Cross border Maritime Spatial Planning for Black Sea Bulgaria and Romania - MARSPLAN-BS II Grant Agreement:

EASME/EMFF/2018/1.2.1.5/01/S12.806725 - MARSPLAN-BS II DEFINING AND ANALYSING FUTURE CONDITIONS WP 1, Activity 1.1, Sub-activity 1.1.3 Starts 05/01/2020 Ends 01/08/2021

Acknowledgement:

The work described in this report was supported by the European Maritime and Fisheries FundoftheEuropeanUnionthroughtheGrantAgreement:EASME/EMFF/2018/1.2.1.5/01/S12.806725 - MARSPLAN-BS II

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ACTIVITY	Partners (acronym)		
Lead Activity 1.1	NCRD (PP3),		
Lead Sub-Activity 1.1.3	NIMRD (PP4)		
Partners involved	MRDPW (PPL), MPWDA (PP2), CCMS (PP5), GeoEcoMar (PP6), OUC (PP7) and NVNA (PP8)		
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According to the EU Directive 2014/89/2014 and the legislation transponsed both in Bulgaria and Romania:

The definition and analysis of future conditions includes the following steps:

- forecasting the effects induced by current trends in the spatial and temporal needs of existing human uses;
- estimation of spatial and temporal requirements for new uses of maritime space identification of future alternative scenarios for the planning area;
- selection of the optimal scenario for the use of the maritime space.

The results obtained in the stage of defining and analyzing the future conditions, are:

- a scenario illustrating the evolution of the maritime space, if current trends and conditions are maintained without new interventions;
- alternative scenarios for the use of maritime space to illustrate the evolution of maritime space following planned
- activities based on new goals and objectives;
- the optimal scenario selection to provide the basis for identifying and selecting the measures for the maritime space planning.

1 GENERAL OVERVIEW

Similar to any planning process, MSP is a future-oriented activity. The probable and desired directions of future development in maritime uses and their management are modelled in a set of scenarios. Each of them is somehow supporting for the decision-making levels to move toward the main goal for marine space.

A substantial topic in this chapter is the delineation of areas' boundaries - both, for the analysis and for the future management. The analysis and management area boundaries are designated through a political process. There are included ecosystems, natural demanded resources, etc., but cannot delineate or delimit exactly the natural processes (sediment transport or hydrochemical compositions). The boundaries for MSP analysis (for planning) can be not the same as those for management (focused on implementation). The analysis area is larger than the management area. This will permit the identification of the influence/impact sources (like pollution) and relevant responsible authorities and institutions for implementing the marine spatial plans.

1.1 Establishment of the analysis and management areas boundaries

GIS database update and GIS model design include: a) A built database - upon the previous project basis (the information has been validated and updated, but some data still need to be updated); b) Data and information cover both maritime space and coastal zones within the plans' boundaries for both countries and cross-border area; c) Data from first project MARSPLAN-BS are used, but extended in terms of additional aspects and included new thematic topics.

The cross-border area for the project is proposed to be: a) in the sea – limited to 12-mile zone in order to avoide still not resolved delineation in EEZ zones between BG and RO; b) on shore - project's area covers corresponding and related to/bordering Black Sea units. For Lau units-directly bordering for both countries, and Nuts III (for Bulgaria) and Nuts II (for Romania). Basis for delimitation decisions about the area and for more detailed investigations in it is the basic analyses on huge range of components and indicators and characteristics of neighbouring territories.

1.2 Transboundary marine area – cross-border functional zones/areas

A functional zone/area is perceived to be a territorial unit resulting from the organization of social and economic relations. Therefore, its boundaries do not reflect geographical particularities but rather a set of activities/functions or interactions that occur within it.

Thus the "Transboundary marine area"² should not be treated just like a single space where common functions (for both countries) take place, but as a system of functional zones/areas with scopes/boundaries depending on a certain function. For example, the functional zone of a cross-border tourist product for ornithological observations will "jump over" Constanta and "land" in Tulcea (for functional and logical reasons). This example is a proof, that the idea of functional zones/areas captures the idea of a territory characterized by spatially related human activities. Apart from tourism, similar examples can be given in almost all marine related human activities and namely those that are subject of cross-border cooperation.

The issues related to cross-border functions, their distinctions and either territorial or functional disparities are not well theoretically or practically examined yet. But political and public awareness are accepted by many public and private regional development agents, which imply and stimulate the cooperation between neighboring countries. Border regions are commonly perceived as disadvantaged areas marked by peripheral location. Most of them are indeed suffering from the distance to political decision centers and economic core regions. This is the case of Constanta-Varna conditional "transboundary marine area" with two economic poles/nodes (the two big ports with developed local economies) and two peripheral areas in-between.

The purpose of future cross-border cooperation is to utilize touristic value and to revitalize socio-economic situation in the mentioned peripheral areas on both sides of Bulgarian – Romanian border.

The concept of functional areas should have a role of facilitation of circulations between the two nodes, e.g., between Constanta and Varna (and not only). The key preconditions for establishment of cross-border functional areas are spatial determination of the nodes and enabling of the functions for cooperation (proposed – tourism, leisure/business/cargo sea routs, nature protection, fisheries, processing industries based on maritime resources).

A narrowed model of functional area could be enabled on Bulgaria – Romania borderland in a form of cross-border tourism functional area (without strictly defined borders), which is regarded as a reasonable concept of territorial cooperation in order to promote the functioning of tourism systems on the both side of cross-border area as an outcome of spatial interaction

² Pre-defined as the marine space b/n Constanta and Varna

and strategical development. It is believed that similar models (not only in tourism) would contribute to regional cohesion in trans-border areas.



Figure 1. Crossborder maritime spatial transboundary area nominated to be case study for common maritime spatial planning between Bulgaria and Romania (*MPWDA*)

1.3 Summary of up-dated results of the maritime present conditions

Successuvely, the present conditions in all basic marine uses are briefly presented in this section.

Fishing and aquaculture: a) Knowledge deficits – the relations between socioeconomic and ecosystem models; b) Methodological deficits - monitoring not only the ecological status, but the economic and social impacts of the implemented MSPs; c) Information deficits - lack of reliable data in many sectors - fishing and catchment areas, aquaculture, habitat distribution, cartography, monitoring, traffic, tourism destinations,etc.; d) Legislation - marine waters concession in order to implement aquaculture projects based on EU funding schemes or private capital; e) Technological deficits - assembling of all intermediate products into a coherent MSP; f) Implementation - institutional, administrative and expert capacity and needs of education; g) Governance - insufficient institutional, administrative and expert capacity; h) Communication - conflicts between fishing community, tourist industry and farm operators, poor communication among almost all institutions involved; i) Potential threats - deterioration of water quality, pollution (transboundary included), rise of bacterial pathogens, destruction of mussel banks due to increase in rapa whelk population.

Extraction of non-living resources (oil and gas, salt, water, mineral resources, etc.). The section includes brief overview of the problems in the area of geological risk and geo-environmental aspects. A number of different projects involve the construction of hydraulic engineering installations, work on oil and gas drilling rigs, installation of underwater cables, gas pipelines, and other technogenic challenges. A geo-environmental issue can occur when determining the

surface area and the boundaries of the so-called temporary disposal sites for dredging spoils, which interfere with the natural course and rate of the sedimentation process on the shelf. Dredging activities can cause lasting destruction on the most superficial bottom sediments.

The geological risk for the drilling rigs is the Holocene gas-saturated clays, in which the socalled shallow gas forms. In the peripheral area of the shelf and the foothill of the continental slope, of engineering and geological risk are the existing gas craters, which can cause gushing of free gas under high pressure. The potential danger of the gas crates for hydraulic engineering installations on the seafloor and for the vessels requires preliminary survey about their distribution and locality. The abrupt change of the incline of the relief on the shelf-slope boundary can be considered a risk factor for all types of survey activities on the seafloor.

Maritime transport (infrastructure, shipping, ship building, shipyard). The Black Sea is a complex ecosystem that combines specific biodiversity, endangered species of flora and fauna. Protected areas of NATURA 2000 have been defined on the territory of the Black Sea. All these factors must be considered when analyzing the system for movement of vessels in the territorial sea and in case of violation of some of the ecological criteria, the shipping lanes shall be positioned so that the vessel traffic cannot endanger the seamless development of biodiversity in the Black Sea.

The anthropogenic pressure, mainly wastewater pollution from industrial and domestic origin, waters from agriculture and pollution from shipping significantly change the basic parameters of the seawater, causing major changes in water quality and worsening the environmental situation mainly in coastal areas. The impact on ecosystems causes various changes at the different levels of interaction.

Vessel traffic and the anthropogenic activities in port areas cause significant water pollution. The traditional sources of water pollution, such as industry, agriculture, energy and urban polluted waters are typical for ports (Stoyanov St. Al., 2004). Bilge, ballast and washing water from ships, paint layers against fouling of ship hulls, the use and discharge of oil and oil products, etc. are significant sources of water pollution in port areas. Special attention is paid to accidental spills of and oil products.

In order to reduce the water pollution caused by anthropogenic activities in port areas the main measure is to reorganize the vessel traffic and to continue control over human activities.

Submarine cables and pipelines - the installed pipelines and cables are not imbedded in the seafloor and the majority of them run through areas with significant depth and far offshore. For these reasons and owing to the streamlined organization for zoning the maritime space, no issues have emerged with regard to the installed pipelines and cables.

Any conflicts with other zones are to be taken into account in the process of maritime spatial planning. The features described in the previous subsection decrease the likelihood of conflict with other zones. For submarine cables this likelihood is further reduced by the improbability for pollution to occur from them. Submarine pipelines are constructed so that in the event of technological disaster or navigational accident a minimum amount of petroleum products would be released. The navigational marks of the pipelines and cables enable the planning of exercises

and the performance of fishing, dredging and dumping dredging spoils without endangering them.

Tourism - the main knowledge deficits are the relations between socioeconomic and ecosystem models. It is necessary to conduct further research to evaluate the interaction between maritime activities and environmental components, the tourist activities and the associated impact. Additional problem is the insufficient knowledge of national legislation and the UNESCO Convention in the field among the tourist operators.

The main methodological deficits are related to the necessity of monitoring not only the ecological status, but also the economic and social impacts of the implemented MSPs.

Information deficits are related to the lack of reliable data in appropriate formats in almost all sectors. A significant problem is the lack of reliable data in appropriate formats to maritime tourism, yachting, cruise tourism, recreational boating. Legislation is still a "debtor" to marine waters concession regulations - in order to implement aquaculture projects based on European funding schemes or private capital. The main implementation gaps are low effectiveness of long-term measures and immediately applied ones; institutional, administrative and expert capacity and needs of education (joint courses). Governance issues are due to insufficient institutional, administrative and expert capacity, not enough effective management and therefore many marine Natura 2000 sites remain paper protected areas. The lack of cadastral information on some sites on the Black Sea coast that actually exist is due to restricted capacity to create such information or to update it.

The recommendations to regional and local authorities are generally related to the cadastral provision of all sites on the coast - beaches, campsites, dikes, dams. Each administration - district administration or mayor's office must provide a complete cadastral plan with coordinates of all sites in the part of the coast for which they are responsible.

Underwater cultural heritage – the project marine space has a significant amount of cultural and historical sites, which are important not only for both countries', but for the world history too. They deserve effective conservation and adequate management. In view of the world experience gained from practical and theoretical knowledge on the preservation and protection of underwater cultural heritage, it appears that it needs a management strategy a set of criteria, involving the public in conservation processes, taking measures for physical protection through underwater conservation, constant monitoring of their condition, prohibition of certain fishing activities.

In order for the change to take place, it is necessary to make appropriate additions to the relevant legislative frameworks. This will lay the foundations for the implementation and development of activities for protection and preservation of underwater cultural and historical treasures.

Military trainings - the main conflict with military zones is with the proposed new Traffic Separation Scheme (TSS). The introduction of a new system for maritime traffic will require a whole new zoning of military polygons and areas, leading to expenditure of time and will burden the state budgets.

The shift of the TSS to the east will create issues, related to its safety and/or leading to an increased vulnerability of the vessels' moving in it. Possible risks/issues would be avoided

through establishment of an Interagency work group of representatives of all relevant ministries (defense, transport, information technologies) - in order to establish a new TSS and military areas, taking into account the environmental state and the natural and cultural assets.

1.4 Marine conditions analyses results

Sea Level

Compared to the reference period, sea level was characterized by a constant exceedance of the monthly average values throughout the year. 2018 was characterized by a maximum of 0.44 m (with 0.27 m above the multi-monthly value of the reference period), recorded in February, and a minimum of 0.105 m in October (with 0.022 m over the multi-monthly value of the reference period). In the long term, the trend is of sea level rise, with a rate of approx. 0.002 m/yr.

Figure 2 Black Sea level oscillations at the Romanian coast: a) annual means 1933 - 2017, b) monthly means 2018 compared to the reference period 1933 – 2017



Figure 3 Sea state a) reference period (1971 - 2017) and b) 2018 (Beaufort scale)



The sea state, given by the frequency of waves higher than 1 m, was calm in July 2018 (49.46% / 31 days). The peak on the Beaufort scale was 5 - 7 (maximum wave height 3.8 m) in February 2018.

Figure 4. Wave rose in Constanța a) during the reference period (1971 - 2017) and b) in 2018



Figure 5. Daily evolution of air temperature, water temperature and salinity in Constanța, 01 - 12.2018

Figure 6. Compared situation of (a) multiannual and (b) monthly means of sea water temperature during 1959 - 2017 and in 2018



Sea water temperature for the 12 months analysed ($T_{water mean} 2018 = 15.1^{\circ}C$) was 2.8°C higher than the reference value ($T_{water mean} 1959 - 2017 = 12.3^{\circ}C$).

The **maximum daily temperature of 27.5°C** was recorded on 7 August, correlated with air temperature. Compared to the multiannual statistics, mean values in Constanta exceeded historical mean values throughout the entire year 2018. The trend of the water temperature in the surface layer for the period 1959 - 2018 is slightly increasing with approximately 0.024°C / year.

