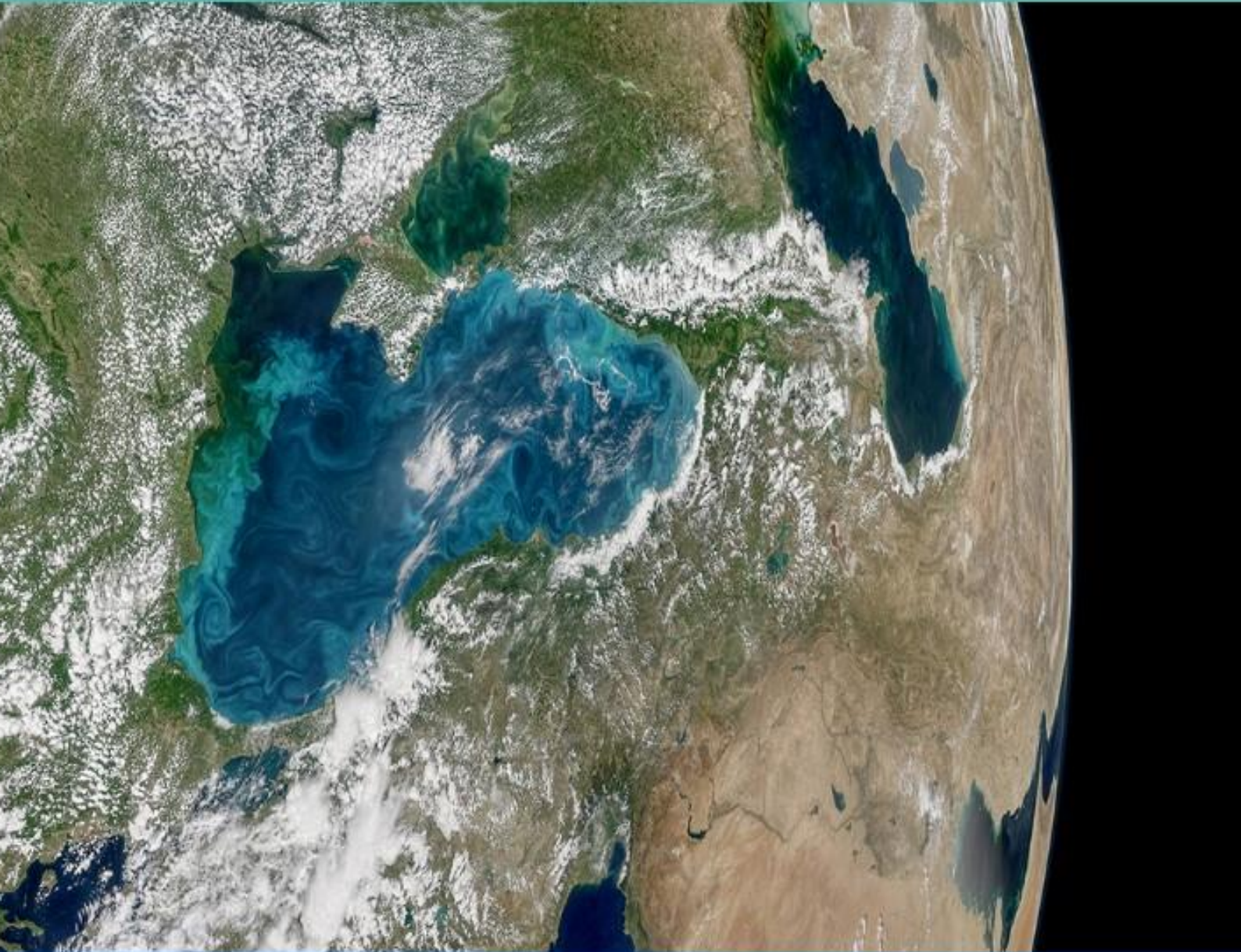


Coordination of Marine and Maritime Research and Innovation in the  
Black Sea  
**Black Sea CONNECT**



**FIRST VERSION OF UPDATED  
BLACK SEA SRIA**



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### Classification

This document is:

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<b>Confidential</b>	
<b>Restricted</b>	x
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## EXECUTIVE SUMMARY

This document is the first update of the Black Sea Strategic Research and Innovation Agenda (Black Sea SRIA). This updated Black Sea SRIA will guide stakeholders from academia, funding agencies, industry, policy and society to address together the fundamental Black Sea Challenges, to promote blue growth and economic prosperity of the Black Sea region, to build critical support systems and innovative research infrastructure and to improve education and capacity building. This document is one of the first key outcomes of the Black Sea CONNECT CSA and instrumental for the support of the Blue Growth Initiative for Research and Innovation in the Black Sea (the Initiative). As such, this deliverable should be considered as the 'proposition resulting from the CSA-powered platforms' and will be evaluated by Black Sea Officials Working Group for the implementation of the Black Sea SRIA (Black Sea SRIA WG-GSO) (i.e. the steering body of the Initiative) and their input will be further considered in a final version of the 'Updated SRIA'.

For the further development and update of this document, the existing SRIA (2019) developed by the SRIA working group (active between 2017-2019, authoring the 2018 Burgas Vision Paper as well) have been used as a guide for all discussions at the national and international level. There will be one other update of the SRIA in 2022. Both updates will act as vehicles for providing inputs to discussions with an aim for a successful construction of the SRIA Implementation Plan.

This first update of SRIA is a result of the discussions held during the National Black Sea SRIA Consultation Workshops organized by the Black Sea countries for establishment of national platforms with various stakeholder groups including policy-makers, regulatory agencies, researchers, and end-users. The inputs provided by each pillar of the Black Sea SRIA on needs, gaps and priorities were analyzed, in the national platforms, considering the research and innovation challenges for the Black Sea, identified by recent and on-going relevant initiatives and projects at the country's level. The results from national platforms included identified gaps, barriers and bottlenecks on innovation and new technologies, scientific knowledge, and sustainable development of marine and maritime economic sectors.

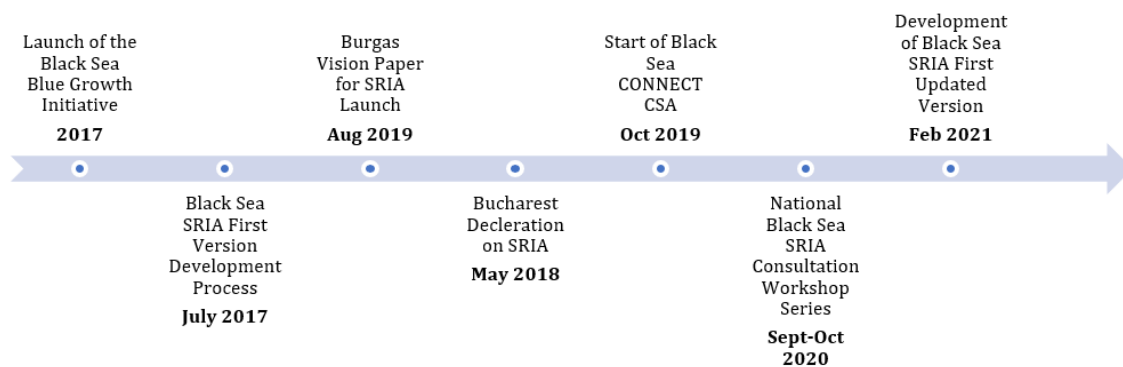
New actions (Pillar 1: 26 New Actions; Pillar 2: 12 New Actions; Pillar 3: 10 New Actions; Pillar 4: 14 New Actions) have been proposed for the SRIA pillars, by the country-level platforms. These new activities will be discussed at a regional/international level in the final version of the updated SRIA, in an international platform, mirroring the national networks of various sectors (research, industry, policy and civil society). This mechanism will ensure constant dialogue and consultation with relevant national stakeholders, the outputs of which will be brought up to the international level.

The final version of the SRIA, towards the end of the project, will include all the new agreed actions per pillar at international level, show the priorities, address multi-funding schemes and promote the public-private cooperation in research, innovation and technology development to boost marine and maritime blue economy.





## 1. INTRODUCTION



### Black Sea SRIA Timeline

In 2017, an Initiative was launched and supported by the European Commission (EC) to develop a joint research and innovation agenda and guide national and EU-level policymakers named as, ‘The Blue Growth Initiative for Research and Innovation in the Black Sea’. As highlighted in the Burgas Vision Paper, this expert working group consisted of *experts from Black Sea coastal countries, (Republic of Bulgaria, Georgia, Romania, the Russian Federation, the Republic of Turkey and Ukraine, as well as the Republic of Moldova), in cooperation with marine experts from leading European marine institutes and organisations, with the support of the European Commission*<sup>1</sup>.

Eight workshops were held by the experts joining the Blue Growth Initiative for Research and Innovation in the Black Sea with the support of the European Commission. Initially information on both national and international marine research projects were collected and analysed. Secondly, gaps and research and innovation opportunities together with the necessary justification and drivers from each Black Sea country were collated. Thirdly, regional and national boundary and framework conditions for the Research and Innovation needs and opportunities for successful implementation of a SRIA were identified.

As a result of these efforts, the Burgas Vision Paper<sup>1</sup> the key framework document for a shared vision of a productive, healthy, resilient, sustainable and better-valued Black Sea by 2030. The paper was launched during the European Maritime Day 2018 in Burgas, Bulgaria (May 2018). It addresses the key pillars on which a new Strategic Research and Innovation Agenda (SRIA) can be built on. This process was further supported by the Ministerial Declaration towards a Common Maritime Agenda (2018)<sup>2</sup> for the Black Sea, endorsed by the same Black Sea countries.

<sup>1</sup> [https://ec.europa.eu/maritimeaffairs/maritimeday/sites/mare-emd/files/burgas-vision-paper\\_en.pdf](https://ec.europa.eu/maritimeaffairs/maritimeday/sites/mare-emd/files/burgas-vision-paper_en.pdf)

<sup>2</sup> [https://ec.europa.eu/maritimeaffairs/maritimeday/sites/mare-emd/files/burgas-ministerial-declaration\\_en.pdf](https://ec.europa.eu/maritimeaffairs/maritimeday/sites/mare-emd/files/burgas-ministerial-declaration_en.pdf)



To further update the Black Sea SRIA and develop its Implementation Plan, Black Sea CONNECT CSA is tasked to scientifically, technically and logistically support the Black Sea Blue Growth Initiative, towards the implementation of the Burgas Vision Paper, and the key pillars on which the Black Sea SRIA was built on.

There are three overarching considerations throughout the Black Sea SRIA:

1. The pillars support developing and adopting innovative, fit-for-purpose observation and data sharing systems (combining ecology and social data) building on existing networks.
2. The actions are designed to benefit primarily from co-funding and co-programming mechanisms and bodies at national, transnational and international level.
3. The Black Sea SRIA will be updated on a regular basis in dialogue and in close link with relevant national and research stakeholders, and further clarifications and revisions will be made as needed.

A key output of the Black Sea SRIA is to help identify national-level priorities to contribute to the development of national Blue Growth agendas and where possible align funding opportunities. Furthermore, the actions proposed in the Black Sea SRIA and their implementation aim to generate scientific knowledge, which includes better ecosystem assessments, forecasts and management, as well as an understanding of the vulnerabilities of the ecosystem. Knowledge is the key element towards science-based and well-informed decision-making and only such policymaking can pave the way to a sustainable blue economy.

The Black Sea SRIA, with its further updates, is considered to be living documents integrating a shared effort to foster blue growth in the Black Sea region. Black Sea SRIA targets multiple stakeholders and end-users, involving all relevant players in the consolidation process, national ministries, regional authorities, research organizations, research infrastructures, academia, the private sector, non-governmental and international organizations and the public, thus engaging the quadruple and the quintuple innovation helix framework. Finally, it addresses the crucial aspect of multilevel governance, bottom-up and horizontal (interregional and transnational), which must be taken into account when implementing its goals.

