant organization in terms of expertise available that could be addressed by the existing public authorities or bodies, subject to specific national arrangements. Currently, none of these arrangements are in place.

From a different perspective, once on board a ship, the PSCO needs to be sure that the tool or technical means he is using and related laboratory analysis will be recognized as valid during formal judicial or administrative proceedings. The standardization of measures and of technical tools is an essential requisite to smooth PSC activities.

If a violation is detected, the PSC should evaluate whether or not the national legislation has provided for such an act and has to proceed accordingly. Should a vessel be penalised, this needs to be recorded in the database of penalty history. The sanctions implemented should be of adequate severity to discourage further violations.

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