For the western shelf of the Black Sea, three specific water masses were recorded: the upper quasihomogeneous layer (UQL), the seasonal thermocline and the cold intermediate layer (CIL). During the warm season (July), CIL reaches depths beyond 25 m, and in autumn beyond 40 m.





Upwelling

Compared to previous years, in 2018 no upwelling phenomena were recorded.

Physical-Chemical Indicators - Transparency



Transparency (N=37) ranged between 0.2 - 18.0 m (mean 6.7 m, median 6.0 m, standard deviation 4.5 m).

In 2018, sea water transparency at the Romanian Black Sea coast (percentile 5) did not reach the proposed target for Good Environmental Status (GES) Descriptor 5 - Eutrophication/Marine Strategy Framework Directive for any of the water bodies (transitional, coastal and marine).

Figure 8 Sea water transparency (m) at the Romanial coastal and marine). proposed for a Good Environmental Status (GES - Descriptor 5) - 2018

Salinity

Sea water salinity of the Romanian shelf ranged in summer 2018 between 6.32 - 19.91 PSU. The minimum value was recorded in surface waters in Sulina, 10 m, in July, as a consequence of

river input, and the maximum value during the same survey, in Portita 30 m, thus proving the limited influence of river input in summer at greater depths.



The spatial distribution of salinity along the Romanian coast pointed out the increasing gradient from the Danube mouths southwards.

In the long term, monthly means in 2018 are comparable with the period 1959-2017.

Figure 9. Horizontal distribution of surface water salinity along the Romanian coast - 2018

Figure 10. Compared situation of (a) multiannual monthly and (b) annual means of sea water salinity in Constanța during 1959-2017 and 2018



Physical-Chemical Indicators (cont.)

The **pH** of coastal waters in Constanta recorded in 2018 values ranging between 8.13 and 8.90. The monthly pH means during 1998-2017 and 2018 differ significantly. The mean value of 2018 - 8.50 - is the highest of the period 2008-2018, and is correlated with sea water temperature, which recorded a historical peak of the annual mean in 2018 (14.5°C).



Figure 11. Compared situation of (a) multiannual monthly and (b) annual means of sea water pH in Constanța during 1959-2017 and in 2018



Dissolved oxygen saturation ranged between 19.1% and 184.4% (mean 109.6%, median 110,4%, standard deviation 24.6%). The minimum was recorded in September, at the water-sediment interface (station East Constanța 7, depth 90 m), as a follow-up of the presence of the suboxic layer typical for the Black Sea.

In the long term, multiannual values of the period 1959-2017 and in 2018 differ significantly, being lower in the cold season, related to wind, waves, currents and water masses regime.

Figure 12. Distribution of dissolved oxygen saturation on the East Constanța profile - July and September 2018

Phosphate, (PO₄)³⁻, concentrations recorded in the water column values ranging between 0.01 - 3.04μ M. During 2018, a potential risk of not reaching the Good Environmental Status was recorded in coastal and marine waters.



Figure 13. a) Spatial variability of phosphate concentrations and compared status related to GES targets, 2018; b) Spatial variability of dissolved inorganic nitrogen (DIN = nitrates, nitrites + ammonium) in Romanian Black Sea waters, 2018

Inorganic nitrogen forms (nitrates, nitrites and ammonium) recorded heterogeneous values along the entire Romanian coast, summing-up exceedings of the proposed GES target value especially in coastal and marine waters. Silicates, (SiO4)4-, recorded concentrations ranging between $0.1 - 48.9 \mu$ M. Higher values are due either to river input, or to accumulations at the water-sediment interface at the end of the warm season. **Overall, there is a decreasing trend of nutrient concentrations in Black Sea waters.**

Chlorophyll a



Figure 14. Seasonal variation of chlorophyll a (µg/L) in shallow waters of Mamaia, 2018

The **chlorophyll** *a* content measured in shallow waters of Mamaia in 2018 ranged between 0.64 and 10.80 μ g/L.

The maximum values were recorded in autumn, ranging between 0.99 and 10.80 μ g/L (November), with a mean seasonal value of 3.55 μ g/L. During this period, high biomass values of the species *Skeletonema costatum*, *Leptocylindrus minimus*, *Protoperidinium granii*, *Neoceratium furca*, *Lingulodinium polyedrum*, *Cerataulina pelagica* and *Prorocentrum micans* (~2-4,6 g/m³) were recorded, the last two species having the greatest share.

Contamination Indicators -Heavy Metals

The state of marine waters in 2018, with reference to the quality standards for marine waters (EQS) (Directive 39/2013, Ord. 161/2006), was good (the EQS exceeding share below 25% of the total water samples analyzed: Cu (1% exceedings), Cd (15% exceedings), Ni and Cr (0% exceedings). The Good Environmental Status (GES) criterion was slightly exceeded for **Pb**, where 32% of the samples exceeded the EQS target value (14 μ g/L Pb).

Figure: State of marine waters in 2018 in relation to environmental quality standards (EQS) for heavy metals

In relation to **allowable levels for contaminants in marine mollusks** (E.C Regulation 1881/2006), the concentrations of Cd and Pb were below the target values in the three mollusk species analysed in 2018 (*Mytilus, Rapana* and *Anadara*), Figure 15:



The state of marine sediments in 2018, with reference to the quality standards for marine sediments (EQS), was good (the EQS exceeding share below 25%): Cu (15% exceedings), Cd (1% exceedings), Pb and Cr (0% exceedings). The Good Environmental Status (GES) criterion was exceeded for Ni, where most of the samples exceeded the EQS target (35 μ g/g Ni). However, for Ni, it is considered that background values are naturally higher in Black Sea sediments.



The state of marine sediments in 2018, with reference to the quality standards for marine sediments (EQS), was good (the EQS exceeding share below 25%): Cu (15% exceedings), Cd (1% exceedings), Pb and Cr (0% exceedings). The Good Environmental Status (GES) criterion was exceeded for Ni, where most of the samples exceeded the EQS target ($35 \mu g/g$ Ni). However, for Ni, it is considered that background values are naturally higher in Black Sea sediments.

Figure 16. State of marine sediments in 2018 in Black Sea sedim relation to environmental quality standards (EQS) for heavy metals.



Figure 17. Total hydrocarbons in water



Figure 18. Total hydrocarbons in sediment

The concentration of total petroleum hydrocarbons in 2018 indicates a low pollution level in sea water and sediments sampled along the Romanian Black Sea coast

Organochlorine Pesticides and Polychlorinated Byphenils

In 2018, in littoral waters, exceedings of threshold values proposed for water were observed most often for the sum of cycloidians, sum of p,p' DDT and its metabolites and heptachlor, while polychlorinated byphenils had concentrations below the detection limit. In sediments, higher concentrations were measured for HCB, p,p' DDE, dieldrin, PCB 28 and PCB 52. In biota, the highest concentrations of organochlorine pesticides and polychlorinated byphenils were accumulated in the species *Rapana venosa* and *Anadara inaequivalvis*.









Figure 21. Study Area – Romanian Black Sea Bathimetry (source: EMODNET)





Source: NCRD, 2020



- 2 ESTIMATING SPATIAL AND TEMPORAL REQUIREMENTS FOR NEW DEMANDS OF OCEAN SPACE
- 2.1. Current trends in the spatial and temporal needs of existing human activities

2.1.1. Review the collected information added to elaborated maps of marine and maritime domains

The previous maps, elaborated under the frame of the Existing Conditions Study, reflected marine locations and maritime objectives by their real geographical coordinates.

The Future Conditions Study indicates patterns, trends and directions by the contribution of the planners, specialists able to draw plans, programs, scenarios, using different tools, including the geographic information systems (GIS)

Information and GIS data are included in the previous studies and reports into the MARSPLAN BS II, already published:

- Synthesis Report on Maritime Uses, support for Maritime Spatial Planning, Laura Alexandrov, Margarita Stancheva, Dan Vasiliu, Hristo Stanchev, Milena Manova, Dragoş Vintilă, ISBN 978-606-9711-22-4, Figure 22.
- Defining and analysing existing conditions in the maritime space, Laura Alexandrov, Vesselina Troeva, Dan Vasiliu, Bogdan Ghinea, Margarita Stancheva, Dragoş Vintilă, Miroslav Tsvetkov, ISBN 978-606-9711-21-7, Figure 23.

2.1.2 Current trends projecting in the spatial and temporal needs of existing human activities

The thematical maps of each domain are visualized images. The identified trends take into account the spatial and temporal needs of existing human uses and support different scenarios, resulted from different maritime activities relations.





Figure 24. Study 1.1.2

To elaborate the future development of maritime space there are considered the environmental conditions dynamics, evolution and history of different steps, comparing maritime activities across sectors. New trends are forecasted by estimating the indices of development.

Applied methods are: a) analyzing existing sectoral planning documents (strategies, plans, programs) as well as policy visions of ministries, authorities, companies and institutions; b) consulting the representatives of each economic sector about the marine domains development (in space and time).

These information and spatial representations have been projected for both, the national marine management area and for the transboundary marine area.

National and regional documents and strategies

EU Legislation

Maritime Spatial Planning supporting the elaboration of national and transboundary plans:

- Directive 2008/56/EC establishing a framework for Community action in the field of marine policy (Marine Strategy Framework Directive)
- Directive 2009/28/EC of the European Parliament and of the Council on the promotion of the use of energy from renewable sources;
- Regulation (EC) no. Council Regulation (EC) No 2371/2002 on the conservation and sustainable exploitation of fisheries resources under the Common Fisheries Policy;
- Directive 2009/147 / EC of the European Parliament and of the Council on the conservation of wild birds;
- Council Directive 92/43 / EEC on the conservation of natural habitats and of wild fauna and flora;

- Directive 2000/60 / EC of the European Parliament and of the Council establishing a framework for Community action in the field of water policy;
- Regulation (EU) no. 1315/2013 of the European Parliament and of the Council on 11 December 2013 on guidelines for the development of the trans-European transport network and repealing Decision no. 661/2010 / EU.
- At the same time, the arrangement of the maritime space promotes at national level the principles highlighted in:
- Communication from the European Commission of 21 January 2009 entitled "Strategic objectives and recommendations for EU maritime transport policy until 2018";
- Commission Communication of 20 September 2011 entitled "A Roadmap to Resource Efficient Europe";
- Commission Communication of 19 May 2020 entitled "EU Biodiversity Strategy for 2030";
- Communication from the European Commission of 24 February 2021 entitled "Building a Europe Resilient to Climate Change A New EU Strategy for Adapting to Climate Change";
- European Commission Communication of 17 May 2021 on "A New Approach to a Sustainable Blue Economy in the European Union. Transforming the EU's blue economy for a sustainable future. "

National Legislation

- Government Ordinance no. 18/2016 on the maritime spatial planning-MSP;
- Law no. 88/2017 for the approval of the Government Ordinance no. 18/2016 regarding the maritime spatial planning-MSP;
- Government Decision no. 406/2017 approving the Regulation on the organization, functioning and nominal composition of the members of the Maritime Spatial Planning Committee;
- Government Decision no. 436/2018 regarding the approval of the Methodology for elaborating the maritime space management plan.
- Main development issues and measures are supported by different other National Programs and Strategies for each marine environment and fields of activities, as
- Aquaculture and Fisheries Program 2021-2027, as main financing instrument for the development of the fisheries sector in Romania in the next programming period.
- General Transport Master Plan of Romania sectoral strategic documents
- General Plan for reziliență, dezvoltare și prosperitate, draft

The strategic vision of the Maritime Spatial Planning Plan and its purpose is in line with the principles promoted by the following strategies at European or international level.

- The European Environment Pact, including the proposals in the "Fit to 55" legislative package, which aims at the maritime field for a European green maritime space;
- The new 2030 Territorial Agenda of the European Union. A future for all territories;
- The 2030 Agenda for Sustainable Development.

2.2. Identifying new spatial and temporal requirements and demands in the selected areas for transboundary spatial analyze

2.2.1. Natural Conditions and Processes

2.2.2.1 Environmental conditions (climate changes effect mitigation)

It is of crucial importance to step up the efforts for mitigation of the climate change impact and for ensuring sustainability in the marine environment of cross-border cooperation. Work on adaptation to climate change should continue to influence public and private investments, including the nature-based solutions. It must be guaranteed that investors, insurers, enterprises and citizens are able to have access to data regarding the status of the marine environment and to develop instruments for integrating climate change into their risk management practices.

The generation of wind energy by offshore wind farms will be of essential importance in the support of regional cooperation between the Republic of Bulgaria and Romania. Smart

integration of renewable energy sources, energy efficiency and other sustainable solutions will contribute to the reduction of carbon emissions at the lowest cost possible.

Based on World Bank data, the Black Sea has a good natural potential for sea winds and localised potential for power from sea waves. The technical potential for wind energy only for Bulgaria and Romania is in excess of 100 GW. The technical potential for Bulgaria is estimated as 2 GW fixed and 24 GW floating, which is an enormous potential. Cross-border cooperation between both countries should promote the development of offshore wind energy. A good step towards the development of this opportunity in the Black Sea is a common pilot project funded by the EU. This project will serve to identify the promising locations for generation of offshore energy and the environmental impact of some of the potential projects.

It is important to explore the potential in the cross-border maritime cooperation area for renewable energy from offshore installations, including from bottom-fixed and floating offshore installations for wind and solar energy, energy from sea waves, currents, temperature and salinity differences, the warming and cooling of sea water, marine biomass (aquatic plants). A study should be conducted of the possibilities provided by the potential conversion of existing platforms for oil and gas extraction and prospecting into platforms for energy from renewable sources. While the bottom-fixed offshore wind energy installations are already a mature technology used in shallow waters, the floating offshore wind energy installations are a promising newly emerging technology for introduction of renewable energy in areas where the seabed is at a greater depth, as is the case with the marine area of the Black Sea which is the subject of research.