The overall objective of this Deliverable is to update and further develop, where needed, the Black Sea SRIA, based on the defined principles in the Burgas Vision Paper as well as the national consultations and stakeholders' inputs that have been made during 2020 in all Black Sea countries. The overall aim of the Black Sea SRIA and its Implementation Plan will guide stakeholders from academia, funding agencies, industry, policy and society to address together with the fundamental Black Sea challenges, to promote blue growth and economic prosperity of the Black Sea region, to build critical support systems and innovative research infrastructure and to improve education and capacity building.



## 2. OBJECTIVES

Black Sea CONNECT CSA, as a part of its work package 2, has aimed to identify national-level priorities, through national workshops, to prepare a plan for implementing the Black Sea Strategic Research and Innovation Agenda (Black Sea SRIA), contributing to the development of national Blue Growth agendas. The Black Sea SRIA will be updated twice by the Black Sea CONNECT CSA life-time, with the aim to define the needs, gaps and priorities in each of the pillars of the Black Sea SRIA, by analysing and streamlining the various national contributions. By doing this, the goal is to update the process at the national level to a transnational, regional concept, and align actions, pertinent to the research and innovation priorities at the regional level. Black Sea CONNECT targets various stakeholder groups, such as policy-makers, regulatory agencies, researchers, entrepreneurs and end-users for all the countries of the Black Sea aiming to contribute to a holistic approach towards the Blue Growth development in the Black Sea.

For his purpose, National Black Sea SRIA Consultation Workshops in all the Black Sea countries to get additional information to achieve the first update of the Black Sea SRIA, were held in September and October 2020 in order to:

- Identify and set the national priorities first, to align actions and objectives at the regional basin scale level;
- Provide concrete input to the Implementation Plan with tangible actions proposed by the stakeholders, based on the national priorities identified during the workshop;
- Establish contacts with stakeholders for future cooperation for setting an active multistakeholder platform;
- Disseminate information and increase the visibility of the action and the Initiative and get feedbacks.

It should be noted that the Black Sea SRIA has to be treated as an inclusive and living document. During the life-time of Black Sea CONNECT CSA, Black Sea SRIA will be updated twice including this version, in order to include any additions, missing actions and targets that could fit the national policy and industry requirements.

This Deliverable addresses the outputs of the first round of national consultations and the inputs that have been made during the discussions. The prospect is that by the end of the project, a broader and inclusive consultation with the academic communities as well as a profound and wide-reaching engagement of key stakeholders and end-users will be realized for Black Sea SRIA Implementation Plan.

## 3. METHODOLOGY

The existing Black Sea SRIA was consolidated in dialogue and in close link with relevant national stakeholders through the organization and the implementation of the National Black Sea SRIA Consultation Workshops under the responsibility of partner institutions. These consultations have been organized during September and October 2020 virtually, or in some



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cases hybrid, due to the COVID-19 restriction measures. This task in the project includes two rounds of national SRIA workshops, to be held in each Black Sea country during the Black Sea CONNECT CSA lifetime, in its first and its final year. This deliverable addresses the results of the first round of the national workshops.

National Black Sea SRIA consultation workshops served as a platform to bring relevant stakeholders and actors together to collaboratively work on the outlined specific pillars of Black Sea SRIA and analyze the needs, gaps and priorities of the Agenda.

Black Sea Connect coordination team circulated a Concept note as a guideline to implement the National Black Sea SRIA Consultations Workshops to align contributions at a regional level and support the basin-scale approach in the best way. An updated concept note for the second workshop in 2022 will be also delivered in due time by CSA coordination team.

The Concept note outlined the key aspects of the National Black Sea SRIA Consultation Workshops to help Black Sea CONNECT partners to organize them in a harmonized way, following the same approach. For the first set of workshops was anticipated that these contributed the national-level feedback from the partner countries' diverse stakeholders (academia, funding agencies, industry, policy and society). The proposed methodology was rigid enough to allow comparable results, and flexible enough to allow countries to give their national perspective.

The process of the Black Sea SRIA first update was organized in 3 phases:



## A. Preparatory Phase

During the Kick-off Meeting (in December 2019) a group of partner institutions responsible for the task was set up to guide the process at country level. The Black Sea SRIA was translated in the national languages and together with the concept note was sent electronically (in some countries) for preliminary information to a comprehensive national list of target audience prepared by each partner, or presented during the National Black Sea SRIA Consultation Workshop. Invitations and agendas were sent to the target audience prior to the Workshops.

Target Audience included: (Non-exhaustive list)

- Universities, institutes, research centres, science bodies
- National funding agencies
- Relevant ministries (Fisheries, Environment, Energy, Transport, Education, Tourism, Economy, etc.) and local authorities (municipalities)
- NGOs, CSOs, Initiatives, start-ups, etc.



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- Experts (Marine science, economy, sustainability, education, oceanography, etc.)
- Business

## B. National Black Sea SRIA Consultation Workshops (events)

Originally the National Black Sea SRIA Consultation Workshops were planned as a two-day physical event scheduled for March – May 2020. However, due to the COVID-19 pandemic and the related restrictions they were postponed for September – October and organized as an on-line or hybrid form (details in the Table).

Countries	Dates and Place	Host Organization
<b>Bulgaria</b>	24 September, (on-line)	IO-BAS
<b>Georgia</b>	28 September, Tbilisi (Hybrid)	TSU
<b>Romania and Moldova</b>	24 September, Constanta (Hybrid)	GEOECOMAR, UST, NIMRD
<b>Russia</b>	10 September, Durso (Hybrid)	SIO-RAS
<b>Turkey</b>	16 September (on-line)	METU, TUBITAK
<b>Ukraine</b>	15 October (on-line)	UkrSCES

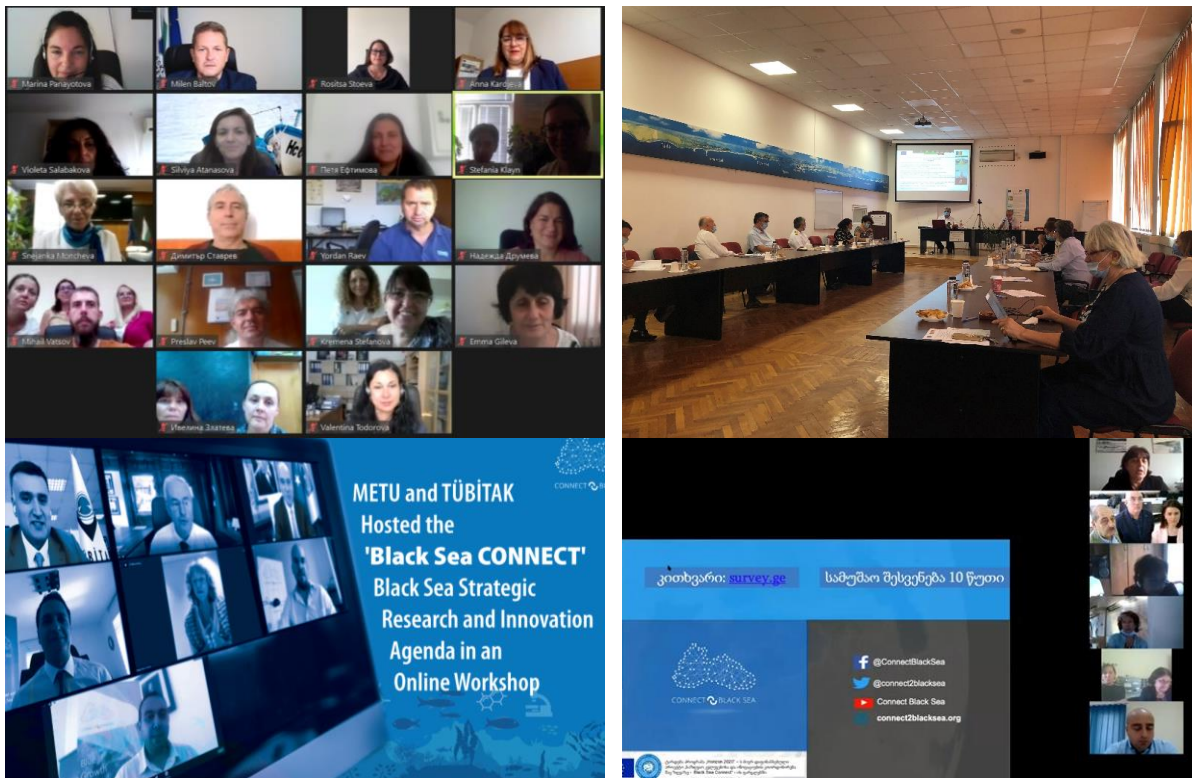
The design of the events in each Black Sea country followed a unified approach with the following main elements:

- An opening session with addresses from National key officials (Ministries, Universities, Scientific Institutes, etc.), European Commission and the Project Coordinator and short presentation of Black Sea SRIA and Black Sea CONNECT CSA;
- Breakout sessions by Black Sea SRIA pillars with carefully selected moderators and administrators/rapporteurs;
- A plenary where the results of the breakout sessions were presented and discussed.

The breakout sessions were the key element for the success of the event as they were expected to generate the main input to SRIA update:

- Score the SRIA Actions under each Goal in the corresponding pillar on a scale 1 to 5 (as proposed by the Romanian partners) on a specially designed template distributed by the Coordination team as a basis to identify the National priorities in a harmonized way;
- Formulate new Goals/Missing topics/Actions of National relevance to fill in eventual gaps in Black Sea SRIA, give a priority rank as a time line (short, medium and long-term) and the corresponding actors.





Images from Bulgarian (top-left) and Romanian (top-right) Turkey (bottom-left) Georgia (bottom-right) National Black Sea SRIA consultations

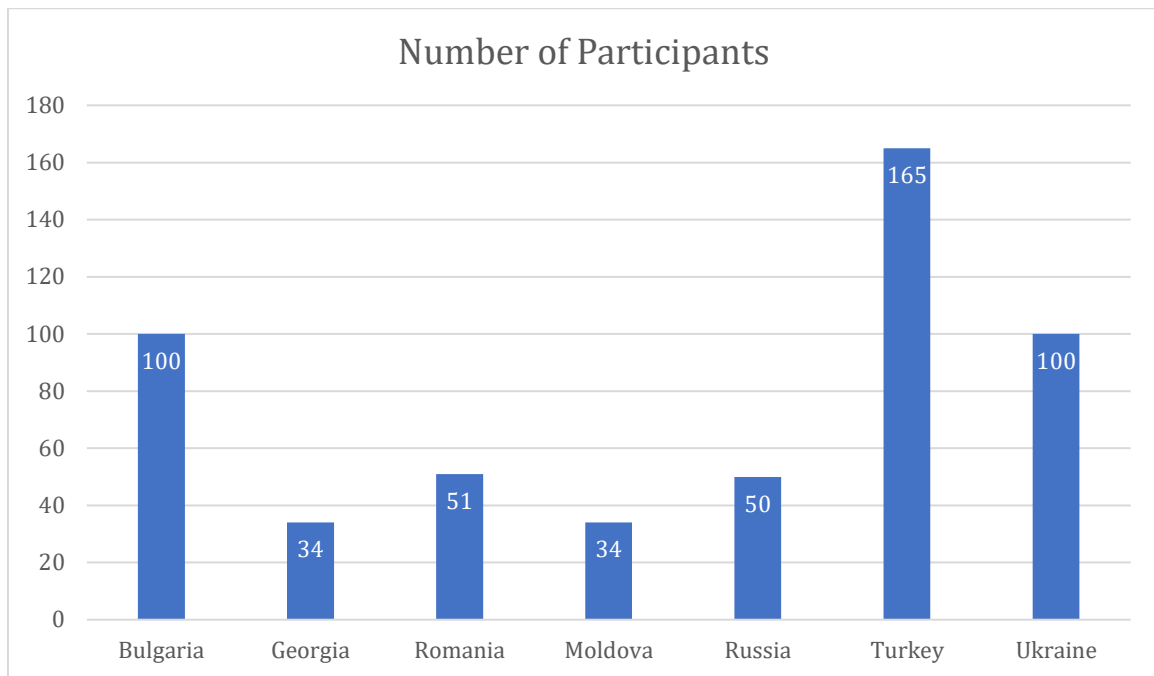
### C. Workshop output synthesis

A total of about 600 attendees participated in the Stakeholder consultation events in the 7 Black Sea countries varying between 34 and 160 participants (Fig. 1). Among the diverse stakeholders’ audience more than half were Universities and Research Institutes representatives (Fig. 2). However, key representatives of National Ministries and Agencies were also among the active attendees (~ 30%) as well as the business and the society. It should be noted that the audience was well gender balanced (Fig. 3).