The cross-border cooperation between both states in regard to renewable energy from offshore installations could develop the potential for large-scale introduction of renewable energy and economies of scale by reducing the system costs and spatial requirements and by facilitating the market and network integration of renewable energy from offshore installations, as well as of the electric power trading.

The transition to climate neutrality requires also smart infrastructure. A more active crossborder and regional cooperation will contribute to deriving the benefits of the transition to clean energy at affordable prices. Careful consideration should be given to the improvement of the infrastructure at ports. The potential increase of the volumes of energy from offshore wind power plants will require large investments in the infrastructure at ports because the entire equipment of offshore wind farms will pass through them. They will serve as operation and maintenance centres for the offshore wind farms.

In order to achieve climate neutrality, it is also necessary to reduce emissions from the transport sector. The multi-modal transport requires strong support. Cross-border cooperation will foster multi-modal cargo operations via rail and maritime transport at short distances. Such opportunities exist between both major Black Sea ports – Varna and Constanța.

The automated and connected multi-modal mobility will play an increasing role together with the smart traffic management systems which have come into existence owing to the progress in digitalisation.

The inclusion of the maritime sector in the emissions trading system of the EU will contribute to alleviating the pressures on the climate. Efforts must be pooled and cooperation between both countries must be aimed at production and use of sustainable alternative transport fuels, as well as at accelerating the introduction of means of transportation and vessels releasing zero and low emissions.

At the same time action must be taken in the cross-border cooperation area for regulating the access of the most polluting ships to the ports of both states and for obligating the vessels calling at the ports to use only ground electric power supply.

Offshore Wind Energy

The most developed type of the technic potential of energy in the Black Sea is the offshore wind turbines, located especially in the western part of the Black Sea. The main offers opportunities is especially for floating wind turbines. Energy Policy Group³ estimates Romania's offshore wind energy resources at 94 GW, of which 22 GW can be installed as turbines fixed to the seabed, and 72 GW in the form of floating wind turbines (ERG 2020). In the case of Bulgaria, the potential natural capacity can only be achieved with the help of floating wind turbines. There are interests in offshore renewable and wind energy, especially in Turkey, but also in Azerbaijan, Russia and the Caspian Sea region (Catuti et al., 2020⁴).

Figure 25.



3 www.espon.eu

⁴ https://www.ceps.eu/ceps-publications/delivering-the-european-green-deal-for-southeast-europe/



Figure 26. The offshore technical potential of wind in the maritime basins which are accesible of states UE27 (source: JRC et al. 2019)⁵

In the Black Sea, the winds are good for sailing many days of the year, but also dangerous when the waves blow.

- In winter, the average number of stormy days is 3 to 8 per month; Cyclonic storms once at 15-20 ages, especially in the autumn-winter period: rotating from south to west and north; causing a surface current with 0.5-2.5 Nd speed, circular in shape, moving counterclockwise. The swell waves (140-200 m long), has period of 12-15 sec.
- When the sea is slightly wrinkled: at wind speed 5-8 Nd the waves have 25cm height, 30-75cm (gr. 2), 1.20m (grade 3) tall; at 13m/sec, the waves have 2-3.5 m high, and are frothy; at 20 m/sec couldbe 7 m high.
- For storms of gr. 9, the wind is 20 m/sec., the surface of the sea is a foam, the waves are 8 m high. Usualy, the Black Sea winds of N-E has 8 force on the Beaufort scale. Winter storms are long lasting, covering large areas of the sea.
- The most important Black Sea winds is: **Crivăț**, blowing from the steppes of Ukraine, formed and cools. It is irregular, reaching speeds of 12 m/sec, possible accompanied by snow and blizzards; **Bora** wind blowing from east of Crimea (between November and

⁵ https://publications.jrc.ec.europa.eu/repository/handle/JRC119146

March), on average 23 times a year. It could reach an even higher force 9, hurricane. For small boats, the grain is dangerous - a sudden storm, with a dark sky, the sea rises quickly, phenomenon met on coastal lakes, also.



Figure 27. Different cases of the wind vaves potential in the Black Sea (Rusu, 2009, Niculescu, 2020)



Conditions and good examples

There are some scenarios. From the approaches related to this field, we can specify the the creation of the offshore network infrastructure for renewable energy:

- by connecting national projects, directly to the coast, by means of (dedicated) *radial links* operated by national transmission system operators,
- through cross-border networks, the so-called "*loop network*", of electricity, with enough attention because the Black Sea is a transcontinental basin that imposes long-term paternal commitments.

The locations and assemblies of offshore energy installations must be based on a cross-border maritime spatial plan, integrated and multifunctional, with specialized assistance and implementation facilities in terms of co-management, coexistence and cooperation between different maritime fields (fishing, aquaculture, navigation, tourism, etc.) and stakeholders working in these maritime domains. One of the main aspects is the protection of the vulnerable marine ecosystem, but also the rational use of marine resources. From the international experience, the projects that have approached so far topics of interest, are mentioned:

- The MERMAID Project which identified the environmental benefits of the various combinations of aquaculture and offshore renewable energy systems;
- The PHAROS4MPAs Project which documented the possible interactions between marine protected areas and the blue economy;
- The SUBMARINER Network has experimentally exploited new opportunities for tourism in the case of offshore energy projects;
- The Baltic LINes Project, which highlighted the opportunities open to fishermen to work part-time in the aquaculture systems offered by offshore wind farms.
- A new MSP Project will therefore have to not only provide dedicated spaces for certain functions, but also opportunities for new and innovative mixed domains.
- Territorial Futures Report (ESPON 2017) with information and considerations on the potential territorial future of a European energy system based entirely on renewable energy.

Among the projects in which Romania was involved in the partnership, have to be mentioned:

- The EsaTDOR Project and Report (ESPON 2013), which includes a set of European maritime territorial evidence, including for the Black Sea, to identify opportunities and risks;
- The COCONET project assessing the relation between MPA's and Marine wind farms;
- MSP-LSI study (ESPON 2020) exploring maritime governance through MSP-LSI.

Land-to-sea interactions (LSI) can support the exploitation of Romania's offshore wind renewable resources by expanding a new onshore electricity grid, and port capacity related to offshore energy projects, and developing an economic strategy to attract new supply chains of renewable energy resources despite the less advantageous situation in the Black Sea; but also through:

- stimulating research and innovation,
- private investment, together with sufficient economic facilitation of the responsible public authorities.

Concluding

- From reductionistic to **holistic** approaches to understand the ecosystems structure-function
- Better management of the **natural capital** through networks of MPAs

- Upgrade **observation systems** to cover biodiversity and ecosystem functioning (GES pillars)
- Assessing Wind Energy and the Costs and Benefits of OWF
- Build a coherent scientific community

One of the main challenge facing the marine ecosystem is eutrophication due to nutrients generated mainly by human activity (from agriculture and urban wastewater), largely coming from the Danube basin. Spatial development and the use of maritime space must take into account that eutrophication can significantly reduce the quality of the marine environment by degrading ecosystems, reducing coastal biodiversity and marine fish stocks.

Extremely important is the ecological and chemical status of transitional (marine) and coastal water bodies, as required by the Water Framework Directive 2000/60 / EC. Where the condition is not good, the planning of the maritime space in the coastal zone must be established in the direction of the improvement of the condition, respectively to achieve the environmental objectives of the transitional and coastal water bodies.

This means to include, in the planning process, the measures established in the programs elaborated under the management plans, the transitional and coastal water bodies and the actions for the implementation of the Black Sea Marine Strategy. It is also necessary to maintain the status of transitional and coastal water bodies once these bodies have achieved their environmental objectives. Also, according to the Water Framework Directive, the achieving and maintaining good chemical status for territorial waters has particular importance in correlation with the good ecological status in the (marine) Black Sea region.

2.1.2.2 Natural resources (biodiversity, conservation, etc.)

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Bulgaria

Underwater immovable cultural properties are registered within the project scope — in the aquatic area of the Republic of Bulgaria — shipwreck remains, ancient ports and pre-historic settlements. Potentially promising human activities related to underwater cultural heritage are the underwater tourism, the archaeological excavations and studies.

The area to the north of Kavarna Cape has the greatest potential for development of underwater tourism and socialisation of underwater sites. Two diving clubs are functioning (in Rusalka resort community and in Tyulenovo village), which offer training for beginners and for experienced divers. Accessible for divers are the sunken ships near Durankulak village, Krapets village and the town of Shabla. Yailata Archaeological Reserve is located on a broad terrace above the sea, separated by high cliffs from the Dobrudzha Plateau. A late Hellenistic fortress was discovered in the territory of the reserve, as well as stone tombs, sacrificial stones, wine cellars, cave complexes, etc. Underwater cave dwellings and stone slabs from the fortress wall may be viewed in the aquatic area of Yailata. At the seabeds of the ancient ports near Shabla Cape, Yailata Cape and Kaliakra Cape various anchors, amphorae and other isolated finds may often be found. Attractive options for adventure underwater tourism are the submerged coves near Rusalka resort community and Tyulenovo village. The best-known among them is Tyulenova Cove, which is 107 m long. In the past it was a habitat of the monk seal (Monachus monachus).

Future archaeological excavations could be carried out at the wreckage sites of the wooden sail boats from the XVII-XIX century in the coastal area near Durankulak village, Krapets village and the town of Shabla. Two archaeological geophysical explorations were carried out in the waters of the Durankulak Lake and in the sea to the east of it. In one of them a positive shape of the sea bottom is registered, which has similar parameters to a settlement mound and which could be the site of underwater excavations. In the second half of the XX century 12 prehistoric settlements dated to the Late Chalcolithic and the Early Bronze Age were found in the waters of the Varna and Beloslav Lakes. Newer studies have proven that some sections of 6 of them are still preserved, while the location of one of the settlements connects it historically to the Varna Chalcolithic Necropolis. In view of their high scientific value, it is important to conduct archaeological excavation.

Scientific studies have found that the coastline at the end of the last Ice Age has been along today's 30—40 m isobaths. It is quite likely that in the area between them and the present day shoreline pre-historic settlements and necropolises may be discovered. Two zones were explored in the course of the implementation of the deep-water project MAP Black Sea, in which shipwrecks dating between the V century B.C. and the XIX century A.D. were registered and documented with a similar frequency of shipwreck sites of 1 per 4 sq. km. Joint Bulgarian-Romanian deep-water studies may be conducted in the cross-border zone, which would yield new information on ancient navigation and the commercial contacts in the Black Sea.

At all deep-water shipwreck sites, a very high degree of conservation of the remains of wooden ships is observed, which is attributable to the specific conditions in the Black Sea basin. The Republic of Bulgaria and Romania could cooperate in preparing a joint application for declaring the deep-water shipwrecks located in the aquatic areas of both countries as UNESCO world cultural and natural heritage sites.



Figure 29. Map of Ecological Status of Coastal Water Bodies in Bulgaria in 2017 (Map produced by CCMS; Data source: BSBD)



Figure 30. Marine and Coastal Protected Areas, Romania-Bulgaria

Romania

Public consultation related the Black Sea	The practical role of stakeholder to MSP from the perspective/point of view	Owner of information
MSP process	of the own field of activity	
AREAS OF	ENVIRONMENT - implementation of the Marine	MEWF
ACTIVITY	Strategy Framework Directive in the Black Sea	
	region	

Main Role of MSP	MSP is a real and necessary support in achieving or maintaining GES				
for Environment	(good ecological status) of the marine environment. The directive				
	was transposed by GEO $71/2010$ on the establishment of the marine				
	strategy adopted by Law 6/2011 subsequent amendments and				
	completions				
Environment -	The legislative framework that ensures the implementation of the				
National strategic	marine strategy with a role in the protection of the marine				
documents /	any ironment are:				
intervention nlans /	environment, are: GEO 71/2010 on the establishment of the maxima strategy				
normative acts	- GLO 71/2010 on the establishment of the market strategy				
normative acts	adopted by Law 6/2011 with subsequent amendments and				
	completions				
	- Law 205/2018 amending GEO 71/2010 on the establishment of				
	the strategy for the marine environment (transposes the updated				
	Annex 3 of Directive 58/2008 / EC)				
	- GD 432/2020 on the approval of the program of measures to				
	achieve the good ecological status of the Black Sea marine region				
	- Order of the Minister of Waters and Forests 1023/2019 for the				
	approval of the Monitoring Program for the permanent				
	assessment of the ecological status of marine waters				
	Law $08/1002$ on the ratification of the Convention for the				
	Protection of the Dlock Coo accient Dollution (Duchement				
	Protection of the black sea against Ponution (Buchatest				
	Convention),				
	- Law 218/2011 on the ratification of the Protocol on the				
	Conservation of Biodiversity and the Natural Environment of the				
	Black Sea, signed in Sofia on June 14, 2002, to the Convention				
	on the Protection of the Black Sea against Pollution, signed in				
	Bucharest on April 21, 1992,				
	- Law 158/2014 on the ratification of the Protocol on the protection				
	of the Black Sea marine environment against pollution from land-				
	based sources and activities				
	Concernment Decision are 201/2002 for the compared of the				
	- Government Decision no. 201/2002 for the approval of the				
	Technical Norms regarding the water quality for molluscs, with				
	the subsequent modifications and completions				
	- Order of the Minister of Environment, Waters and Forests				
	488/2020 on the approval of the List of endangered marine				
	species on the Romanian Black Sea coast in order to protect and				
	conserve them				
	- Joint Order of the Minister of Water Environment and Forests no.				
	983/2015 and the Minister of Agriculture and Rural				
	Development 1699/2015 amending the Annex to the Order of the				
	Minister of Environment and Sustainable Development and the				
	Minister of Agriculture and Sustainable				
	Davalopment no. $1050/2007/22/2000$ for the delimitation and				
	- Development no. 1550/2007/56/2008 for the deminitation and				
	cataloging of marine areas suitable for the growth and				
	exploitation of molluscs;				

	•• Water Law 107/1996 with subsequent amendments and				
	completions				
	GEO 202/2002 on integrated coastal zone management				
	Environmental law				
Main Environment	- Permanent marine monitoring,				
initiatives with	- Identification of pollution sources, from the land and in the sea				
nipact on MSF	and impacts on environment,				
process	- Identification of risks, solutions and measures of coastal				
	flooding. Plan of fighting against,				
	- Identification of coastal risks, erosion and their impact on marine				
	environment,				
Environment Study	- The entire surface of the Black Sea under Romania's				
Location	responsibility				
MSP interventions	- Although the Maritime Spatial Planning Directive does not				
for Environment	address the coastal zone but only marine waters, the influence of				
	coastal and coastal waters on marine waters cannot be neglected,				
	with the impact of land-based sources also affecting marine				
	waters				
	- The sources of pollution to be considered are diffuse pollution				
	from agriculture and point pollution (wastewater, industrial				
	water, etc.)				
	- The impact of rising sea levels combined with the effects of				
	climate change and reduced sediment supply has led to coastal				
	erosion				
Issues in the field of	The specific issues are addressed to the entire Romanian Black Sea				
Environment	coast (coastal waters, marine, EEZ, high seas):				
	- Insufficient data on activities,				
	- Routes / areas where these activities are correlated with measures				
	to protect the marine environment				
Main Environment	- MMAP, is responsible for developing the marine strategy and				
Problems	protecting the ecological diversity of the Black Sea				
Environment	The MSP plan provides the necessary information				
Problems,	- on the type of maritime activities,				
solution/resolving	- the areas where it takes place,				
	- the routes of the ships,				
	- activities envisaged in the future (eg offshore energy production).				
	- Proper planning reduces / eliminates anthropogenic pressure and				
	its impact on the marine ecosystem.				
Environment Main	The main pressures generated by human activities are represented by				
conflicts	- introduction of nutrients,				
	- overfished,				
	- pollution with oil products,				
	- pollution with dangerous substances,				
	1 0 7				

	- pollution of marine litter, including plastic and microplastic,		
	- noise pollution,		
	climate change		
Environment - LSI elements	 Achieving or maintaining the good ecological status of the marine environment it is requierd: knowledge of the pressures generated by human activities from the coastal zone as well as their impact on the marine environment. MSP including successful human activities, should lead to: reducing and even eliminating pressures on the marine 		
	environment,		
	- adoption of more effective protection measures, avoiding duplication of activities in sensitive or ecologically valuable areas.		
European level, new trends	The protection, conservation and management of the marine ecosystem, depending on the impact of maritime activities, environmental measures and objectives and good ecological status (achieving and updating to) of the marine environment answer the new tendencies of EU level, such as sustainable Blue Growth or European Ecologic/Green Pact		
Environment Future	Protection and conservation of the marine environment, by		
Directions of development	increasing the level of knowledge, implementing the program of measures (GD 432/2020), increasing cooperation at regional level.		
Directions of development Environment Future Benefits and opportunities for MSP	increasing the level of knowledge, implementing the program of measures (GD 432/2020), increasing cooperation at regional level. The MSP Plan is a support / tool for the implementation of the Marine Strategy Framework Directive, under the MSP Directive 2014/89 / EU		
Directions of development Environment Future Benefits and opportunities for MSP Meetings/ thematic groups for Projects /Strategies	 increasing the level of knowledge, implementing the program of measures (GD 432/2020), increasing cooperation at regional level. The MSP Plan is a support / tool for the implementation of the Marine Strategy Framework Directive, under the MSP Directive 2014/89 / EU For the elaboration of the program of measures meetings with the national actors involved in maritime activities were organized, as well as meetings with BG and the Signatory Parties of the Bucharest Convention Projects financed by MMAP, European funds (DG Environment - Marine Unit, POCA). 		
Directions of development Environment Future Benefits and opportunities for MSP Meetings/ thematic groups for Projects /Strategies Environment	 increasing the level of knowledge, implementing the program of measures (GD 432/2020), increasing cooperation at regional level. The MSP Plan is a support / tool for the implementation of the Marine Strategy Framework Directive, under the MSP Directive 2014/89 / EU For the elaboration of the program of measures meetings with the national actors involved in maritime activities were organized, as well as meetings with BG and the Signatory Parties of the Bucharest Convention Projects financed by MMAP, European funds (DG Environment - Marine Unit, POCA). 		
Directions of development Environment Future Benefits and opportunities for MSP Meetings/ thematic groups for Projects /Strategies Environment Importance for	 increasing the level of knowledge, implementing the program of measures (GD 432/2020), increasing cooperation at regional level. The MSP Plan is a support / tool for the implementation of the Marine Strategy Framework Directive, under the MSP Directive 2014/89 / EU For the elaboration of the program of measures meetings with the national actors involved in maritime activities were organized, as well as meetings with BG and the Signatory Parties of the Bucharest Convention Projects financed by MMAP, European funds (DG Environment - Marine Unit, POCA). 		
Directions of development Environment Future Benefits and opportunities for MSP Meetings/ thematic groups for Projects /Strategies Environment Importance for successful MSP Plan	 increasing the level of knowledge, implementing the program of measures (GD 432/2020), increasing cooperation at regional level. The MSP Plan is a support / tool for the implementation of the Marine Strategy Framework Directive, under the MSP Directive 2014/89 / EU For the elaboration of the program of measures meetings with the national actors involved in maritime activities were organized, as well as meetings with BG and the Signatory Parties of the Bucharest Convention Projects financed by MMAP, European funds (DG Environment - Marine Unit, POCA). 		
Directions of development Environment Future Benefits and opportunities for MSP Meetings/ thematic groups for Projects /Strategies Environment Importance for successful MSP Plan • Indicators	 increasing the level of knowledge, implementing the program of measures (GD 432/2020), increasing cooperation at regional level. The MSP Plan is a support / tool for the implementation of the Marine Strategy Framework Directive, under the MSP Directive 2014/89 / EU For the elaboration of the program of measures meetings with the national actors involved in maritime activities were organized, as well as meetings with BG and the Signatory Parties of the Bucharest Convention Projects financed by MMAP, European funds (DG Environment - Marine Unit, POCA). Given the complexity of the marine ecosystem whose status is assess by Biodiversity indicators: 1) seabed integrity, 2) marine litter 		
Directions of development Environment Future Benefits and opportunities for MSP Meetings/ thematic groups for Projects /Strategies Environment Importance for successful MSP Plan • Indicators • Targets	 increasing the level of knowledge, implementing the program of measures (GD 432/2020), increasing cooperation at regional level. The MSP Plan is a support / tool for the implementation of the Marine Strategy Framework Directive, under the MSP Directive 2014/89 / EU For the elaboration of the program of measures meetings with the national actors involved in maritime activities were organized, as well as meetings with BG and the Signatory Parties of the Bucharest Convention Projects financed by MMAP, European funds (DG Environment - Marine Unit, POCA). Given the complexity of the marine ecosystem whose status is assess by Biodiversity indicators: 1) seabed integrity, 2) marine litter to reduce/eliminate marine litter, including plastic and 		
Directions of development Environment Future Benefits and opportunities for MSP Meetings/ thematic groups for Projects /Strategies Environment Importance for successful MSP Plan • Indicators • Targets	 increasing the level of knowledge, implementing the program of measures (GD 432/2020), increasing cooperation at regional level. The MSP Plan is a support / tool for the implementation of the Marine Strategy Framework Directive, under the MSP Directive 2014/89 / EU For the elaboration of the program of measures meetings with the national actors involved in maritime activities were organized, as well as meetings with BG and the Signatory Parties of the Bucharest Convention Projects financed by MMAP, European funds (DG Environment - Marine Unit, POCA). Given the complexity of the marine ecosystem whose status is assess by Biodiversity indicators: 1) seabed integrity, 2) marine litter to reduce/eliminate marine litter, including plastic and microplastic, 		

*MEWF-Ministry of Environment, Waters and Forests

Ecosystems services

MSP support for MSFD Purposes RO/BG-MN-010	 Mapping the following aspects Knowledge and assessment of ecosystem services for the adoption of more effective protection measures, which reduce / eliminate the impact of human activities and increase the resilience of the marine ecosystem to the action of anthropogenic and climatic control factors. The measure also aims at Romania's compliance as a signatory to the Convention on Biodiversity and the launch of the European Union's Biodiversity Strategy. 		
Environment objectives RO/BG-MN-005 RO/BG-MN-006 RO/BG-MN-007	 Management for Marine Protected Areas in accordance with the requirements of the Marine Strategy Framework Directive Creating coherent and representative networks of Protected Mine Areas that include Marine Protected Areas in Romania and Bulgaria, including management plans. Increased control of regulated activities in Marine Protected Areas Creating ecological corridors between marine protected areas Creating risk maps for habitats in marine protected areas Natura 2000 		
Implementation	The quality and number of habitats, distribution and abundance of species adapted to existing physiographic, geographical and climatic conditions.		
Legal Support	 Maritime Spatial Planning Directive, 2014/89/EU, Romania, Law no. 88/2017 for the approval of the Government Ordinance no. 18/2016 on maritime space planning Bulgaria, Maritime Space, Inland Waterways and Ports of the Republic of Bulgaria Act, mended and supplemented, SG No. 28/29.03.2018 Marine Strategy Framework Directive – MSFD - 2008/56/EC Government Decisions on the approval of the Program of measures for achieving the good ecological status of the Black Sea 		
Responsibility	 Ministry of Environment National Agency for Environmental Protection, Ministry of Transport and Infrastructure, Ministry of Transport and Infrastructure, Ministry of Research, Innovation and Digitization (NIMRD "Grigore Antipa" Constanța, NIRD GeoEcoMar) National Agency for the Natural Protected Areas 		

GENERAL ACTIONS related to space issues			SPECIFIC ACTIONS related to space issues
- Assess the state of marine		_	Identify the types of services (for example:
ecosystems and their services			production, regulation, cultural, support)
- Making maps of ecosystem services			and prioritize them;
- Evaluate, by 2020, from an economic		-	Identifying the most appropriate
point of view, these services			methodologies for accounting valuation of
- Integrate ecosystem values into their			types of services;
EU accounting and reporting		-	Training of custodians / administrators of
systems.			protected areas and also of economic
- Develop a national system for the			agents on the assessment of ecosystem
payment of ecosystem services and			services, local environmental authorities
reinvest the monetary value in			(EPAs) with responsibilities in the field of
ecological protection / restoration /			regulation of activities
reconstruction and long-term		-	Making maps of the identified ecosystem
maintenance of ecosystem services.			services

Proposals for the 2021-2024 period

- (Fair) Transition in the field of environment and climate change, contributing to the achievement of a low level of pollution goals, a high degree of waste recycling, new renewable energy sources identification and use, protection of the natural heritage implementing a high-performance circular economy.
- (Integrate, collective EU) Action to reduce greenhouse gas (GHG) emissions by at least 55% by 2030 and achieve climate neutrality by 2050: transposing and implementing the European Green Deal, with: a)strategies, plans and legislation on key actions harmonized with national realities and opportunities; b)new framework for sustainable, fair and intrusive development; ensuring economically efficient, socially sustainable and environmentally transition, focused on competitiveness, innovation and decarbonisation.
- (Internally) Transpose the European Climate Law (2021) and follow the model of the other Member States and a Climate Protection Act, to be drafted and adopted.
- Developing a new sustainable development strategy, in line with European benchmarks, which involves rethinking the national economic system from the perspective of climate neutrality, promoting clean energy, technological innovation and sustainable development indicators, while respecting the ecological and social balance.
- Elaboration of a Measures Program for the greening of contaminated sites and their introduction in the normal economic circuit; the transformation of the Environment Fund into the Environment and Climate Fund, in order to capitalize on the European funds.
- Establishing of the Scientific Advisory Board on Climate Change, which would scientifically substantiate national climate and environment policies, the implementation of the Climate Pact, dialogue and consultations between public authorities, specialists and civil society on energy and climate transition issues.
- Development of sustainable Ecotourism, with the protection of the natural heritage and efficient

management of the resources wich represent a priority direction of action.

Coordinating principles in environmental policy that also cover marine space:

- Improving the integration of environmental policy and the coherence of sectoral policies in terms of applying the principles of sustainable development;
- Improving the environmental infrastructure and reducing the gap with other EU Member States and between regions;
- Preventing the risk and reducing the effects of natural disasters;
- Supporting and promoting energy production from alternative, renewable and non-polluting sources;
 - Economic Evaluation of ecosystem services, conservation of the biodiversity and sustainable use of its components,;
 - Reducing pollution and improving air quality;
 - Preventing and limiting the negative effects of climate change;
 - Ensuring a healthy environment within communities;
 - Improving the awareness, information, consultation and participation of all citizens in environmental decision-making;
 - Integrated, unitary and coherent administration / management of protected natural areas by strengthening the institutional capacity of the National Agency for Natural Areas Protection
 NANAP.

Combating climate change

- Updating the National Climate Change Strategy, drawing up and communicating to international partner institutions the long-term strategy on greenhouse gas emissions and the Climate Change Adaptation Strategy; development of the Action Plan in partnership with all responsible institutions and various stakeholders consultation;
- Improving legislation; integrating climate goals into all policies; stakeholder participation.
- Collaboration with all partner institutions for the implementation of the National Integrated Energy Climate Plan (PNIES);
- Ensuring the transparency of water quality data; facilitating environmental education.