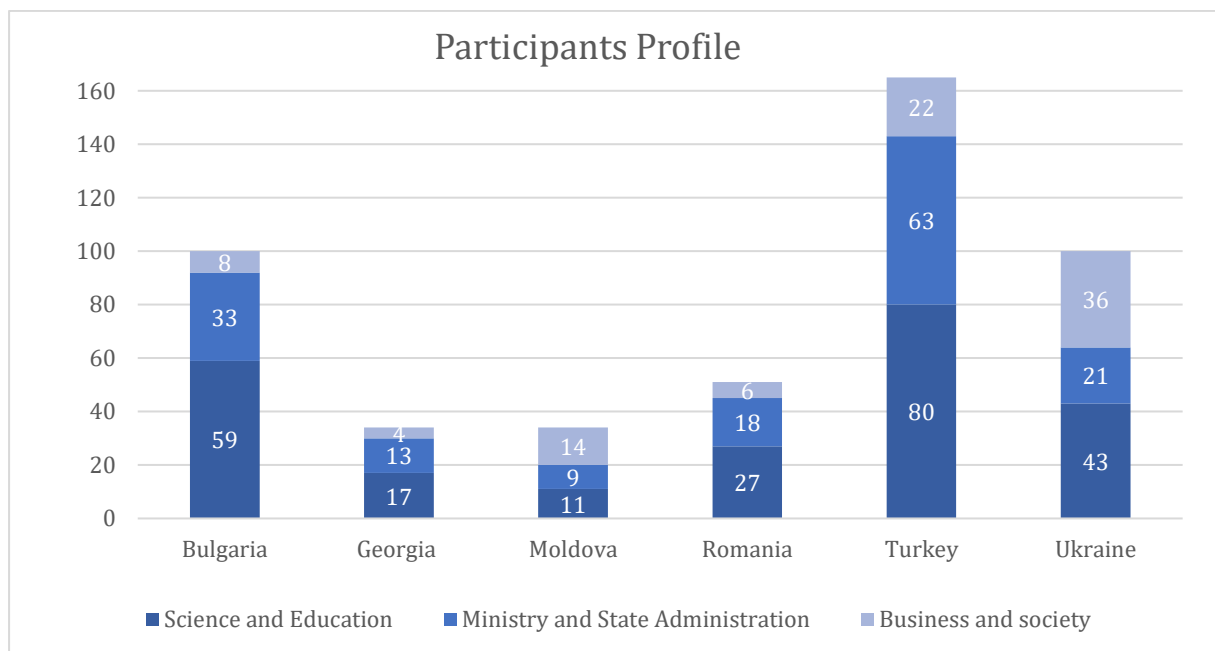
The National Black Sea SRIA Consultation Workshop in Russia took place as a session under a broader event entitled “Sustainable Development of Marine/Blue Economy in the Azov-Black Sea Region, the Importance of Maritime Spatial Planning – 2020” that took place in a hybrid form on the September the 10<sup>th</sup> 2020. For that purpose, relevant data is it is not included in the number of participants, gender balance and participants profile. More explanation regarding the data collection in Russia is explained below.



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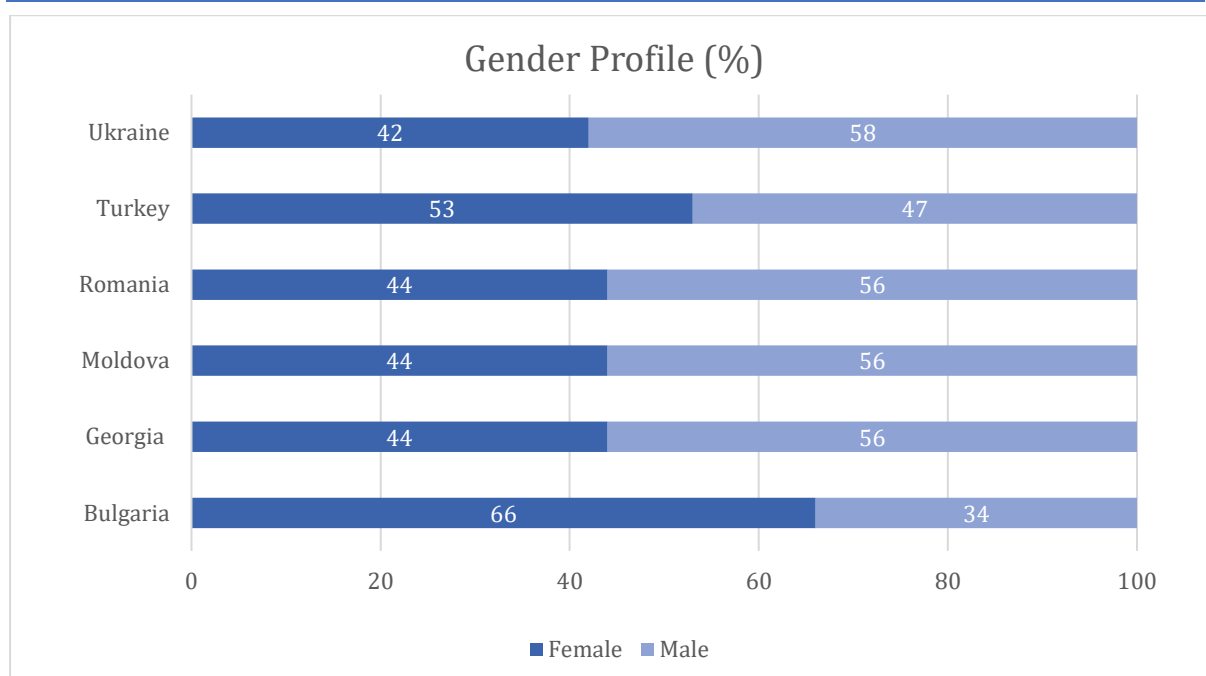
**Fig. 1.** Number of participants per Black Sea country



**Fig. 2.** Participants profile by stakeholder category in the Black Sea workshops



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**Fig. 3.** Gender profile of the National Black Sea SRIA Consultation Workshops participants by countries

The breakout and plenary sessions were featured by active discussions that enabled ‘big data’ output, e.g. high amount of information and ideas for national priority actions/actors as input for the Black Sea SRIA updates.

In order to streamline the synthesis of the workshops output the following approach was undertaken:

- To enable scaling of the national priority in a unified way the ranking of each action of the original Black Sea SRIA was given either a score High priority - HP (if the score was 5-4) or Low priority - LP (in case of score between 3-1) based on the initial 1-5 score scale. Depending on the corresponding score given by the National Consultation workshops, the seven countries initials were marked in one of these two categories (Tables First Updated SRIA). Russia followed the same scoring system but the scores were based on expert judgement consent between the two Russian partners based on the views of participants in a High-Level Conference organized in Russia and on relevant Projects output comprehensive review.
- The New Proposed Actions by all countries were arranged in corresponding Tables by Pillars and Goals below each Pillar Goal of the original Black Sea SRIA. Each New Proposed Action was marked with the initials of the country who proposed the action. New Proposed Actions addressing the same original Action were combined keeping the country initials. The draft Tables were distributed among the responsible Black Sea partners (originators) for revision. The New Proposed Actions addressing only strictly national issues were excluded from the synthesis. The original National Reports prepared by each partner are attached to this document as Annexes.





- The procedure aimed to make a ranking of the original Black Sea SRIA actions to enable the selection of common ones (voted by at least 4 countries) with the potential of possible regional priorities to be discussed during the second round of the National Stakeholders Consultations (planned for 2022). These new actions will be further debated at a regional/international level, in an international platform, mirroring the national networks of various sectors (research, industry, policy and civil society). This mechanism will ensure constant dialogue and consultation with relevant national stakeholders, the outputs of which will be brought up to the international level and to be included in the Final Updated Black Sea SRIA.

The First updated SRIA will not be a standalone document.

#### 4. First Updated SRIA

The First updated Black Sea SRIA represents the original Tables of Black Sea SRIA (Pillars and Actions by Pillars) with the scores attributed to each action by the 7 Black Sea countries (country initials) and the corresponding New Proposed Actions that reflect identified gaps, barriers and bottlenecks on innovation and new technologies, scientific knowledge, and sustainable development of marine and maritime economic sectors from national perspective as an outcome of the National Stakeholders Workshops.

#### Priority Ranking by Pillars and Actions

The synthesis of the ranking of the original Black Sea SRIA actions shows that albeit the heterogeneity of the scoring by countries almost all actions (excluding 3 out of total 41) were considered of common importance and priority (voted by 4 countries or more) (Fig. 4).

A top priority by all 7 countries was given to 15 Actions, associated mainly with the fundamental Black Sea research challenges (**Pillar1**), building of critical support systems and research infrastructures (**Pillar3**) and education and capacity building (**Pillar4**):

- **Pillar1** Developing innovative multi-disciplinary research (**Main Goal 1**) and promoting of new knowledge to mitigate the impacts of global climate change and the multiple environmental stressors (**Main Goal 2**), more specifically the focus is on:
  - addressing ecosystem threats, e.g. eutrophication, deoxygenation, invasive species, emerging pollutants, litter (P1.1.1)
  - food system research, including fisheries, recruitment, stock assessment and sustainability, MPAs, biotech (P1.1.2)
  - quantify sources of natural and anthropogenic inputs towards an understanding of the drivers and processes that influence the Black Sea at wider scale (P1.2.1)
  - research on integrated coastal and marine management (P1.2.1)
- **Pillar 3** Developing smart, integrated observing and monitoring systems (**Main Goal 1**), advancing a harmonised set of working methodologies (**Main Goal 2**) and developing new marine based technologies (**Main Goal 3**) with focus on:



- produce, collect and digitise and verify existing historical data for compatible high-quality data sets (the FAIR principles and open data access) (P3.1.1.)
  - develop common monitoring standards and research infrastructures for integrated coastal and marine management in support of policy- and decision makers (P3.2.1) and common methodology and transboundary pilot schemes for marine spatial planning (P3.2.2)
  - identify and promote key technologies and innovations in close interaction with solution providers and best practices (P3.3.1)
- **Pillar 4** Supporting formal and informal learning, education, training and use of knowledge and technologies for established and emerging marine and maritime jobs (**Main Goal 1**), **Empowering** ocean-engaged citizens contributing to a clean, plastic free, healthy and productive Black Sea (**Main Goal 2**) and Contributing to enhanced science policy dialogue in formulating coastal and marine policies and programmes (**Main Goal 3**) with focus on:
- development of new programmes, the design and implementation of dedicated undergraduate, MSc, PhD and postdoctoral programmes for future researchers and professionals in all fields of Blue Growth (P4.1.1)
  - develop programmes for life long training and vocational education of professionals in integrated coastal and marine management and blue economy (P4.1.2),
  - promote Citizen Science (P4.2.1)
  - nurture a Black Sea cultural/scientific identity, through dedicated education (P4.2.2)
  - integrated outreach (P4.3.1)
  - train policy and decision makers (P4.3.2) and
  - establishment of Black Sea Ambassadors (P4.3.3)

As of high common priority (by 6 countries) were identified 11 actions from the above 3 Pillars and **Pillar 2** Developing products, solutions and clusters underpinning Black Sea Blue Growth, creating incentives for maritime innovation in existing and new, emerging blue economy sectors (**Main Goal 2**) and especially the activities related to:

- renewable energy sectors such as offshore wind and wave energy and the potential of responsible exploration of gas hydrates (P2.2.1)
- sustainable high-tech fisheries and aquaculture including multi-use platforms (P2.2.2)
- new and innovative tourism offers and services to promote synergies between coastal tourism and other activities (P2.2.4)
- promote low-emission, carbon-neutral ships and freight operations and circular economy principles to achieve sustainable and green shipbuilding, repair and retrofit (P2.2.5)
- promote innovative marine litter (including microplastics) detection and management techniques (P2.2.6)



From **Pillars 1, 3 and 4** in addition to those listed above the following specific actions were also given a high common priority:

- promote socio-economic research focusing on coastal communities interacting with the marine ecosystem to understand how drivers of marine environment and human induced pressures impact the communities (systems approach) (P1.1.4)
- increase knowledge on ecosystem resilience through an improved understanding of specific Black Sea features such as Rim current dynamics, mesoscale features, suboxic-anoxic interface, deep part and their roles in nutrient fluxes, productivity and fisheries (P1.2.5)
- develop and enhance a network of dedicated Marine Research Infrastructures building on existing European and international initiatives, ensuring interaction between the ongoing projects and research activities (P3.1.1)
- support the development of coherent basin-scale programmes for the conservation and valorisation of marine cultural heritage (P3.3.2)
- enable researchers, innovators and entrepreneurs open and easy access to research infrastructures and networks via the establishment of the Open Transnational Service and Access initiatives (P3.4.1)
- support students, graduates and early career researchers to gain practices and undergo work placement apprenticeships schemes in businesses and institutions active in blue economy

The low common priority (by 3 countries only) is limited to 3 actions, related to:

- develop integrated, novel evolutionary end-to-end (microbes to fish) modelling and data analyses capacity (P1.2.6)
- define geological features located near shore and offshore, their evolution through time and support the business uptake of innovative technologies to boost growth by avoiding potential geo-hazards (P2.1.2)
- promote mentoring and training for new start-ups and coaching for scaling-up companies in blue economy and blue growth at local/regional levels (P4.1.4)



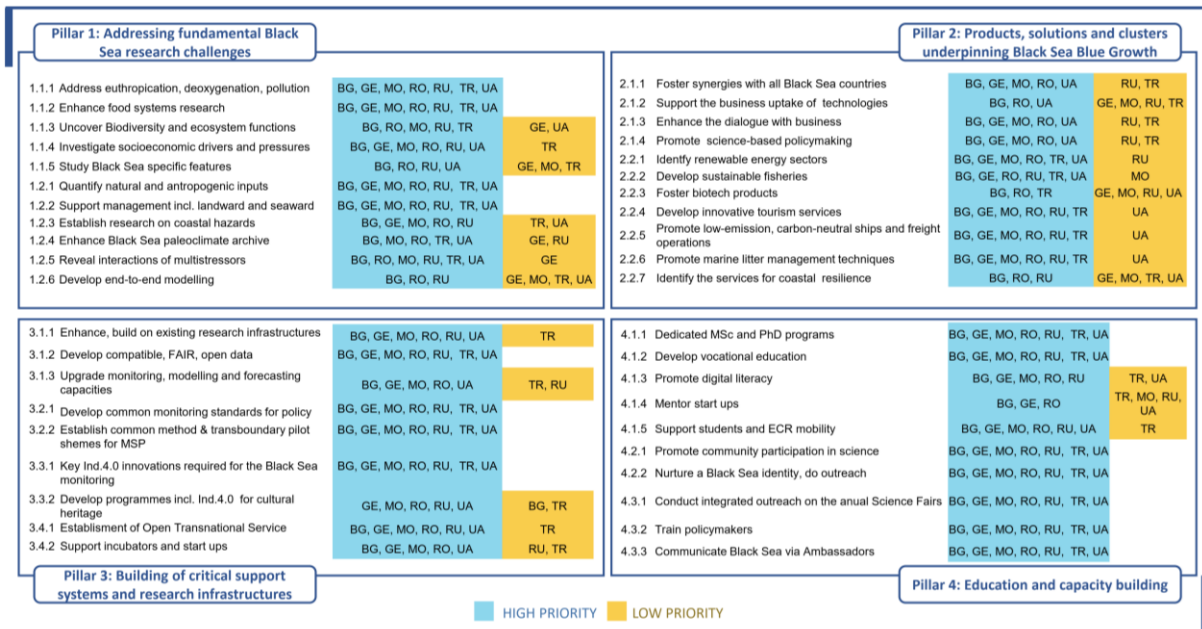


Fig. 4. Black Sea country Priority ranking by Pillars and Actions

By countries **Romania** and **Bulgaria** ranked all 41 actions of the Black Sea SRIA as of high priority (scores 4-5) (Fig. 5).

**Georgia** ranked 33 actions (80 %) of high priority (all 9 actions in Pillar3 and the 10 actions in Pillar4, 6 actions in Pillar 1 (out of 11) and 8 in Pillar 2 (out of 11).

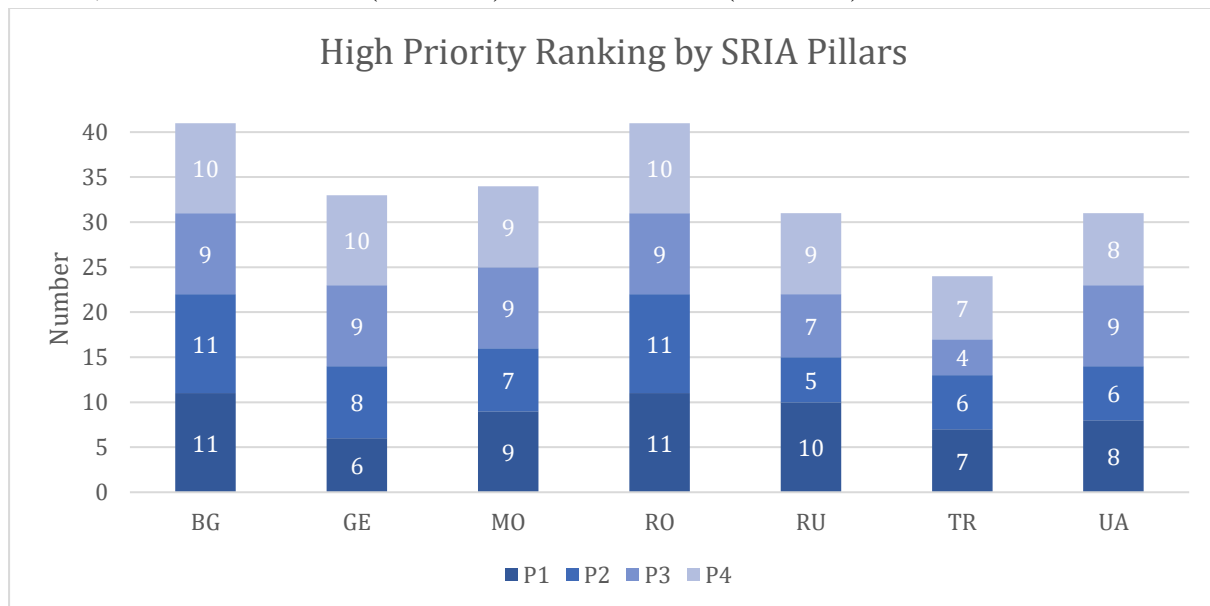


Fig. 5. High Priority ranking by SRIA Pillars by Black Sea countries (P-Pillar)

**Moldova** gave priority to 34 actions (83 %) (all 9 actions in Pillar3, 9 actions in Pillar1 (2 with low priority), 9 – in Pillar4 (1 with low priority), and 7 in Pillar2 while 4 of low priority).





**Russia** ranked 31 actions of high priority (80 %) with at least 1 action of low priority scored in all Pillars, mostly in Pillar2 (6 actions against 5 ranked of high priority).

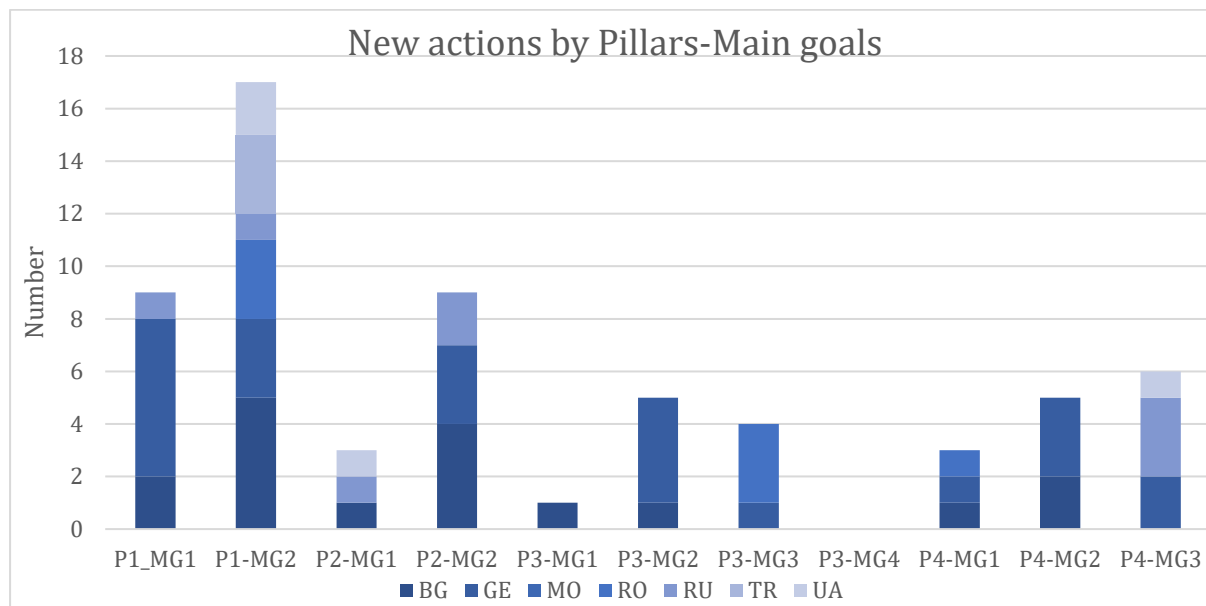
**Ukraine** similar to Russia also ranked 31 actions of high priority (80 %), but with different association among Pillars (all 9 actions in Pillar3 of high priority, 8 – in Pillar1, 8 in Pillar4 (2 of low priority) and like Russia the low priority actions are in Pillar2 (5 out of total 11).

**Turkey** is the country with the lowest high ranked priority actions 24 (~ 58 % of all the SRIA actions) with actions of low priority scored in all Pillars, mostly in Pillar2 (5 versus 6 of high priority) and Pillar3 (5 versus 4 of high priority).

## Proposed New Actions

A total of 62 new actions are proposed as a result of the active discussions during the National Stakeholders workshops. Although unevenly associated with the Black Sea SRIA Pillars/ Main Goals (MG) they enabled ‘big data’ output, e.g. substantial amount of information and suggestions for national priority actions/actors as input for the Black Sea SRIA updates.

The highest number (26) address Pillar1 (P1\_MG1- 9 and P1\_MG2-17) and P2\_MG2 (9) which is quite in conformity with the results of the prioritisation of the SRIA actions by the Black Sea countries. No new actions were proposed to address P3-MG4 (*Mechanisms to create, support and promote start-ups oriented towards the circular and blue economy*) and only 1 proposal is related to P3\_MG1 (Fig. 6).



**Fig. 6.** New actions proposed by SRIA Pillars and Main goals (MG)

By countries Georgia contributed with the highest number of new proposed actions (23), Bulgaria (17), Romania (10), Russia (10) (Fig. 6).



Some of the new proposed actions specify/detail the more generally formulated original Black Sea SRIA actions, important to focus the interest at regional level, while others contribute to fill in missing actions or are relevant to overcome existing barriers.

Among the 9 new proposed actions under Pillar1-MG1 the majority address the needs related to the specific Black sea challenges (HABs, gelatinous exotic species, fish, beach and bathing pollution regional monitoring programmes) and the ecosystem services.