Danube Delta - pilot study

The Danube Delta should become a model of sustainable development:

- modeling the circulation of water and sediments in the Danube Delta and marine space (in front of it) as a support in management decisions regarding ecological reconstruction and unclogging works;
- reforming the management of aquatic resources: restoring profitable fishing facilities; development of breeding stations for the production of juveniles needed for restocking, in particular for (traditional) sturgeons, pikeperch and carp;
- prohibition transfer of the land dediated to aquaculture, in agricultural land (pastures, arable land); banning the sale of monofilament tools; providing compensation for commercial fishermen, providing them the equivalent of a minimum wage per economy / month; regulating the way in which commercial fishermen capitalize the fish caught (local free market); supporting the development of other means to ensure a decent living for fishermen families;
- reforming tourism management: assessing the support capacity to ensure sustainable tourism; reducing
 the pressure of tourism on habitats and species; establishing clear rules on the types and ways of
 practicing tourism; implementation of the speed system regulation and its movement control for the
 Danube boats Delta; extending the Delta visits period to at least 9 months / year, reducing the pressure
 during the summer season, transition to a slower tourism, developing local gastronomic points,
 increasing the use of environmentally friendly means of transport with a low degree of pollution;

- revitalization of traditional activities (reed processing, crafts, gastronomy, etc.) and development of new activities (tourist guide services, repairs and refurbishment, etc.) that contribute to the implementation of the principles of sustainable development and the circular economy;
- realization of the Danube Delta and coastal area Cadastre, agreement with the Management Plan of the reservation elaborated in 2015, with the new ICZM Law and with the sectorial (afferent) MSP Plan.
- ecological passenger transport by providing ships with low fuel consumption and low pollution impact, which also use alternative renewable energy systems, as priority for the new ITI Danube Delta financial instrument.



Water and soil management

An integrated approach that can respond to these demands, must include:

- increasing resilience to disasters caused by natural risks exacerbated by climate change;
- development of the intervention and response capacity of the structures responsible for the management of emergency situations generated by floods or droughts;
- regulation of a coherent water quality control system, based on the principles set out by the European directives;
- achieving a coherent national wastewater strategy;
- implementating a national water management strategy in the context of adapting all intersectoral measures and actions to the challenges posed by the effects of climate change and by achieving the water security objective;
- completion of the program on combating coastal erosion;
- specific strategy for sustainable soil management, digital database by integrating areas of erosion risk, low content of organic matter, subsidence;

Recycling and circular economy

- Waste reduction, until 2025;
- Rational use of natural resources, including materials considered waste today, reintroduction of

waste into the circular economy;

- Development of the Strategy for the circular economy and its implementation based on innovation; implementation responsibilities will be shared fairly among all actors in the system based on the "polluter pays" principle;
- Increasing the requirement in the field of compliance with environmental legislation.

Proposals for the period 2021-2024: instead of conclusions

- Review and implement the new National Strategies on Waste Management and Recovery to move to the circular economy, combat air pollution with the cessation of infringement proceedings and adopt the planned national "zero pollution" plan at EU level.
- Improving the management of waste and hazardous substances at national level;

2.2.2 MARITIME ACTIVITIES

Objectives

- Auditing the exploitable mineral resources in locations in conservation, in order to identify opportunities for capitalization.
- Significant investments in the national defense industry in order to close the technological gaps that allow operators in this sector to be reliable suppliers.
- Establishing partnerships with companies from NATO countries.
- Building new production plant within the national defense industry and expanding the portfolio of externally marketable products with (at least) 5 products that can be built in partnership with companies in the Allied countries.
- Implement the provisions of the legislation on corporate governance in all companies in the ministry's portfolio.

Measures

- Elaboration of a national strategy for decentralization of restrictive decisions imposed on public enterprises in order to develop profitable state-owned companies, to provide good quality services at a competitive price, while modernizing the services offered on a competitive market. At the same time, it is considered to avoid bureaucracy and their development in a sustainable and accelerated way in accordance with private companies, this having an impact on the organizational, economic and legal development of companies.
- Elimination of limitations imposed by law on state-owned companies. Where companies are in areas essential to the country's economy, national security and strategic interest in positions where specialists require the employment and specialization of staff.

Purpose by the MSFD point of view

- Location and early detection of activities to change the related hydrographic conditions
 - reducing the impact on the components of the marine and coastal ecosystem (benthic),
 - establishing a framework for maritime spatial planning in accordance with the Directive 2014/89 / EU

MSFD Environment objectives RO/BG-MN-020	 Location of the areas with adverse effects, resulted from fishing and other exploitations, on the related hydrographic conditions; Prevention and / or control; Location of areas with effects of activities from urban areas, of maritime transport infrastructure, constructions and seaports, coastal protection works; Prevention and control; Maintaining the present ratio of the erosion/deposition within each Romanian coastal sector.
MSP according to Descriptor 7	The permanent change in hydrographic conditions does not adversely affect marine ecosystems
Implementation After 2024	The Coastal Zone Management Strategy is currently being reconsidered. In order to achieve it at an optimal level, there is a need for data and information to substantiate the scientific basis of this Strategy. The data and information background is obtained by performing appropriate monitoring activities for D7. The identification of changes in the dynamics of the elements that make up the marine hydrographic conditions requires continuous monitoring, in real time, covering the entire coastal area of Romania and continuously feeding a hydrographic database, based on which can been make forecasts and scenarios, as accurate as possible.
Legal Support	 Maritime Spatial Planning Directive, 2014/89/EU, Romania, Law no. 88/2017 for the approval of the Government Ordinance no. 18/2016 on maritime space planning Bulgaria, Maritime Space, Inland Waterways and Ports of the Republic of Bulgaria Act, mended and supplemented, SG No. 28/29.03.2018 Marine Strategy Framework Directive – MSFD - 2008/56/EC Government Decisions on the approval of the Program of measures for achieving the good ecological status of the Black Sea
Responsibility	 Ministry of Environment National Agency for Environmental Protection, Ministry of Research, Innovation and Digitization Ministry of of Transport and Infrastructure

GENERAL / SPECIFIC ACTIONS related to space issues

- Adaptation of legislationPublic and sectoral consultations;
| Fishing and Aquaculture |
|--|
| Extraction of non-living resources (oil and gas, incl. infrastructure, submarine cables and pipelines; salt, |
| water, etc.) |
| Maritime transport (infrastructure, shipping, ship building, shipyard, etc.) |
| Submarine cables and Pipelines |
| Tourism (coastal and marine) |
| Physical restructuring of coastline or seabed |
| - Coastal defence/flood protection |
| - Dredging and dumping |
| Military trainings |
| Research |

2.1.2.1 Fisheries and Aquaculture

Bulgaria

The measures and activities proposed are in conformity with Regulation (EU) 2021/1139 of the European Parliament and of the Council of 7 July 2021 establishing the European Maritime, Fisheries and Aquaculture Fund and amending Regulation (EU) 2017/1004, the Strategic guidelines for a more sustainable and competitive EU aquaculture for the period 2021 to 2030 approved by the Commission, and the Bulgarian Multiannual national strategic plan for aquaculture in Bulgaria (2021–2027).

EU policy in this sphere is based on four priorities:

- fostering sustainable fisheries and the restoration and conservation of aquatic biological resources;
- fostering sustainable aquaculture activities, and processing and marketing of fisheries and aquaculture products, thus contributing to food security in the EU;
- enabling a sustainable blue economy in coastal areas and fostering the development of fishing and aquaculture communities;
- strengthening international ocean governance and enabling seas and oceans to be safe, secure, clean and sustainably managed.

Most of the problems affecting the Black Sea, such as overexploitation of fish resources, climate change, pollution and declining biodiversity, are transboundary in nature and therefore require a shared response. There is a growing need for more effective management of the marine environment and maritime human activities in order to address the increasing pressures on the Black Sea basin.

Fisheries are of exceptional importance for the livelihood of coastal communities in the crossborder cooperation area. The fostering of sustainable fisheries and the conservation of aquatic biological resources is an important priority for both European countries.

Support should also be targeted to better fleet management and to the conservation and sustainable exploitation of marine biological resources, and aimed at achieving a balance between the fishing capacity and the available fishing opportunities.

Avoidance of unwanted catches is one of the main challenges. An option should be envisaged for providing support for innovations and investments in this direction. It is necessary to support investments in selective fishing gear and in the improvement of port infrastructures. Support is

necessary for innovations and investments on board the fishing vessels. That support should include actions which aim to improve health, safety and working conditions, energy efficiency and the quality of catches. It should not include the acquisition of equipment that increases the ability of a fishing vessel to find fish. It should also be possible to grant support for the design, development, monitoring, evaluation and management of transparent systems for exchanging fishing opportunities between the Republic of Bulgaria and Romania.

Fisheries control is of the utmost importance. Both countries should support the development and implementation of an EU fisheries control system, as envisaged in Council Regulation (EC) No 1224/2009. It is necessary to support the keeping on board of compulsory vessel tracking and electronic reporting systems, compulsory remote electronic monitoring systems and the compulsory continuous measurement and recording of propulsive engine power. These investments in control assets could also be used for the purposes of maritime surveillance and cooperation on coast guard functions.

Investment in human capital plays an essential role in the competitiveness and economic performance of the fisheries, aquaculture and maritime sectors. Therefore, it should be possible to envisage support for advisory services, cooperation between scientists and fishers, professional training, lifelong learning, as well as promotion of social dialogue and dissemination of knowledge.

In view of the ageing of the fishers' community, support for young fishers starting up fishing activities should be made available. The provision of support should be made conditional upon the acquisition of adequate experience or qualifications.

Both neighbouring states should support scientific research, education, innovations and knowledge transfer for management of the fisheries and aquaculture sector, as well as the collection and making available of current data on fisheries. In view of the challenges and costs related to obtaining reliable and complete data, support needs to be ensured for the actions of both states in the area of the cross-border maritime cooperation, aimed at the collection and processing of data in compliance with Regulation (EU) No 2017/1004 of the European Parliament and of the Council. This support should enable synergies with the collection and processing of other types of data concerning the marine environment.

Both states should support an effective knowledge-based implementation and governance of the common fisheries policy of the EU through the provision of scientific advice, bilateral cooperation on conservation measures, the fisheries control system and voluntary contributions to the activities of international organisations.

Measures should be envisaged for support and compensation in case of temporary cessation of fishing activities as a result of the implementation of certain conservation measures, due to reasons of force majeure, such as a natural disaster, an environmental incident or a health crisis. Said support may take the form of support from mutual funds, insurance instruments or other collective schemes which enhance the capacity of the sector to manage risks and respond to adverse events.

Targeted action should be implemented to support the protection and restoration of aquatic biodiversity and ecosystems in the area of the cross-border maritime cooperation. Support

should be provided also to the actions to achieve or maintain a good environmental status in the marine environment in accordance with Directive 2008/56/EC, to the management, restoration, surveillance and monitoring of Natura 2000 areas, taking into account the prioritised action frameworks established pursuant to Directive 92/43/EEC, to the protection of species, more specifically under Directives 92/43/EEC and 2009/147/EC of the European Parliament.

Support should be provided to the promotion and the sustainable development of aquaculture. Emphasis needs to be placed primarily on the diversification of production from marine cultures, because at present the farming of the Black Sea mussel predominates almost totally.

It would be expedient to target the studies at species for which practices exist that were developed and approved internationally and domestically. Preference should be accorded to species that are native to the Black Sea and for which the coastal water quality meets their requirements. Efforts should be aimed at restoring the populations of endangered and rare fish species in the cross-border cooperation area, which may be of major commercial significance – turbot, European seabass, sea bream, Shi drum, annular sea bream and bluefish. Stocking material for the turbot may be sourced from the city of Trabzon – Turkey. As regards the European seabass, the sea bream and the Black Sea salmon it is envisaged to build 3 farms equipped with mesh cages in Bulgaria's aquatic area of the Black Sea, for which EU funding has been earmarked. The network of hatcheries may be expanded by hatcheries in the border area, in cooperation with Romania.

FAO supports the development of marine aquaculture in the Black Sea and in this respect the building of marine aquaculture centres started in some of the Black Sea countries. The positive outcomes of the activity of those centres can and should be used in the practice of the Republic of Bulgaria and Romania.

In order to ensure food security, it is necessary to support the creation and functioning of efficient and well-organised markets. The aim is to improve the consumers' awareness, as well as the transparency, stability, quality and diversity of the supply chain. More specifically, support should be provided for the creation of producer organisations, the promotion of new market outlets and the development and dissemination of studies of the marine products market.

As regards the processing industry, an option should be envisaged for providing support for targeted investments, which should contribute to the achievement of the objectives of the common organisation of the markets. For enterprises other than small and medium-sized enterprises (SMEs), such support should be provided only through financial instruments or through InvestEU and not through grants.

The two bordering states should provide support for compensating the fisheries and aquaculture sector in instances of exceptional events which place the markets under stress. Job creation in coastal regions relies on the locally driven development of a sustainable blue economy that revives the social fabric of those regions. To be sustainable, blue growth depends on innovation and investment in new maritime businesses and in the bio-economy, including sustainable tourism models, ocean-based renewable energy, new port services, which can create jobs and at the same time enhance local development.

Local and cross-border partnerships for the development of a sustainable blue economy need to be encouraged. That approach should boost economic diversification in a local context through the development of coastal and inland fisheries, aquaculture and a sustainable blue economy. It is necessary for the local communities in fishing and aquaculture areas to better exploit and benefit from the opportunities offered by the sustainable blue economy by capitalising on and strengthening environmental, cultural, social and human resources.



Figure 32. Fishery, aquaculture in Bulgaria

The reduction of the administrative burden and overregulation and the limiting within reason of the changes in the applicable statutory framework is an important orientation of the conduct of economic activities in the aquaculture sector. Said activities also include expansion of the capabilities for informing and consulting the stakeholders in order to alleviate the administrative and financial burdens during the transition to a sustainable food chain, supported also via the Farm to Fork Strategy of the EC.

Romania

> Fishing

Fishing is practiced along the coast where exist four main fishing ports (Sulina, Capul Midia, Constanța and Mangalia) and 18 other small fishing points, located between Sulina - Vama Veche. The depth of the fishing boats actions traditionally varies between 2 and 20 m. Only when specialized fishing for turbot, mackerel lor small shark is practiced, at the 60 m.

The Romanian fishing fleet operates in the area of competence of the Regional Fisheries Management Organizations - G.F.C.M Zone 37 - Mediterranean and Black Sea, Sub-area 37.4, Division 37.4.2, GSA 29.

Fishing vessels used in Romanian waters needs improvement, important equipment, installations and apparatus, such as: hydraulics, lifting equipment, refrigerated storage compartments, essential for fishing.

The main issues affecting fishing are related to:

- specific conflicts: between representatives of the fishing community and shellfish collectors; between fishing and other maritime activities,
- pollution of any kind and overexploitation, leading to a decrease of fish productivity and to a significant increase of rapans population;
- invasion of this predator, which has no natural enemy in the Black Sea; an example mussel colonies diminishing their traditional natural stocks by the entrance of Rapana.

The fishing season takes four / seven months by the year (March-October), when the most important commercial fish species arrive near the coast for reproduction and feeding. In recent years, mrine fishing has been limited in Romania to stationary fishing in the coastal area, using fixed gear, various types of nets, longlines and cages / traps.

Fishing zones and no-fishing zones have been established taking into account industrial sectors and other restricted zones. They are delimited on the basis of annual catch records which depend on the environmental conditions wich influence fish migration and agglomerations.

Population preference for fish and other valuable aquatic organisms has changed in the last 30 years due to the catches structure:

- the gastropod Rapana (Rapana venosa) has become the basis of sea fishing in Romania (98% of the total catch), currently reporting a decrease due to the migration of Rapana populations to the northwest of the Black Sea, in the Ukrainian area;
- Mussels (Mytilus galloprovincialis) are collected only with the help of divers. The National Agency for Fisheries and Aquaculture (ANPA) introduced the quota of collecting (Total allowable catch), in 2018,;
- the shell collecting is not yet regulated in Romanian waters and the hydraulic shearing tool was introduced among the legal instruments in 2018, by the Ministry of Agriculture and Rural Development (Order no. 1369/2018 in marine and inland waters).

> Fleets, fishing gear and fishing effort

The activity of fishing vessels is low: 20 vessels with LOA between 24 and 40 m registered according to the Fishing Fleet Register. Only two or three ships are active for a very short period of time. The total number of registered boats / ships was 148 (2016), of which only 121 assets, most with LOA of 6 - 12 m (79.53%).

Fishing in small fleets is usually artisanal: it targets several species using one or two, or more gears / installations, the fishermen switching from one gear (installation) to another, several times throughout the year.

271 fishermen were engaged in small-scale fishing (6-12 m boats), using different types of gear, and 29 fishermen worked on boats with fishing installation under 6 m (2017),. For 12-18 m boats, a staff increasing was reported: 10 fishermen in 2013, 74 in 2017.

The level of catches depends on hydroclimatic conditions evolution, fish stocks and fishing effort (number of nets, number of effective fishing days). Therefore, they differ from year to year, catches being dominated by small pelagic species and short life cycles.

The structure of the fish population indicates the more frequent presence of a number of approx. 20 species (dominant sprat, anchovy, horse mackerel, gobies and turbot) and larger species (Danube turbot and mackerel). The small shark, the mullet and the bluefish appear to a lesser extent; the appearance of isolated examples is rare, such as blue mackerel and bonito.

Catches of rapane have increased significantly in recent years, due to economic value, according to records (10% in 2010 and 96.2% in 2017 of total catches) induces people preference for consumption.



Figures 33-38. Fishing areas according to the fishing tools and cummulativ impact assessment

Efficient use of "environmentally friendly" fishing techniques and equipment
Stimulating "environmentally friendly" practices by using

- Stimulating *"environmentally friendly"* practices by using fishing vessels of less than 10 m length, not using towed gear (small-scale fishing)

- Designation of areas where the use of beam fishing gear is permitted. Modification of usage requirements, where appropriate
- Fishing and molluscs collecting in environmentally friendly conditions
- Development of the multiannual regional management plan for the fish stocks
- Location and control of turbot nets
- Prohibition zones and periods for fish species fish stocks. Definition, delineation and re-evaluation

MSP Priorities Resulted from MSFD Measures

MSFD Purposes and Objectives

RO/BG-MN-013 RO/BG-MN-014 RO/BG-MN-015 RO/BG-MN-016 RO/BG-MN-017 RO/BG-MN-018 RO/BG-MN-019

Environment Objectives

According to the MSFD Purposes

- Impact of fishing assessing concerning commercial species, Location and Distribution:
- maintaining conservation status of existing populations/stocks,
- introduction of new *environmentally friendly* fishing techniques. (selective gear, placement of PINGER/ADD electronic devices type
- Small-scale coastal fishing encouraging and localization, technological innovations use, to not increase fishing effort (eg more selective fishing techniques),
- Areas identification, where the type of trawling is allowed, reducing the damage to benthic habitats,
- Fishing techniques promoting and stimulating and collecting the *environmentally friendly* molluscs.
- Early detection of the fishing impact of commercial fish species, in accordance with the maintenance of the conservation status of existing populations/stocks (for sustainability),
- Fishing techniques/gear control to improve the stock of turbot and to reduce by-catches,
- Prohibition periods and zones (extension, periods, fishing zones change, etc.) reassessment or modification, in accordance with environmental conditions changes.
- Range of fish species affected by human pressure (eg Gobiidae Fam. from the coastal zone).
- Distribution and frequency maintaining of species during the implementation of management measures.
- Dolphin distribution area, along with:
 - reducing the number of deaths among the three species of dolphins,
 - reducing the level of bycatch of marine mammals (Phocoena phocoena, Tursiops truncatus, Delphinus delphis).
- Erosion Reducing on the sea solid bed, as well as reducing fishing effort.
- Current ratio maintaining for commercial fish and mollusks species of, in size/number of species and/or abundance within each population group, in the Romanian EEZ area of the Black Sea.
- Declining trend of non-native species.
- Species distribution and frequency maintaining, through proper management.
- Fishing mortality maintaining and reducing at regional level.

Implementation in developing 2021-2022	 Measure RO-MN-013: is in implemented, for the period 2021-2022: organizing training courses for fishermen having positive-important impact on all activities by ensuring the development of <i>environmentally friendly activities</i>, healthy and balanced for fish fauna. Measure RO-MN-014: is implemented with good effect by applying control measures to ensure the sustainability of the aquatic resource within the various national projects (NP), funds were obtained for scientific, technical and technological support for the development of mussel aquaculture on the Romanian coast for Measure RO-MN-016: The National Fisheries Data Collection Program (EU-ANPA) provides scientific and technical support for maintaining the current ratio of species from commercial fish populations, in size/number of species and/or abundance within each population
MSP according to Descriptor 3	Distribution of fish population by age and size, indicating a healthy stock of the commercially ish populations which are within safe biological limits
Legal Support	 Maritime Spatial Planning Directive, 2014/89/EU, Romania, Law no. 88/2017 for the approval of the Government Ordinance no. 18/2016 on maritime space planning Bulgaria, Maritime Space, Inland Waterways and Ports of the Republic of Bulgaria Act, mended and supplemented, SG No. 28/29.03.2018 Marine Strategy Framework Directive – MSFD - 2008/56/EC Government Decisions on the approval of the Program of measures for achieving the good ecological status of the Black Sea
Responsibility	 Ministry of Agriculture and Rural Development: National Agency for Fisheries and Aquaculture, Ministry of Research, Innovation and Digitization (NIMRD "Grigore Antipa" Constanţa, NIRD GeoEcoMar), NGO " Mare Nostrum"

GENERAL ACTIONS related to space issues

Efficient use of environmentally friendly fishing techniques.

- capacity building with local fishermen's groups, through educational campaigns
- attention paying to the introduction of fish species and other crops in marine facilities
- Use of technical and rules guideslines
- Authorized areas establishment for the use of fishing gear and those which are prohibited,
 - control operations to monitor compliance
 - monitoring and research component in order to assess the impact of beam use on the ecosystem
- Reviewing the areas and periods of prohibition existing in territorial waters; spatial and temporal evaluation of stocks
- Delimitation of periods and areas of prohibition

SPECIFIC ACTIONS related to space issues

- Establishing the criteria necessary to identify areas where beam trawling is allowed after the establishment of working groups / at national and regional level;
 - monitoring compliance with these areas;
 - research and monitoring the impact on bental habitats.

4.2.10. Mariculture (marine aquaculture)

Marine aquaculture in the Black Sea area of Romania has shown a relatively recent development. 50-60 years ago, the first technologies for the directed cultivation of the most important marine species of invertebrates and fish were experimentally developed. Among the cultivated fish species are mentioned: rainbow trout (*Onchorhyncus mikiyss*), mullet (*Mugil cephalus*), turbot (*Scophtalmus maeoticus / Psetta maeotica*), plaice (*Platichthys flesus luscus*) and sturgeons; pike pearch (Stizostedion lucioperca) in brackish waters

An aquaculture station was built in Capul Midia, Năvodari area under a project developed for the turbot rearing in Recirculating Aquaculture System (ELCOMEX Ltd.).

Aquaculture technology and production is expected to grow in the region, depending on funding opportunities and level of profit.

Currently, only one private company (SC Maricultura Ltd.) has been cultivating the mussel *Mytillus galloprovincialis* in the Romanian marine waters, sometimes under the pressures of approvals. Two other mollusc farms facilities are in planning in the Eforie area.

There are a number of factors hindering the development of the sector, like the lack of a legislative framework. Mariculture can only be developed:

- in the naturally sheltered coastal areas (which are almost non-existent from a geomorphological point of view);
- in artificially sheltered areas, which should be built and arranged in appropriate areas, which require significant financial resources, difficult to access and recover;

Figure 39. Sea water quality for bath

In 2021 the implementation of the national program for the classification of mollusk harvesting and cultivation areas was performed, in accordance with European - Regulation 854/2004.

The concession of marine waters in order to implement aquaculture projects based on European funding schemes or private capital is almost ready to be approved soon, in 2022.

For marine aquaculture, further research is needed to assess the interaction between marine activities and environmental components, including climate instability and associated impact.

In 2020, the effective microbiological classification of the living bivalve molluscs was initiated, within a joint approach that includes the National Sanitary-Veterinary Authority and the Sanitary-Veterinary Directorates Constanța and Tulcea, the National Agency for Fisheries and



Aquaculture, Ministry of Environment, Waters and Forests, INCDM "Grigore Antipa", as well as fishermen' associations.

The sources of pollution highlighted by the "Documentary, field and hydrodynamic survey in order to establish and microbiological classification of the production and relocation areas of living bivalve mollusks in the Romanian Black Sea sector according to Regulation (EC) no. 627/2019", and the areas of interest for classification were debated and the network plus the microbiological sampling program for the classification stage were established.

The areas classified as suitable for mollusk farming were established according to the requirements of Government Decision no. 201/2002 for the approval of the Technical Norms on the quality of water for mollusks, which transposes the provisions of the Directive 79/923 / EEC on the quality norms for the waters for mollusks.

From north to south, the three classified areas, within the process of designating the Allocated Areas for Aquaculture (ZAA), in Romania, are:

According to the joint Order no. 983 / 15.06.2015 of the Minister of Environment, Waters and Forests and no. 1699 / 03.07.2015 of the Minister of Agriculture and Rural Development, for the amendment of the Annex to order no. 1950/2007/38/2008 of the Minister of Environment and Sustainable Development and the Minister of Agriculture and Rural Development, for the delimitation and cataloging of marine areas suitable for the cultivation and exploitation of mollusks, the following areas are regulated:

⁻ Zone 1 - between Perișor and Chituc, 215 Mm2

⁻ Zone 2 - between Năvodari and Constanța (Baia Mamaia), 109 Mm2

⁻ Zone 3 - between Agigea and Mangalia, 101 Mm2



Figure 40. Future development of the Fisheries and Aquaculture fields

In the fish processing industry, 19 units with main activity and 19 in which fish processing was found as a secondary activity were identified throughout the country, in 2017. Four private companies have been identified in the coastal area, located in Tulcea, Corbu, Agigea and Neptun Resort. Manufactured fishery products are diversified year by year, depending on market and consumer requirements, in the form of preserved, semi-preserved and refrigerated products by primary processing.

Public consultation related the Black Sea MSP process	The practical role of stakeholder to MSP from the perspective/point of view of the own field of activity	Owner of information
AREAS OF ACTIVITY	FISHING and AQUACULTURE - FA	NAFA
Main Role of MSP for Fishing and Aquaculture	 Zonning the fishing areas Zonning the aquaculture area Avoidance of traditional and potential conflicts b Different fishing activities Between fishing and other maritime activities Between fishing and marine environment 	etween:
FA National strategic documents / intervention plans / normative acts	- National Strategy for Marine Fiseeries and Aquad	culture

Main FA initiatives	- European Funds for fisheries	
with impact on MSP	- Strategy for Fisheries and aquaculture	
process	- The microbiological classification of marine waters has been	
	carried out, opened the way to the development of marine	
	aquaculture in Romania	
FA Location	10 the whole coastal area is targeted	
MSP interventions	Knowledge on the phenomena of erosion of the coastal area	
for FA	generated by waves currents wind etc. with a major impact on	
	fishing activities are necessary	
Issues in the field of	Specificity of fishing and marine aquaculture activities:	
FA	- the need for ports and fishing shelters with specific facilities,	
	- access to marine perimeters for marine aquaculture	
Main FA Problems	It occurs throughout the coastal area	
FA Main conflicts	Accidental pollution, interactions with certain activities related to	
	tourism	
	Avoidance of potential conflicts that may arise both between	
	different actors in the fishing segment (fishing ships versus	
	fishermen/talian, fishermen versus divers, marine aquaculture	
	versus marine fishing), and between those engaged in fishing and	
	other economic activities (fishermen versus marine recreation,	
	fishermen versus beach managers, etc.)	
FA Problems,	Adoption of specific zonal regulations / interdictions in common	
solution/resolving	with all the factors involved	
FA - LSI elements	harmonizing all existing interests between the authorities and	
	economic agents involved, capitalizing on the full potential of	
	existing resources while maintaining a clean and sustainable	
Furonean level new	The objectives are also sustainable in the current conditions of the	
trends	new European trends	
FA Future Directions	Development of fishing infrastructure and marine aquaculture	
of development	Strteegy + management	
	For the development of the fishing infrastructure, certain locations	
	of interest are considered, with more numerous fishing	
	populations, and for the development of the marine aquaculture	
FA Future Benefits	MSP can help for:	
and opportunities for	- Unlocking the development of marine aquaculture in Romania	
MSP	mitigating conflicts between various actors in the coastal area	
Meetings/ thematic	Many meetings concerning:	
groups for Projects		
/Strategies		
FA Importance for	-	
successful MSP Plan		
Indicators	-	
Targets	Development of marine aquaculture, improving	

*NAFAI-National Agency for Fisheries and Aquaculture

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- 3. HUBENOVA, T., UZUNOVA, E., ZAYKOV, A., MARKOV, Y., DELCHEVA, S., 2020. MULTIANNUAL NATIONAL STRATEGIC PLAN FOR THE PROMOTION OF AQUACULTURE IN THE REPUBLIC OF BULGARIA (2021–2027). PAGE 151

2.2.2.2 Extraction of non-living resources

Introduction

Though extraction of non-living resources is not among the Five Priorities for Ensuring a Sustainable and Equitable Blue Recovery to the COVID-19 Crisis⁶, its traditional importance and progressive development will continue. Submarine mineral and energy resources is among the potential sectors for growth along with marine biotechnology and blue energy. Further, the sector falls into the scope of the second Pillar of the draft Black Sea Strategic Research and Innovation Agenda (SRIA)⁷.