The 17 actions proposed under Pillar1-MG2 highlight various aspects in need of new knowledge to mitigate the impacts of global climate change and the multiple environmental and anthropogenic stressors in the Black Sea, specifically coastal hazards, methodological standards, modelling, technologies for mitigation, MPA and gas seeps and their ecological and resource importance in particular.

The new actions proposed under Pillar 2 (12) highlight innovative solutions for sustainable development of port infrastructure (Smart ports), marine gas hydrates, eco-friendly integrated multitrophic aquaculture (EfIMA) potentials, Early Warning (EW) systems for ecological hazards, targeting the need of maritime innovation in existing and new, emerging blue economy sectors.

Under Pillar 3 the new actions (10) emphasize the ICZM and MSP issues under (P3-MG-2) and under P3-MG3 focus on issues related to the conservation and valorisation of marine cultural heritage, lack of understanding of the link between cultural heritage and social and environmental aspects, the need of special research programmes and legislative framework for the practice of recreational diving and scientific research.

Under Pillar 4, 14 new actions are proposed specifying the various training needs and educational programs, campaigns for shaping ecological behaviour and culture towards enhanced capacity building for blue growth in the Black Sea.

The most important role of the process of the First updated Black Sea SRIA is that it set the stage for national multi-stakeholder platforms dialogue with the prospect that by the end of the project a profound and wide-reaching engagement of key stakeholders and end-users will be achieved to secure far-reaching ambition and capacity to catalyse SRIA implementation and boost progress for the Black Sea blue economy.



## 5. Next Steps for Black Sea SRIA

This report will be submitted to the Research Executive Agency of European Commission as a Black Sea CONNECT CSA deliverable. It will also be submitted for the review of the Black Sea Officials Working Group for the implementation of the Black Sea SRIA (Black Sea SRIA WG-GSO) and Directorate-General for Research and Innovation of the European Commission (DG RTD). Consisting of members from the relevant ministries in the 7 Black Sea countries, Black Sea SRIA WG-GSO is the main body to support the implementation of the Black Sea SRIA. The tentative plan is to remotely seek input before and present this Update during the 2021 March meeting of the Black Sea SRIA WG-GSO. The comments will be integrated into the final update of the Black Sea SRIA that will be delivered in 2022.



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<b>Pillar 1 - Addressing fundamental Black Sea research challenges</b>				
Main Goal 1 - Developing innovative multi-disciplinary research, building on existing initiatives, including data sharing mechanisms that will generate the knowledge needed to increase ecosystems resilience.				
#	Actions	Main Actor(s)-Initiative	National Priority for countries	
			Low Level (1-3)	High Level (4-5)
1.1.1	Address the main Black Sea challenges on eutrophication, deoxygenation, invasive species, emerging pollutants, litter. <i>(Medium/Long Term)</i>	Academia, BSC, FAO, GFCM Ministries and Related Governmental Agencies, Private Sector, Research Institutions		BG, GE, MO, RO, RU TR, UA
1.1.2	Enhance food systems research including fisheries, recruitment, stock assessment and sustainability, MPAs, biotech (such as alternative protein sources) <i>(Medium/Long Term)</i>	Academia, BSC, FAO, GFCM, Ministries and Related Governmental Agencies, Research Institutions		BG, GE, RO, RU, TR, UA
1.1.3	Fill gaps in understanding the evolution of the Black Sea, ecosystem dynamics, biogeographic patterns, biodiversity, and ecosystem functions (including living resources) and potential impacts of aquaculture. <i>(Short Term)</i>	Academia, BSUN, FAO, GFCM, IOC-UNESCO, Ministries and Related Governmental Agencies, National Authorities, Navy Oceanographic Offices, Research Institutions, UNEP	GE, UA	BG, RO, MO, RU, TR
1.1.4	Promote socio-economic research focusing on coastal communities interacting with the marine ecosystem to understand how drivers of marine environment and human induced pressures impact the communities (systems approach) <i>(Short/Medium Term)</i>	Academia, Black Sea NGO Forum, BSEC, CPMR, Maritime Clusters, National Statistical Institutes, Port Authorities, Research Institutions, Union of Black Sea Municipalities	TR	BG, GE, MO, RO, RU, UA
1.1.5	Increase knowledge on ecosystem resilience through an improved understanding of specific Black Sea features such as Rim current dynamics, mesoscale features (such as fronts, eddies, vertical upwelling), suboxic-anoxic interface, deep part (including the sea bottom) in the Black Sea and their roles in nutrient fluxes, productivity and fisheries <i>(Short/Mem Term)</i>	Academia, Ministries and Related Governmental Agencies, Private Sector, Research Institutions, Space Agencies, UNDP	GE, MO, TR,	BG, RO, RU, UA



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New actions proposed in 2020 Consultations under Pillar 1: Main Goal 1			
#	Actions	Main Actor(s)-Initiatives	Suggested
1	Create Black Sea Digital Twin to improve the information to scientists and the broader public.	Institute of Oceanology-BAS, National Institute of Meteorology and Hydrology, Ministry of Environment and Waters, Ministry of Transport, Maritime Executive Agency, Coastal Municipalities	BG
2	Assess, map and monitor the Black Sea ecosystem services and develop prognostic scenarios for their status under natural and anthropogenic stress.	Institute of Oceanology-BAS, Institute of Biodiversity and Ecosystem Research-BAS, Institute of Fisheries Resources, Ministry of Agriculture, Forestry and Food, Fisheries and Aquaculture Executive Agency, Ministry of Environment and Waters, Black Sea Basin Directorate, Environmental NGOs, Coastal Municipalities	BG
3	Implement bathing water pollution monitoring for all public beaches.	BSC, BSEC, environment, tourism and health ministries/agencies and coastal local authorities in Black Sea countries, NGOs.	GE
4	Establish national Blue Flag or equivalent beach and bathing water rating schemes.	BSC, BSEC, Blue Flag (Foundation for Environmental Education), environment, tourism and health ministries/agencies and coastal local authorities in Black Sea countries, NGOs.	GE
5	Implement harmful algal bloom (HAB) regional monitoring programs (in situ and remote sensing).	BSC, environment and health ministries/agencies and coastal local authorities in Black Sea countries. Ministry of ecology and natural resources of Ukraine, National Academy of Science of Ukraine, related agencies and research institutions	GE, UA
6	Establish joint (e.g., Georgia-Turkey) fisheries monitoring and assessment programme with public data sharing based on FAIR principles.	BSC, BSEC, environment and/or agriculture and fisheries, tourism ministries/agencies, fisheries ports, fisherman associations, national and international NGOs (such as FFI).	GE
7	Develop Global Fishing Watch-compatible open access big data pilot scheme for the Black Sea (including vessel tracking data publishing).	BSC, BSEC, environment and/or agriculture and fisheries, tourism ministries/agencies, fisheries 8ports, fisherman associations, national and international NGOs (such as FFI International/Caucasus Office).	GE
8	Establish regional mechanisms for conservation of the Black Sea coastal habitats	BSC (CBD Advisory Group), environment ministries/agencies, coastal local authorities.	GE
9	Address the main Black Sea challenges on increasing native gelatinous species blooms. To provide new knowledge of the impacts of climate change on invasive ctenophores Mnemiopsis leidyi/Beroe ovata control using climatology approach.	SIO RAS; State assignment of Ministry of Higher Education and Sciences, UNDP	RU



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<b>Pillar 1 - Addressing fundamental Black Sea research challenges</b>				
<b>Main Goal 2 - Providing new knowledge to mitigate the impacts of global climate change and the multiple environmental and anthropogenic stressors in the Black Sea from land-sea interface to the deep basin</b>				
#	Actions	Main Actor(s)-Initiatives	National Priority for countries	
			Low Level (1-3)	High Level (4-5)
<b>1.2.1</b>	Quantify sources of natural and anthropogenic inputs including from the river catchments, atmosphere, maritime activities, towards an understanding of the drivers and processes that influence the Black Sea at wider scale (covering river-to-sea interactions and atmosphere – hydrosphere interfaces) <i>(Short/Medium Term)</i>	Academia, BSC, Coastal Communities, Maritime Agencies, Ministries and Governmental Agencies Municipalities, NGOs, Port Authorities, River Commissions, Research Institutions, Research Infrastructure Networks, Space Agencies		<b>BG, GE, MO, RO, RU, TR, UA</b>
<b>1.2.2</b>	Develop research on integrated coastal and marine management including the interaction between land-based and sea-based activities and their impacts on coastal zones, both landward and seaward <i>(Short/Medium Term)</i>	Academia, BSC, CPMR, Ministries and Government Agencies, MEDCOAST, Municipalities, NGOs, Research Institutions		<b>BG, GE, MO, RO, RU, TR, UA</b>
<b>1.2.3</b>	Establish research on coastal hazards: erosion, submarine landslides, sea level rise, extreme events, flooding, and connections with climate change <i>(Short/Medium Term)</i>	Academia, Copernicus, Ministries and Governmental Agencies, Municipalities, Research Institutions	<b>UA, TR</b>	<b>BG, GE, MO, RO, RU</b>
<b>1.2.4</b>	Use state of the art geochemical proxy tools and advanced models to enhance Black Sea paleoclimate archive to shed light on the recent geological and biogeochemical natural evolution of the Basin <i>(Short/Medium Term)</i>	Academia, Infrastructures from IODP, IOC-UNESCO, International Marine Research Networks, Research Institutions	<b>GE, RU</b>	<b>BG, MO, RO, TR, UA</b>
<b>1.2.5</b>	Reveal the interactions between multiple stressors, biodiversity and marine ecosystem functioning as well as demonstrate how adaptation and evolution may change ecosystem response to changing stressors <i>(Short/Medium Term)</i>	Academia, Copernicus, Global and Regional Observing Systems, IOC-UNESCO, Research Infrastructure Networks, Research Institutions	<b>GE</b>	<b>BG, RO, MO, RU, TR, UA</b>
<b>1.2.6</b>	Develop integrated, novel evolutionary end-to-end (microbes to fish) modelling and data analyses capacity	Academia, Copernicus, Research Institutions	<b>GE, MO, TR, UA</b>	<b>BG, RO, RU</b>



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<b>New actions proposed in 2020 Consultation under Pillar 1: Main Goal 2</b>			
<b>#</b>	<b>Actions</b>	<b>Main Actor(s)-Initiatives</b>	<b>Suggested by</b>
1	Develop quality standards of the Black Sea sediments, create sediments archive for reconstruction of the paleoevolution and reconstruction of the historical record of pollutant discharges from anthropogenic activities.	IO-BAS, NIGGG-BAS	<b>BG</b>
2	Study the underwater gas seeps towards short-term prognosis of their ecological, climatic and resource importance.	IO-BAS, NIGGG-BAS	<b>BG</b>
3	Carry out pollution related research to develop harmonised models of diffusive sources and data base for point sources. Assess microplastics pollution in different media and identify the sources.	Ministry of Environment and Waters, Environmental Executive Agency, Black Sea Basin Directorate, Coastal municipalities, IO-BAS, IBER-BAS	<b>BG</b>
4	Assess the effects of exploration and exploitation of marine living and mineral resources on benthic ecosystem and seafloor conditions and the impact on the Black Sea ecosystems.	Ministry of Environment and Waters, Black Sea Basin Directorate, IO-BAS, IBER-BAS (no actors suggested by RO)	<b>BG, RO</b>
5	Introduce advanced technologies so that impacts on wild stocks and coastal marine habitats are minimized.	Ministry of Environment and Waters, Black Sea Basin Directorate, Ministry of Agriculture, Forestry and Food, Fisheries and Aquaculture Executive Agency, IO-BAS, IBER-BAS, IFR	<b>BG</b>
6	Evaluate to what degree no-take or highly protected MPAs provide resilience or a buffer against ecosystem disruption caused by climate change.	Ministry of Environment and Waters, Black Sea Basin Directorate, Ministry of Agriculture, Forestry and Food, Fisheries and Aquaculture Executive Agency, IO-BAS, IBER-BAS	<b>BG</b>
7	Development of regional coastal models, future predictions, models for the digital ocean. Development and implementation of modern technologies of modelling and forecasting the state of the marine environment	<b>No Actors Suggested</b> Ministry of ecology and natural resources of Ukraine, National Academy of Science of Ukraine, related agencies and research institutions	<b>RO</b> <b>UA</b>
8	Strategies for implementing actions for counteract the effects of the climate change.	<b>No Actors Suggested</b>	<b>RO</b>
9	3D mapping of sea bottom morphology and of velocities of the Black Sea currents	<b>No Actors Suggested</b>	<b>RO</b>
10	Sharing Project / Scientific research data with users	<b>No Actors Suggested</b>	<b>TR</b>
11	Common use of funders for tracking up-to-date data on new generation pollutants	<b>No Actors Suggested</b>	<b>TR</b>