Departure point

There is increasing recognition and understanding of the dependence of humankind on the vital life-supporting services provided by the ocean⁸. The Black Sea belongs to this vital system and can be a source of solutions for climate change mitigation as well as for many dimensions of a sustainable blue economy, including the future of *extraction of non-living resources*. Conditionally, it could have the potential even to surpass the growth rate of the Romanian and Bulgarian economies, both in terms of generated value and employment. Such a development could include contributions from new or less developed services like *minerals and marine genetic resources*. For example, the deposits of deep-water organogenic-mineral sediments⁹ (DOMS) are enormous and their spheres of possible application – wide (agriculture, construction, production of new materials, nanotechnologies). But extraction and use of DOMS is still in the phase of research and experiments.

The context in brief

⁶ "A Sustainable and Equitable Blue Recovery to the COVID-19 Crisis", Secretariat of the High Level Panel for a Sustainable Ocean Economy, World Resources Institute: 1) Sewerage and Wastewater Infrastructure for Coastal Communities, 2) Coastal and Marine Ecosystem Restoration and Protection; 3) Sustainable Community-Led Non-fed Mariculture, 4) Sustainable Ocean-based Renewable Energyq and 5) Transition to Zero Emission Marine Transport

 ⁷ <u>https://ec.europa.eu/info/news/launch-european-black-sea-strategic-research-and-innovation-agenda-2019-may-08_en</u>: Pillar 2: Developing Products, Solutions and Clusters underpinning Black Sea Blue Growth

⁸ <u>https://www.oceanpanel.org/</u>, The High-Level Panel for a Sustainable Ocean Economy

⁹ Dimitar Dimitrov, Geology and Nontraditional Resources of the Black Sea

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Currently, exploitation of non-living resources is focused mainly on exploration and extraction of oil and gas. Though with much smaller income, extraction of salt and sea water, lye and mud for different uses should be considered too.

Bulgaria

Extraction of non-living resources contributes to the GVA of the Bulgarian Blue Economy by over 11%. In 2017, the sector has employed about 4200 persons and earned EUR 83 million. Oil and gas exploration occurs mostly in the northern part of the Black Sea. The Galata Platform (with the relevant infrastructure) is the only functioning facility for extraction of natural gas in the Bulgarian Black Sea area.

Offshore oil and gas explorations during the last decade in 2 (1-21 Khan Asparuh and Khan Koubrat) out of the total 3 blocks gave promising starting results, but later the exploration wells have been plugged and abandoned due to non-commercial hydrocarbon content in target reservoirs.

Salt extraction is practiced for centuries in two coastal lagoons of Bulgaria, but far beyond the scope of the current project.

The greatest development potential of the sector is in alternative uses of non-living resources for the purposes of medicine, pharmacy, bio- and nanotechnologies. Examples of efficient

"factories" are the functioning SPA treatment facilities in Balchik area, that use mud, salt and its derivatives. A good capacity for enlargement and further development is available.

The western part of the Black Sea Basin is one of the most promising hydrocarbon-bearing areas in the SE However, Europe. the offshore projects in the Romanian Black Sea area are hindered by high costs with exploration associated and exploitation activities. In addition, there are considerable geological and technical uncertainties. Adding the lack of upstream offshore infrastructure and the long lifespan of offshore projects (over 10 years from a

confirming exploration to industrial extraction), the investment interest is cautious and not promising considerable development in near future. A confirming fact is that out of total 16 blocks for exploration, development and exploitation, only one is currently in operation - XVIII ISTRIA¹⁰.





¹⁰ This perimeter (comprising five production fields) accounts for 185 million barrels of oil, 8 million barrels of condensate and 48 bcm of gas.

Meanwhile, most of the discoveries that have proved considerable deposits of oil and gas have been postponed or suspended due to lack of economic efficiency in current conditions. The only exception reported so far is the XV MIDIA A block, where gas exploitation is decided to begin soon.

Development prospects

The Common Maritime Agenda for the Black Sea is the most recent EU sea basin strategy, built on 3 Goals¹¹ - sound ecosystems, blue economy, reliable financing. The up-to-date priority sectors of the blue economy are maritime transport, coastal tourism, fisheries and aquaculture. Extraction of non-living resources is not among the announced priorities, but this fact would not mean "full stop" for the sector. Its future development will rather be highly dependent on the choice and mutual consent on the MSP development scenario. At least 2 of the total 4 scenarios recommend restriction of extraction, while the "blue economy" and "one for all" scenarios would rather support exploration and mining.

Still, if a political decision gives priority to extraction of non-living sea resources, the aspects below could be of use to provide focus for future development efforts:

Potential benefits of the sector: a) Wealth worth millions of Euros could be potentially generated; b) A fair share shall be returned to governments and the people through tax revenues and employment; c) Mining revenues will enable governments to stimulate other blue economy sectors and invest in ecology; d) Indirectly, the sector will support local economic activities; e) Well-educated labour force will be prepared and/or attracted; f) Labour mobility will be increased and demographic issues alleviated.

Current issues to overcome: a) Absence of specific policy, legislation & regulations; b) Insufficient resources and technical skills; c) Potentially large revenue streams, requiring robust financial systems; d) Limited understanding of deep sea ecosystems – unknown ecological risks; e) Local communities' concerns of marine mining; f) Use of mobile platforms and other technologies.

Insufficient capacities: a) Limited economic and human resources; b) Weak institutions, legal and policy arrangements; c) Small number of legal and sea/ocean governance specialists; d) Few research institutions and marine scientist.

Tasks waiting to be solved: a) To clarify the role and responsibilities for improved sea governance; b) Policy coordination and collaboration in MSP's implementation; c) Develop a transparent legal, regulatory and fiscal framework to regulate and adjust revenue streams; d) Develop environmental policies, regulations and guidelines to regulate exploration and mining; e) Design and develop regional and national database.

Factors to develop extraction: a) Baseline data and information; b) Relevant policy and legislation; c) Trained personnel; d) Sustainable yield of whatever is extracted; e) Permanent and efficient monitoring; f) Regional cooperation and transparency; g) Clear rules and guidelines.

¹¹ <u>https://blackseablueconomy.eu/423/cma-regional-stakeholders-conference-2021;</u> CMA Goal 1: healthy marine and coastal ecosystems; CMA Goal 2: competitive, innovative and sustainable blue economy; CMA Goal 3: sustainable investment in the Black Sea blue economy.

In conclusion, the prognosis for non-living resources extraction in the project spatial scope is evolutionary (slow progressive development) rather than revolutionary (rapid expansion).



Figure 41. Natural Resources exploiting in Bulgaria

Romania

Offshore projects in the Black Sea area have a specific investment risk profile, because the offshore operations involve high costs, associated with exploration and exploitation activities; and the geological and technical uncertainties assumed by investors, for the exploration phases, are significant.

There is also a deficit in the development of exploration and production activities (the upstream industry on the Romanian continental shelf of the Black Sea), and the stage of preparation of the offshore projects is much longer comparing to other types of investments, requiring more than ten years from the confirmation stage of the discovered area till the exploitation and production phase.

Between the 16 hydrocarbon exploration perimeters, 10 are in concession and only one is currently in operation, XVIII ISTRIA. This perimeter includes five production fields, with 185 million barrels of crude oil, 8 million barrels of condensate and 48 billion cubic meters. Natural gases; According to the Deloitte report (2018), about 8%, the difference being covered by onshore production. The total amount of crude oil produced in 2016 in Romania was about 27 million barrels, and consumption exceeded 82 million barrels (Deloitte Report-2018).

2015	2016	2017
256.072 t	258.171 t	209.483 t

Figure ... Perimeters of gas and oil exploration, development and exploitation in the Black Sea (Source: ANRM, 2021)

Figure 42-43. Gas and oil pipelines in the Black Sea (Source: I.N.C.D.M. "Grigore Antipa")



Romanian perimeter and year of discover

Campul	Anul de Productie demarata	
Perimeter XVIII ISTRIA is one of the older discovered		
Lebăda Fields	1987	
Campul Lebăda Vest	1993	
Campul Sinoe	1999	
Campul Delta	2009	
Campul Marina	2014	
Perimetrul XV MIDIA B	·	
Campul Doina	1995	
Campul Ana	2008	
Perimetrul XVIII ISTRIA are cele mai vechi descoperiri		
Perimetrul EX-27 MURIDAVA		
Perimetrele EX-28 EST COBALCESCU, EX-29 EST RAPSODIA si XV MIDIA A		
Perimetrul XIX 2 NEPTUN (DEEP		
În 2012, OMV Petrom S.A. și Exxon Mobil	Exploration & Production Romania Ltd. (ca	
Operator) au anunțat descoperirea de resurse recuperabile estimate prin sonda Domino 1		
În 2015, companiile Lukoil, PanAtlantic și	Romgaz au anunțat descoperirea unui nou	
zăcământ important de gaze		

Mineral Resources



Figure 44. Extracția de resurse minerale în zona costieră și marină (Sursa: ANRM)

Strategic objectives:

- Implement measures to ensure energy security in the context of EU policy lines aiming fueling and natural gas supply, setting up a system for maintaining mandatory stocks in accordance with European legislation, adding the decarbonising and reducing greenhouse gas emissions.
- Promoting energy investments, especially in the field of clean energy.
- Completion and approval by the Romanian Government of Romania's Energy Strategy 2020-2030, with a view to 2050.
- Unlocking offshore natural gas exploitation projects in the Black Sea.
- Expanding the electricity transmission network to increase the capacity to interconnect neighboring states and electricity from new or renewable sources.
- Making investments in expanding the natural gas transmission and distribution network, emphasising the implementation of intelligent transmission and distribution networks.
- Clarification of the legal and regulatory framework that would allow investments in new renewable energy capacities and stimulation of green financial instruments to support investments in renewable energy.
- Stimulating the growth of natural gas production.
- Creating a framework to facilitate the absorption of European funds for investments in the production of onshore and offshore wind and solar energy.
- Creating a competitive, transparent and predictable regulatory environment based on substantive public consultation, as foundation of free and competitive energy markets.

- Extending the service life of mature natural gas fields.
- Implementation of reforms and objectives within the National Recovery and Resilience Plan (PNRR) of Romania.
- Use of energy resources for short-term use to overcome the energy crisis.
- Establishment of the Energy Fund, in line with international norms of good practice in the field of energy.
- Operationalization of the Modernization Fund for the opening of the call for projects, the realization of new energy capacities and the reduction of electricity imports and the increase of competitiveness on the European energy market.

Proposals for the period 2021-2024: instead of conclusions

- Energy transition, which involves the establishing of an internal energy mix for the development of clean, renewable sources (hydro, solar and wind); where the European Green Pact is a driving force behind the implementation of the National Strategy for the Transition to a Carbon-Neutral Economy.

TRANSGAZ

The modernization and development program of SNTGN Transgaz SA for the period 2022-2024 mainly follows the following directions:

- Ensuring the supply of natural gas to consumers in safe conditions, with the limitation of the impact on the environment:
 - o modernization and refurbishment of the National Transport System;
 - o correlation with the Management Program of the company's management.
- During the period 2021-2024, the project proposed concerning the natural gas transmission network leads to the:
 - new developments of the NTS in order to take over the gas from the Black Sea coast (Vadu T1), which involves the creation of an additional point for taking over the natural gas from the offshore exploitation perimeters of the Black Sea;
 - development on the Romanian territory of the National Natural Gas Transmission System on the Bulgaria-Romania-Hungary-Austria Corridor (phase I);

Supporting offshore operations

- Exercising the quality of institution issuing authorization documents, in accordance with the provisions of Law no. 256/2018 on some measures necessary for the implementation of oil operations by holders of oil agreements on offshore oil perimeters.
- Inter-ministerial collaboration in order to amend and supplement Law no. 123/2012 on electricity and natural gas.
- Promoting an Emergency Ordinance on ensuring the continuity of natural gas supply to natural gas distribution systems, in case of depletion of deposits / cessation / renunciation of oil concession, suspension of oil well activity.
- Identifying solutions for the development of natural gas distribution systems in order to expand the concession areas.

• Amending and supplementing the Offshore Law no. 256/2018 in order to start the strategic project for the exploitation of Black Sea gas to increase energy security, to reduce dependence on imported gases and ensure the transition to clean energy

2.2.2.3 Maritime transport

Bulgaria

The horizons ahead are envisaged by international documents to which Bulgaria and Romania are parties. Spatial and temporal requirements are defined in the documents, giving the strategic context and goals for a sustainable future.