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<b>12</b>	Develop the "FOOD NETWORK MODELING" project with the cooperation of countries in order to develop evolutionary dynamics.	N/A	<b>TR</b>
<b>14</b>	Creating task force for addressing urgent challenges and threats (bioinvasions, biohazards and natural and technogenic catastrophes, pollution, epidemic outbreaks)	Ministry of ecology and natural resources of Ukraine, National Academy of Science of Ukraine, related agencies and research institutions	<b>UA</b>
<b>15</b>	Establish operational Black Sea Catchment Observation System ( <a href="http://enviroGRIDS.net">http://enviroGRIDS.net</a> ), to monitor and act on nutrient pollution loads (including introduction of economic and financial instruments for reduction of loads).	BSEC and BSC (with UNIGE support, having MoU with BSC), environment ministries/agencies and education ministries/universities of littoral countries.	<b>GE</b>
<b>16</b>	Develop local safe landfill management programs (collection, transfer, disposal)	Solid Waste Management Company of Georgia Ltd. (under Ministry of Infrastructure and Development of Georgia), Regions, Municipal Authorities.	<b>GE</b>
<b>17</b>	Undertake national inventories and mapping of coastal hazards.	National marine and coastal environment monitoring agencies, coastal protection, maritime authorities.	<b>GE</b>
<b>18</b>	Develop research based on modern approaches (climatology assessments, remote sensing techniques) to integrate coastal and marine areas studies, including the interaction between land- and sea-based activities	SIO RAS, Southern branch of SIORAS	<b>RU</b>



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<b>Pillar 2 - Developing products, solutions and clusters underpinning Black Sea Blue Growth</b>				
Main Goal 1 - Supporting marine and maritime research and innovation domains of all the Black Sea countries to create synergy, increase economic benefits, reduce hazards in service of prospering, resilient and empowered communities deriving interest from the Black Sea basin				
#	Actions	Main Actor(s)-Initiatives	National Priority for countries	
			Low Level (1-3)	High Level (4-5)
2.1.1	Promote and foster synergies, through networking events and meetings towards capacity building to transfer knowledge between clusters in the blue economy and reinforce existing inter-sectorial arrangements)	BSC, Black Sea NGO Forum, BSEC, CPMR, GFCM, Local Authorities, Local Communities, Maritime Clusters, Ministries and Related Governmental Agencies, Industries, Regional and National Networks	TR, RU	BG, GE, MO, RO, UA
2.1.2	Define geological features located near shore and offshore, their evolution through time and support the business uptake of innovative technologies to boost growth by avoiding potential geo-hazards ( <i>Medium Term</i> )	Academia, Local Authorities, Ministries and Related Governmental Agencies, NGOs, Private Sector, Research Institutions	GE, MO, RU TR	BG, RO, UA
2.1.3	Support the dialogue between researchers and business in order to promote and uptake of the circular economy principles as booster for sustainable innovation for blue growth ( <i>Medium Term</i> )	Academia, Maritime Clusters, NGOs, Private Sector, Research Institutions	TR, RU	BG, GE, MO, RO, UA
2.1.4	Support and promote methodologies for science-based policymaking, foresight and cost-benefit analyses and other financial instruments towards the assessment of the innovative and feasibility potential of the projects ( <i>Short Term</i> )	Academia, Ministries and Related Governmental Agencies, Research Institutions	TR, RU	BG, GE, MO, RO, UA



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New actions proposed in 2020 Consultation under Pillar 2: Main Goal 1			
	Actions	Main Actor(s)-Initiatives	Suggested by
1	Development of a unified database at national level with completed and on-going projects, in particular related to the blue growth in order to analyse and further use the results achieved.	Maritime Clusters, NGOs, Ministries and Related Governmental Agencies, Research Institutions, EC, national, private funds as public-private funding	BG
2	Apply the legal basis: The Law "On Strategic Environmental Assessment". Create the basis for future environmental impact assessment procedure and spatial planning for coastal areas.	Ministry of ecology and natural resources of Ukraine, Ministry of Education and Science of Ukraine, Ministry of Infrastructure of Ukraine, National Academy of Science of Ukraine, Odessa, Mykolayev, Kherson, Zaporizhia, Donetsk Regional State Administrations, related agencies and research institutions	UA
3	Development of regional models of economic activity, taking into account the need to preserve and improve the environment and the development of social infrastructure, forecasts of regional development with various regulatory impacts.	NWIM RANEPА	RU



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<b>Pillar 2 - Developing products, solutions and clusters underpinning Black Sea Blue Growth</b>				
<b>Main Goal 2 - Creating incentives for maritime innovation in existing and new, emerging blue economy sectors</b>				
#	Actions	Main Actor(s)-Initiatives	National Priority for countries	
			Low Level (1-3)	High Level (4-5)
2.2.1	Identify renewable energy sectors such as offshore wind and wave energy while investigating the potential of responsible exploration of gas hydrates. (Short/Medium Term)	Academia, Ministries and Related Governmental Agencies, Private Sector, Regional Authorities, Research Institutions	RU	BG, GE, MO, RO, TR, UA
2.2.2	Develop sustainable high-tech fisheries and aquaculture including multi-use platforms (Short/Medium Term)	Business Associations, FAO, Fisheries and Aquaculture Organisations, GFCM, Ministries and Related Governmental Agencies, Private Sector, Research Institutions, SMEs	MO	BG, GE, RO, RU, TR, UA
2.2.3	Foster biotechnology by exploring the potential of high-value, novel products from unique organisms inhabiting the Black Sea, along the whole value chain (Medium/Long Term)	Academia, Associations (such as European Aquaculture Association and European Society for Marine Biotechnology), FAO, GFCM, Ministries and Related Governmental Agencies, Private Sector, Research Institutions	GE, MO, RU, UA	BG, RO, TR
2.2.4	Further develop new and innovative tourism offers and services to promote synergies between coastal tourism and other activities (e.g. pesca-tourism, culture and underwater heritage, aquaculture, yachting) (Short Term)	Academia, Business Associations (such as shipbuilders), Local and Regional Authorities, Ministries and Related Governmental Agencies, Private Sector, Research Institutions	UA	BG, GE, MO, RO, RU, TR
2.2.5	Promote low-emission, carbon-neutral ships and freight operations in line with the international safety standards (e.g. elimination of water pollution noise reduction) and circular economy principles to achieve sustainable and green shipbuilding, repair and retrofit (Medium Term)	Academia, Ministries and Related Governmental Agencies, Port Authorities, Private Sector, Public Authorities, Research Institutions	UA	BG, GE, MO, RO, RU, TR
2.2.6	Develop and promote innovative marine litter (including microplastics) detection and management techniques in coasts and open waters, in line with the principles of awareness and circular economy (Short Term)	Academia, Black Sea NGO Forum, BSC, Citizens, UN (inc. GFCM), Local Communities, Ministries and Related Governmental Agencies, Municipalities, Private Sector, Research Institutions	UA	BG, GE, MO, RO, RU, TR



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2.2.7	Identify the services provided by marine biotic and abiotic resources for enhanced coastal protection and resilience (Short/Medium Term)	Academia, Local and Regional Authorities, Ministries and Related Governmental Agencies, Private Sector, Research Institutions	GE, MO, TR, UA	BG, RO, RU
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New actions proposed in 2020 Consultations under Pillar 2: Main Goal 2			
	Actions	Main Actor(s)-Initiatives	Suggested
1	Design and development of innovative solutions for sustainable development of port infrastructure and operations in line with the global trend for environmentally friendly "Smart ports (digitalization, automation, artificial intelligence, database, Internet of Things".	Port administration; NGO-s, Ministries and Related Governmental Agencies, Municipalities, Private Sector, Research Institutions, Black Sea Economic Cooperation – BSEC, EC, National, Private funds, local, public-private funding, international bodies.	<b>BG</b>
2	Development of platforms for accessible and easy to use IT services related to the blue economy for administrations, businesses, educational institutions	Academia, Local and Regional Authorities, Ministries and Related Governmental Agencies, Private Sector, Research Institutions, Black Sea Economic Cooperation (BSEC), International Center for Black Sea Studies (ICBSS), National, local budget, private funds	<b>BG</b>
3	Development of technologies for extraction of methane from marine gas hydrates and disposal of flue gases as hydrates in marine sediments Study gas hydrates as an energy resource, a factor for climate change, a geo-risk and a role in the carbon budget	Private Sector, Academia, Research Institutions, Ministries and Related Governmental Agencies, Regional Authorities	<b>BG</b> <b>RU</b>
4	Diversification of aquaculture target species and products. Explore the concept of EfIMA development in Allocated Zones for Aquaculture (AZA) and couple it with an integrative inclusion of stakeholders throughout the process. Eco-friendly integrated multitrophic aquaculture (EfIMA) potentials.	BSEP, BSC, environment, agriculture and fisheries ministries/agencies of the Black Sea littoral countries.	<b>BG</b> <b>GE</b>
5	Use of satellite Earth Observations (EO) for the Early Warning (EW) of the chemical hazards in marine environment.	BSC, ministries of environment of littoral countries.	<b>GE</b>
6	Applying Black Sea Catchment Observation System for modelling streams of waste/litter from land based and riverine sources flowing into the Black Sea and to quantify marine/beach litter.	BSEC and BSC (with UNIGE support, having MoU with BSC), environment ministries/agencies and education ministries/universities of littoral countries.	<b>GE</b>
7	. Establish more demanding sets of rules for maritime vessels in the Black Sea in order to combat pollution. Establish methodologies for maritime vessels voluntary reporting pollution incidents / affecting the marine ecosystem in the Black Sea basin. Establish clear responsibilities (including reporting the fulfilment of the obligations to implement the methodology).	No actors suggested  No actors suggested	<b>RU</b> <b>RO</b>



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<b>Pillar 3 - Building of critical support systems and research infrastructures for the benefit of Black Sea communities</b>				
Main Goal 1 - Developing smart, integrated observing and monitoring systems in support of addressing scientific and socioeconomic challenges of the Black Sea, towards governance for a sustainable ecosystem, mitigation of climate change impacts, and accurate forecasting for adaptive management				
#	Actions	Main Actor(s)-Initiatives	National Priority for countries	
			Low Level (1-3)	High Level (4-5)
<b>3.1.1</b>	Develop, and enhance a network of dedicated Marine Research Infrastructures at the Black Sea, building on existing European and international initiatives, ensuring interaction between the ongoing projects and research activities (Short Term)	Academia, BSEC, Copernicus, GOOS, IOC-UNESCO, Ministries and Related Governmental Agencies, Research Infrastructures (such as EMSO-ERIC, DANUBIUS-RI, EURO ARGO-ERIC, JERICO, HYDRALAB, EuroFleets), Private Sector, Research Institutions	<b>TR</b>	<b>BG, GE, MO, RO, RU, UA</b>
<b>3.1.2</b>	Produce, collect and digitise and verify existing historical data to make available compatible high-quality data sets (the FAIR principles and open data access) (Short/Medium Term)	Academia, NCPs, National Data Centres and Organisations, Regional Data Infrastructures and European Projects (such as Copernicus, EMODNET, SeaDataNet, SeaDataCloud, DANUBIUS-RI, EURO ARGO ERIC, EMSO-ERIC), Research Institutions, Regional and National Authorities		<b>BG, GE, MO, RO, RU, TR, UA</b>
<b>3.1.3</b>	Integrate, strengthen and upgrade monitoring, modelling and forecasting capacities to address social challenges (Short/Medium Term)	Academia, BSC, CMEMS, Copernicus, EuroGOOS, National Authorities, Regional and National Forecasting Centres, Regional Forecasters, Research Institutions, Risk Management Agencies	<b>TR, RU</b>	<b>BG, GE, MO, RO, UA</b>



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New actions proposed in 2020 Consultations under Pillar 3: Main Goal 1			
#	Actions	Main Actor(s)-Initiatives	Suggested by
1	Implement and maintain of integrated information system for the Black Sea (Open Science, European Open Science Cloud (EOSC) initiatives) based on innovative web tools.	Academia, research institutions, national authorities, national research infrastructure, NGOs, Governmental agency, Black Sea, EuroGOOS	<b>BG</b>



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<b>Pillar 3 - Building of critical support systems and research infrastructures for the benefit of Black Sea communities</b>				
<b>Main Goal 2 - Advancing a harmonised set of working methodologies, standards and procedures on all aspects of coastal and marine research</b>				
#	Actions	Main Actor(s)-Initiatives	National Priority for countries	
			Low Level (1-3)	High Level (4-5)
3.2.1	Develop common and monitoring standards and research infrastructures for integrated coastal and marine management in support of policy- and decision makers (Medium Term)	Academia, BSC, ICES, IMO, Maritime Clusters, MEDCOAST, Ministries and Related Governmental Agencies, Regional Authorities, Research Institutions		<b>BG, GE, MO, RO, RU, TR, UA</b>
3.2.2	Establish common methodology and transboundary pilot schemes for marine spatial planning at national and regional levels based on ecosystem approach (Short Term)	Academia, BSC, Local and Regional Authorities, Ministries and Related Governmental Agencies, MSP Platforms, Research Institutions		<b>BG, GE, MO, RO, RU, TR, UA</b>



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New actions proposed in 2020 Consultations under Pillar 3: Main Goal 2			
	Actions	Main Actor(s)-Initiatives	Suggested by
1	Improve transboundary/Black Sea regional integrated monitoring and modelling implementing technological innovations	Academia, BSC, ICES, IMO, Maritime Clusters, MEDCOAST, Ministries and Related Governmental Agencies, Regional Authorities, Research Institutions	<b>BG</b>
2	Preparation of a Guideline for Environmental Impact Assessments (EIA) of maritime and coastal projects for the Black Sea coastal countries	The Black Sea Commission (ICZM Advisory Group), national ministries/agencies responsible for environmental decisions on projects / plans in littoral countries.	<b>GE</b>
3	Preparation of a Guideline for Strategic Environmental Assessment (SEA) of maritime and coastal plans for the Black Sea coastal countries	The Black Sea Commission (ICZM Advisory Group), national ministries/agencies responsible for environmental decisions on projects / plans in littoral countries, Iv. Javakhishvili Tbilisi State University	<b>GE</b>
4	Maritime Spatial Planning Guideline for Black Sea coastal countries.	The Black Sea Commission, European MSP Platform, national planning ministries/agencies in Black Sea coastal countries.	<b>GE</b>
5	Implement priority actions prescribed by the Black Sea ICZM Guideline.	The Black Sea Commission (ICZM Advisory Group), national ministries/agencies responsible for planning and/or environmental decisions in littoral countries.	<b>GE</b>



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<b>Pillar 3 - Building of critical support systems and research infrastructures for the benefit of Black Sea communities</b>				
Main Goal 3 - Developing new marine based technologies by benefiting from the fourth industrial revolution for the Black Sea to promote safe and sustainable economic growth of the marine and maritime sectors, the conservation and valorisation of marine cultural heritage				
#	Actions	Main Actor(s)-Initiatives	National Priority for countries	
			Low Level (1-3)	High Level (4-5)
<b>3.3.1</b>	Identify and promote key technologies and innovations required for the Black Sea monitoring and research in close interaction with solution providers and best practices (Short/Medium Term)	Academia, BSEC, CPMR, EuroGOOS, Maritime Clusters, Ministries and Related Governmental Agencies, National Emergency Agencies, Port Authorities, Private Sector, Research Institutions, SMEs		<b>BG, GE, MO, RO, RU, TR, UA</b>
<b>3.3.2</b>	Support the development of coherent basin-scale programmes for the conservation and valorisation of marine cultural heritage (Long Term)	IOC-UNESCO, Media, Ministries and Related Governmental Agencies, Museums, NGOs, Research Institutions	<b>BG, TR</b>	<b>GE, MO, RO, RU, UA</b>



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New actions proposed in 2020 Consultations under Pillar 3: Main Goal 3			
	Actions	Main Actor(s)-Initiatives	Suggested by
1	Filling the lack of understanding of the importance of the link between cultural heritage and social and environmental aspects.	No Actors Suggested	RO
2	Development of special research programmes for information on and capitalization of underwater heritage.	No Actors Suggested	RO
3	Coherent and permissive national legislative framework for the practice of recreational diving and scientific research	No Actors Suggested	RO
4	Black Sea Data Cube development based on seamless integration of remote sensing, vector, model and other data across marine, coastal and catchment basins/domains.	BSC, UNIGE and UNEP/GIRD, national research institutions (partners of EU EnviroGRIDS project), geospatial companies, NGO-s	GE



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<b>Pillar 3 - Building of critical support systems and research infrastructures for the benefit of Black Sea communities</b>				
Main Goal 4 - Mechanisms to create, support and promote start-ups oriented towards the circular and blue economy in the Black Sea region economic growth of the marine and maritime sectors, the conservation and valorisation of marine cultural heritage				
#	Actions	Main Actor(s)-Initiatives	National Priority for countries	
			Low Level (1-3)	High Level (4-5)
<b>3.4.1</b>	Enable researchers, innovators and entrepreneurs open and easy access to research infrastructures and networks via the establishment of the Open Transnational Service and Access initiatives (e.g. transnational and virtual access)) (Short/Medium/Long Term)	Academia, Ministries and Related Governmental Agencies, National Authorities and Organisations, Regional Organisations, Research Infrastructures, Research Institutions	<b>TR</b>	<b>BG, GE, MO, RO, RU, UA</b>
<b>3.4.2</b>	Create, integrate and support incubators and techno parks for promoting SMEs, start-ups and innovative businesses for blue economy (Short/Medium/Long Term)	Academia, Chambers of Commerce and Industry, International Organisations Ministries and Related Governmental Agencies, Private Sector, Regional Organisations, Research Institutions, Startup Europe, Venture Capital	<b>TR, RU</b>	<b>BG, GE, MO, RO, UA</b>

**No new action is suggested under Main Goal 4 in 2020 Consultations**



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<b>Pillar 4 - Education and capacity building</b>				
Main Goal 1 - Supporting formal and informal learning, education, training and use of knowledge and technologies for established and emerging marine and maritime jobs				
#	Actions	Main Actor(s)-Initiatives	National Priority for countries	
			Low Level (1-3)	High Level (4-5)
4.1.1	Develop new programmes and coordinate existing ones (syllabus and curricula) to support and implement priorities defined in SRIA. This entails the design and implementation of dedicated undergraduate, MSc, PhD and postdoctoral programmes for future researchers and professionals in all fields of Blue Growth (Short/Medium Term)	Academia, Ministries and Related Governmental Agencies, Regional and National Authorities, Private Sector, Research Institutions, Training Organisations		BG, GE, MO, RO, RU, TR, UA
4.1.2	Develop programmes for life long training and vocational education of professionals in integrated coastal and marine management and blue economy (Short Medium Term)	Academia, BSC, MEDCOAST, Ministries and Related Governmental Agencies, Private Sector, Regional and National Authorities, Research Institutions, Training Organisations, Vocational Training Institutions		BG, GE, MO, RO, RU, TR, UA
4.1.3	Promote digital literacy (e.g. e-learning environments) and prepare for the rapid change in use and implementation of virtual technologies as an essential component of life long education in all fields of blue economy (Short/Medium Term)	Academia, Media, Ministries and Related Governmental Agencies, National and Regional Authorities, NGOs, Research Institutions, Private Sector, Training Organisations	TR, UA	BG, GE, MO, RO, RU
4.1.4	Promote mentoring and training for new start-ups and coaching for scaling-up companies in blue economy and blue growth at local/regional levels. (Short/Medium Term)	Academia, Business Community, Chambers of Commerce, BlueInvest Funds, Innovation Parks and Clusters, Ministries and Related Governmental Agencies, National and Regional Authorities, CPMR, Research Institutions, NGOs, Technological Parks, Training Organisations	TR, MO, RU, UA	BG, GE, RO
4.1.5	Support students, graduates and early career researchers to gain practices and undergo work placement apprenticeships schemes in businesses and institutions active in blue economy (Short/Medium Term)	Academia, Chambers of Commerce, Innovation Parks and Clusters, Ministries and Related Governmental Agencies, National and Regional Administrations, NGOs, Private Sector, Research Institutions, Technological Parks, Training Organisations	TR	BG, GE, MO, RO, RU, UA



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New actions proposed in 2020 Consultations under Pillar 4: Main Goal 1			
	Actions	Main Actor(s)-Initiatives	Suggested
1	Creating regionally aligned training programs for easier collaboration and creating uniformity in understanding the blue economy and blue growth.	No Actors Suggested	RO
2	Establish lifelong training and vocational education of professionals in ICZM, MSP and blue economy at leading universities in all coastal countries.	BSEC, BSC, BSUN, Erasmus+, Education, economy and/or environment ministries and leading universities in capitals and/or key coastal towns of Black Sea countries.	GE
3	Establishment of territorial national and regional investment profiles	Academia, Business Community, Chambers of Commerce, BlueInvest Funds, Innovation Parks and Clusters, Ministries and Related Governmental Agencies, National and Regional Authorities, CPMR, Research Institutions, NGOs, Technological Parks, Training Organisations	BG



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<b>Pillar 4 - Education and capacity building</b>				
<b>Main Goal 2 - Empowering ocean-engaged citizens contributing to a clean, plastic free, healthy and productive Black Sea</b>				
#	Actions	Main Actor(s)-Initiatives	National Priority for countries	
			Low Level (1-3)	High Level (4-5)
4.2.1	Educate the communities in the region towards the unique value of the Black Sea and promote Citizen Science in the region ( <i>Short/Medium Term</i> )	Academia, EMSEA, Local Authorities, Mass Media, Ministries and Related Governmental Agencies, NGOs, Opinion Makers (influencers), Private Sector, Research Institutions, Training Organisations, Social Media and Communication Experts and Specialised Companies		<b>BG, GE, MO, RO, RU, TR, UA</b>
4.2.2	Nurture a Black Sea cultural/scientific identity, through dedicated education and work stage programmes in all fields of research and Blue Economy ( <i>Short Term</i> )	Academia, Local Authorities, Ministries and Related Governmental Agencies, NGOs, Parent and Consumer Associations, Opinion Makers (influencers), Private Sector, Research Institutions, Social Media and Communication Specialists, Sport Clubs, Training Organisations		<b>BG, GE, MO, RO, RU, TR, UA</b>



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New actions proposed in 2020 Consultations under Pillar 4: Main Goal 2			
	Actions	Main Actor(s)-Initiatives	Suggested by
1	Creating of Media Culture (informed/dedicated journalists to tackle different public ecological problems/issues of Black Sea)	Academia, Mass Media, Research Institution, Local authorities	<b>BG</b>
2	Campaigns for Sharing good practices for pollution prevention for shaping ecological behaviour and culture	Academia, EMSEA, Local Authorities, Mass Media, Ministries and Related Governmental Agencies, NGOs, Opinion Makers (influencers), Private Sector, Research Institutions, Training Organisations, Social Media and Communication Experts and Specialised Companies	<b>BG</b>
3	Implement Fishing for Litter scheme in the Black Sea countries	BSC and BSEC, ports, fishing vessels, fisherman, local authorities, media, ministries and government agencies, research and educational institutions, national/international NGOs, citizen scientists.	<b>GE</b>
4	Develop waste management campaign covering rivers and catchments in the Black Sea	National and regional authorities, waste management authorities and associations, NGOs, research and educational institutions, schools, citizen scientists.	<b>GE</b>
5	Develop beach clean-up campaigns for all 6 countries.	BSC, national and regional authorities, waste management authorities and associations, NGOs, research and educational institutes, schools, citizen scientists.	<b>GE</b>



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<b>Pillar 4 - Education and capacity building</b>				
<b>Main Goal 3 - Contributing to enhanced science policy dialogue in formulating coastal and marine policies and programmes</b>				
#	Actions	Main Actor(s)-Initiatives	National Priority for countries	
			Low Level (1-3)	High Level (4-5)
4.3.1	Conduct integrated outreach on the annual 'European Researchers Night', at multiple Black Sea locations, targeting public, students and children ( <i>Short Term</i> )	Academia, International Organisations, Local Authorities, Mass Media, Ministries and Related Governmental Agencies, NGOs, Private Sector, Research Institutions, Social Media and Communication Specialists		<b>BG, GE, MO, RO, RU, TR, UA</b>
4.3.2	Train policy and decision makers through dedicated activities for the efficient implementation of marine and coastal policies and management ( <i>Short Term</i> )	Academia, Ministries and Related Governmental Agencies, National, Regional and Local Authorities, NGOs, Research Institutions		<b>BG, GE, MO, RO, RU, TR, UA</b>
4.3.3	Communicate the uniqueness and importance of the Black Sea basin, via the establishment of Black Sea Ambassadors, at local, regional and global levels at special events and initiatives such as the International Black Sea Day (31 <sup>st</sup> October), and the European Maritime Day ( <i>Short Term</i> )	Academia, BSC, International Organisations, Local Authorities, Mass Media, Ministries and Related Governmental Agencies, NGOs, Private Sector, Research Institutions, Social Media and Communication Specialists		<b>BG, GE, MO, RO, RU, TR, UA</b>



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<b>New actions Added in 2020 Consultations under Pillar 4: Main Goal 3</b>			
	<b>Actions</b>	<b>Main Actor(s)-Initiatives</b>	<b>Suggested by</b>
<b>1</b>	Support online transparent and inclusive mechanisms for ongoing national and international consultations and discussions, updating the SRIA priorities and implementation.	UkrSCES, National Academy of Science of Ukraine, universities, related agencies and research institutions	<b>UA</b>
<b>2</b>	Strengthen national programs supporting Black Sea Day activities.	BSC, ministries of environment of Black Sea countries, coastal local authorities.	<b>GE</b>
<b>3</b>	National support for engagement and initiatives of Black Sea Ambassadors in all coastal countries.	BSEC and BSC, ministries of education and environment in all Black Sea countries.	<b>GE</b>
<b>4</b>	Development of training methods and activities aimed at educating children and youth in the field of sustainable development, blue economy and ecology of the sea and raising awareness of teachers of educational institutions and the population in these areas.	SFedU, NWIM RANEPa, RTU MIREA, ErmakNW	<b>RU</b>
<b>5</b>	Development of joint educational programs for higher education (master degree), advanced training and retraining in the field of socio-economic research of the Black Sea ecosystem, tourism, management of coastal and marine resources, as well as other topics related to the development of the blue economy in the Black Sea region.	SFedU, RTU MIREA	<b>RU</b>
<b>6</b>	Creation of a virtual platform with the aim of posting information, methods and materials, announcements, etc. available in the languages of the countries of the Black Sea region.	SFedU, NWIM RANEPa, RTU MIREA, ErmakNW	<b>RU</b>



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**6. GLOSSARY**

<b>ACRONYM</b>	<b>TITLE</b>
<b>BSC</b>	Black Sea Commission
<b>BSEC</b>	Organization of the Black Sea Economic Cooperation
<b>BSUN</b>	Black Sea University Network
<b>CMEMS</b>	Copernicus Marine Environment Monitoring Service
<b>Copernicus</b>	The European Earth Observation Programme
<b>CPMR</b>	Conference of Peripheral Maritime Regions
<b>DANUBIUS-RI</b>	International Centre for Advanced Studies on River–Sea Systems
<b>EC</b>	European Commission
<b>EMODNET</b>	The European Marine Observation and Data Network
<b>EMSEA</b>	European Marine Science Educators Association
<b>EMSO-ERIC</b>	European Multidisciplinary Seafloor and Water Column Observatory - European Research Infrastructure Consortium
<b>ESFRI</b>	European Strategy Forum on Research Infrastructures
<b>EU</b>	European Union
<b>EURO ARGO - ERIC RI</b>	European contribution to the Argo programme
<b>EUROFLEETS</b>	New operational steps towards an alliance of European research fleets
<b>EuroGOOS</b>	European Global Ocean Observing System
<b>FAO</b>	Food and Agriculture Organization
<b>GFCM</b>	General Fisheries Commission for the Mediterranean
<b>GOOS</b>	Global Ocean Observing System
<b>Hydralab</b>	Network of environmental hydraulic institutes in Europe
<b>ICES</b>	International Council for the Exploration of the Sea
<b>ICT</b>	Information and Communication Technologies
<b>ICZM</b>	Integrated Coastal Zone Management
<b>IMO</b>	International Maritime Organization
<b>IOC-UNESCO</b>	Intergovernmental Oceanographic Commission of UNESCO
<b>IODP</b>	International Ocean Discovery Program
<b>JERICO</b>	Joint European Research Infrastructure network for Coastal Observatories
<b>JPI</b>	Joint Programming Initiatives
<b>MEDCOAST</b>	Mediterranean Coastal Foundation
<b>MPAs</b>	Marine Protected Areas
<b>MSP</b>	Maritime Spatial Planning
<b>NGOs</b>	Non-governmental Organizations
<b>SeaDataCloud</b>	EU Funded Project - Further developing the pan-European infrastructure for marine and ocean data management
<b>SeaDataNet</b>	EU Funded Project - Pan-European infrastructure for ocean & marine data management
<b>SMEs</b>	Small and Medium-sized Enterprises
<b>UNDP</b>	United Nations Development Programme
<b>UNEP</b>	United Nations Environment Programme



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**Country Abbreviations**

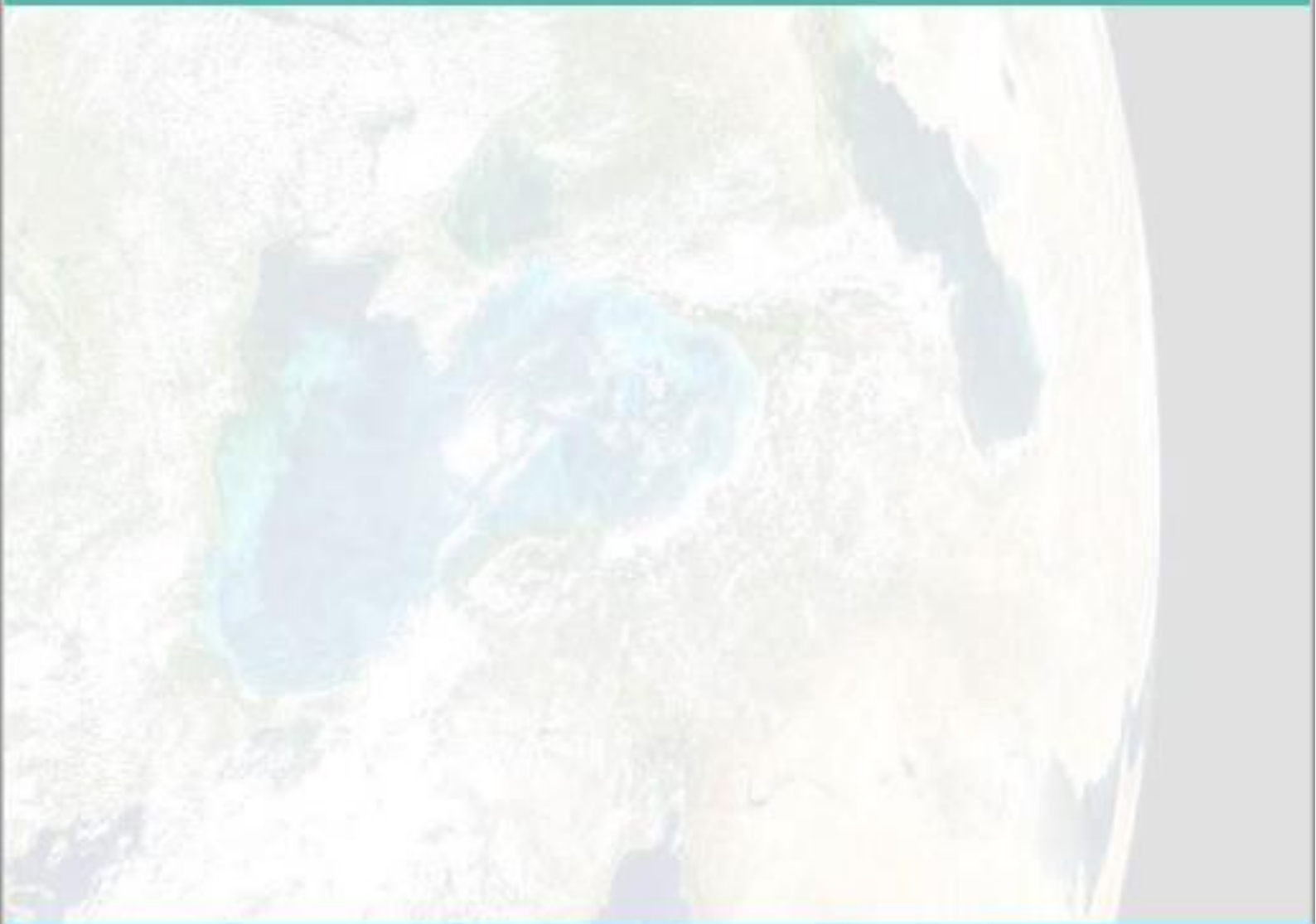
ACRONYM	TITLE
<b>Bulgaria</b>	BU
<b>Georgia</b>	GE
<b>Moldova</b>	MO
<b>Romania</b>	RO
<b>Russia</b>	RU
<b>Turkey</b>	TR
<b>Ukraine</b>	UA

**Partner Abbreviations**

No	Consortium Members	Type	Short name	Country
1	Middle East Technical University - Institute of Marine Sciences (Coord.)	University, Research Institute	METU	Turkey
2	Organization of the Black Sea Economic Cooperation	Intergovernmental Organization	BSEC	Turkey
3	The National Institute for Research and Development of Marine Geology and Geoecology	Research Institute	GEOECOMAR	Romania
4	Institutul National de Cercetare-Dezvoltare Marina "Grigore Antipa"	Research Institute	INCDM	Romania
5	Bulgarian Academy of Sciences Institute of Oceanology	Research Institute	IO-BAS	Bulgaria
6	The Scientific and Technological Research Council of Turkey	Governmental Research and Funding Agency	TUBITAK	Turkey
7	Institut Français de Recherche pour l'Exploitation de la Mer	Research Institute	IFREMER	France
8	Helmholtz-Zentrum Geesthacht Zentrum für Material- und Küstenforschung GmbH, also representing the German Marine Research Consortium KDM	Consortium of Research Institutes	HZG	Germany
9	Ukrainian scientific Centre of Ecology of Sea	Research Institute	UkrSCES	Ukraine
10	North-West Institute of Management of the RANEPА	University, Research Institute	NWIM RANEPА	Russia
11	P.P. Shirshov Institute of Oceanology of the Russian Academy of Sciences	Research Institute	SIO-RAS	Russia
12	Tiraspol State University	University, Research Institute	UST	Moldova
13	Ivane Javakhishvili Tbilisi State University	University, Research Institute	TSU	Georgia
14	Secretariat of the Black Sea University Network	Non-governmental Organization	BSUN	Romania



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