The maritime transport, with its high socio-economic importance, major effect on sectors as fishing and tourism and impact on the ecosystem, is evolving and will continue to do so, fully consistent with the Sustainable Development Goals¹² of the United Nations, in order to reach the targets for 2030 and climate neutrality of the EU by 2050.¹³ The measures against climate change and goals set in the European Green Deal¹⁴ provide a clear vision for the development of the spaces and the economy in the near future.

On European level, The Green Deal prioritises more efficient transport system through multimodality and a shift to low-carbon transport modes (such as maritime transport). The construction of intermodal terminals and investments in ports will encourage the use of alternative freight transport, other than road transport, and contribute to increasing the share of sustainably transferred goods. The attaining of this transition requires measures to enhance governance, to increase the capacity of railways and inland waterways in order to support the multimodal freight operations by rail and water, including short sea shipping.

Transport prices should reflect their impact on the environment and on health. Therefore, the Commission carefully considers the current tax exemption for marine fuels regarding the maritime sector in EU emissions trading, coordinated at global level, in particular within the International Maritime Organization (IMO). In parallel, the EU should step up the production and deployment of sustainable alternative transport fuels. The Commission will also review the Alternative Fuels Infrastructure Directive and the Trans-European Transport Network Regulation (TEN-T) to accelerate the entry of zero- and low-emission vehicles and ships. Another action, recognised by the Commission, is the reduction of the pollution and involves regulation of the access of the most polluting ships to EU ports and obliging moored ships to use ground-based power supply.

The greenhouse gas emissions from maritime transport are projected¹⁵ to increase significantly from the current level and support the target of the IMO of reducing of the CO₂ emissions from international shipping consistent with the Paris Agreement.¹⁶ The Council calls on IMO to swiftly implement the Initial Strategy on reduction of GHG emissions from ships. Port

¹² <u>The 17 Goals | Sustainable Development (Un.Org)</u>

¹³ <u>https://ec.europa.eu/clima/eu-action/climate-strategies-targets/2050-long-term-strategy_bg</u>

¹⁴ European Green Deal | European Commission (europa.eu)

¹⁵ Council conclusions on oceans and seas <u>st14249-en19.pdf (europa.eu)</u>

¹⁶ Paris Agreement (europa.eu)

activities, shipbuilding, and maritime transport are part of the main pillars and contributors to the Union's Blue Economy, whose further development needs to be in line with the principles of sustainability. The marine litter itself is not only having a significant impact on marine ecosystems, but is also already generating additional costs and lost revenues for the Blue Economy and causing problems in maritime transport.

On regional level, The Common Maritime Agenda for the Black Sea (CMA) aims to support regional cooperation for a sustainable Blue Economy. It is developed in the broader framework of the Black Sea strategy and it is endorsed at Ministerial level. The CMA is complemented by its scientific pillar – the Strategic Research and Innovation Agenda (SRIA), supported by the Directorate General for Research and Innovation of the European Commission (DG RTD).

The CMA sets goals and priorities which are embodied into actions. One of the priorities aiming to promote Black Sea's transport and digital connectivity, emphasises the common benefits of the sector derived from modernisation, better exploration of the existing connectivity potential of the basin, and enhancing the blue economy. The outlined actions include the promotion of sustainable and safe shipping; protection of the marine environment through the development of modern navigation systems; environmentally friendly and carbon emissions efficient and safe ships; fostering smart connectivity and digitalisation of ports and infrastructures, such as green-shipping, eco-ports and ports as smart hubs; promotion of the use of liquefied natural gas (LNG) and compressed natural gas (CNG) as an alternative to oil-derived fuels for ships; promotion of sustainable and competitive interconnections for multimodal transport, including with navigable inland waterways; promotion of the development of combined transport, including feeder shipping for a better intercontinental connection, and promotion of sustainable and comprehensive connectivity, based on international law and internationally agreed practices, rules, conventions and technical standards.

The SRIA aims to advance a shared vision for a sustainable Black Sea by 2030, while considering its ecosystem characteristics (unique biodiversity and cultural heritage sites) and the new local, national and transboundary policy measures. The SRIA is developed under the umbrella of the Black Sea Synergy initiative, which is the EU's key regional policy framework in the Black Sea. The Vision Paper¹⁷ for a SRIA is the result of a deep analysis of gaps, regional and national framework conditions for research and innovation needs and opportunities for successful implementation. It also identifies key challenges, goals and actions and embed them in a common strategic agenda. According to the Burgas Vision Paper (or the Blue Growth Initiative for Research and Innovation in the Black Sea), education, research, and innovation can unlock the potential for blue growth in transport and the rest of the blue economy's components in the region. A main pillar of the paper is "Developing products, solutions and clusters underpinning Black Sea's blue growth", expressed in creating incentives for marine and maritime innovation in traditional and emerging blue economy sectors. The planned actions for the transport sector are focused on developing sustainable safe shipping and a cleaner marine environment.

The search and rescue procedures are activated in case of distressed vessels and people. The IMO is working with Member States and other organisations to help implement the

¹⁷ <u>Burgas-vision-paper_en.pdf (blackseablueconomy.eu)</u>

International Convention on Maritime Search and Rescue (SAR)¹⁸, whose main objective is to facilitate cooperation among the parties intervening with search and rescue operations. The foundations for regional cooperation are laid in the Agreement on Cooperation Regarding Maritime Search and Rescue Services Among Black Sea Coastal States (Ankara Agreement), which articulates the jointly arrangement of maritime search and rescue exercises so as to train their organisations in working together. Representatives of the competent authorities are obligated to meet yearly in order to develop the cooperation and the exchange of information and experience. The Convention and the Agreement are implemented in the national legislations of both Bulgaria and Romania. Being neighbours and parties to the documents, the shared responsibility and capacity of the countries for search and rescue is a must for the future.

In Bulgaria, an Integrated Transport Strategy for the period until 2030¹⁹ is adopted. The goal of the strategy is to define the contribution of Bulgaria to the European transport system, in compliance with the priorities set out in Article 10 of Regulation (EU) No 1315/2013, including to set priorities for investments into the expansion of the TEN-T network. It defines the orientations of the national transport policy and the sustainable development of the transport system of the Republic of Bulgaria.

The coronavirus disease (COVID-19) pandemic is having a major effect on many human activities carried out in the world ocean and the Black Sea is not an exception. The UN's Second World Ocean Assessment²⁰ calls for fostering not only a green but also a blue recovery from the pandemic. The full implications of the pandemic on human interactions with the ocean are still to be fully assessed.

Romania

Port Activity and shipping future plans

For the next 3 years, the priority axes of action regarding the naval sector aim the development of ports, the transformation of Constanța port into a regional leader and the intensification of the project completion process and the projects preparing for the EU funding programs, during the period 2021-2027.

Priorities in the field of shipping concern:

- elaboration of the naval strategy;
- development of ports by creating facilities for the containers storage and operation of, as well as facilities for their transport;
- increasing the competitiveness of Romanian water transport companies, through financial policies and facilities, for the renewal of fleets and port operating equipment, so as to increase the speed of water transport, faster handling of goods in ports, decrease in fuel and electricity consumption and reduction of emissions and residues;

¹⁸ <u>https://www.imo.org/en/About/Conventions/Pages/International-Convention-on-Maritime-Search-and-Rescue-(SAR).aspx</u>

¹⁹ https://www.mtitc.government.bg/bg/category/42/integrirana-transportna-strategiya-v-perioda-do-2030-g

²⁰ UN | The Second World Ocean Assessment <u>https://www.un.org/regularprocess/woa2launch</u>

- modernization of the infrastructure of sea and river ports and connection of ports to road and rail transport systems;
- development of the Port of Constanța by promoting a major investment plan, to reach its maximum potential and expand the hinterland to the first regional port;
- analysis of the opportunity to set up ferry lines between the Port of Constanța and other ports in the Black Sea basin;
- increasing the traffic safety by developing infrastructure for coastal maritime traffic information and management services and the acquisition of technical vessels;
- digitization / development of the Port Community IT System platform; permanent updating of electronic navigation maps; exchange of RIS (River Information Services) information at regional level; waterway management; improving the IT infrastructure for storing and processing geospatial data; creation of databases (EU Directive 2017/2397); implementation of the European Maritime One-Stop Shop (EMSWe) in accordance with Regulation (EU) 2019/1239;
- integration of river and sea ports in the European tourist circuit, the development with multimodal terminals and transport infrastructure connections between ports.
- administrative merger to reduce bureaucracy, multiple tariffs applied to goods, application of a common policy for how to attract goods in Romanian ports, inland waterways also.



Figure 45. Maritime activities and shipping lines, central south of Romania

Public consultation related the Black Sea MSP process	The practical role of stakeholder to MSP from the perspective/point of view of the own field of activity	Owner of information
AREAS OF	PORT ACTIVITY - PA	MTI, APC
ACTIVITY	Laws, Projects, Investment, Future trends	
Main Role of MSP	Implementation of the proposals for the develop	ment on port

for Port Activity	infrastructure, increasing the safety of navigation inside seaports	
PA National	Master Plan of the port, started in 2015; in present under evaluation	
strategic documents		
/ intervention plans /		
normative acts		
Main PA initiatives	Investment project, "Modernization of port infrastructure by	
with impact on MSP	ensuring the increase of signal depths and basins and safety of	
process	navigation in the Port of Constanta", since 2018 on going. The basins	
	built with depths lower than those designed, made not possible their	
	modification after dredging for maintenance (because of the areas of	
	hard material/rock/granite remained unrocked, since the execution of	
	seaports), needing:	
	- bringing to the project quotas, just finalized	
	- dredging the investments and deepening a basin in the Constanta	
	port from the project quota (-7.00m to -9.00), with the	
	consolidation of the existing quay.	
	Current investments project "Feasibility study, cost-benefit	
	analysis and financing application for the investment objective-"	
	Drage of investors and maritime ports",	
	- promoting dredging investments to correct the existing depths of	
	the Constanta ports, Midia, Mangalia.	
	- Identifying possibilities of creating / extending signals /	
	maneuvering basins / navigable basins, in areas with natural	
	depths, not navigable at present.	
	analyzing proposing variants / scenarios taking into account both	
	existing infrastructure. existing port traffic. as well as the trends	
	registered in the current transport demand.	
PA Location	All development of the port maritime infrastructure are and will be	
	developed in the Constanta, Midia, Mangalia seaports	
MSP interventions	Existing mooring fronts in all seaports	
for PA		
Issues in the field of	Ensuring permanently navigation depths in ports (port operators):	
PA	- Transformation of port aquifers with natural depths into navigable	
	areas, in order to increase the safety of navigation in ports	
	- Deepening of existing water basins, which involves consolidations	
	of the quays	
	Gaining territories over the sea, in order to build docks/	
	embankments with new mooring fronts docks	
Main PA Problems	The problems are inside aquariums inside seaports: Constanta,	
	Constanta-Midia area, Mangalia	
PA Problems	Promotion of special regulations at the entrance to the access channel	
solution / resolving	in the port of Midia, due to the sanding phenomenon in that area.	
PA Main conflicts	Possible future appearance of contaminated materials in the dredging	
	process and their storage places.	
PA - LSI elements	It has to be taken into account, inside the ports areas:	
	- Enssuring the necessary conditions for operation by bringing the	
	depth of the access channels and maneuvering basins, of the	

	berths depths at designed elevations, according to the foundation
	depth of the respective quays;
	- Creating the conditions for increasing the goods traffic;
	- The need to expand the navigable areas by creating new channels
	/ basins in the areas that currently have natural depths, thus
	improving the navigation conditions, for the navigation and ship
	safety.
	 The LSI concept is not implement in Romania, because it is a ICZM Law (202/2002,3) which is in present in changing/improvement: The ICZM and MSP plans must be designed and implemented in an integrated manner based on the principles issued by each entity involved, according to the own field of activity. The Romanian ICZM and MSP authorities has as main attributions:
	• ensuring and maintaining ships safety and security, and
	 control compliance with the rules regarding the safety of navigation;
	• these attributes have to be integrated in a MSP national plan.
	- the establishment of living separation devices in the coastal area
	with
	- the adequate or improved monitoring by modern surveillance.
	means (drones_aircraft) the conflict reduction
	- The concurrently use of maritime space and marine resources:
	It could also contain prevention and response plans for marine pollution cases and the involvement of relevant actors! with roles in these actions
European level, new	- The promotion of normative acts in order to achieve the proposed
trends	objectives concerning the maritime infrastructure
PA Future	Constanta Port:
Directions of	- Development of the Port of Constanta as one of the main
development	connecting points of Europe with Asia and its inclusion in the motorway network:
	- Maintenance, repair, modernization and development of the naval
	transport network;
	- Development of the functional structures of the Constanta Port for
	its transformation into a logistics center and its integration in the
	intermodal transport system;
	- Ensuring traffic safety and projected depths of port basins and
	berths and signaling the access into the port channels;
	- Development of the naval transport infrastructure and of the port
	facilities destined to the tourism activity.
	Midia Port:
	- Development of the MIDIA Area, belonging of Constanta Port, as
	a) transport node for petroleum products and liquid goods and b)
	cluster for services and maintenance providers of oil equipment;

	- Development of oil installations;
	- Development of Maritime Safety Service, Pilot Lanes/Tugs.
	Mangalia Port:
	- Elimination of the limitation of the drift ships at the port entry
	- Improving maneuvering conditions and safety in navigation
	Full recovery of existing maritime infrastructure as originally
	planned
PA Future Benefits	- Ensuring traffic safety by respectarea of the projecting depths of
and opportunities	port basins and berths
	- Ensuring the signaling on the access in the port channels;
	- Elimination of draft/pescaj restrictions on entry into port.
	- Increasing the efficiency of the operators, avoiding the finishing
	and double handling operations.
Meetings/ thematic	- Described in point 3: modernization of the port maritime
groups for Projects	infrastructure through investment dredging works.
/Strategies	- Other projects in the attention of CN APM SA Constanta:
	construction of springs with new mooring fronts), LNG terminal,
	barge terminal in Constanta port.
PA Importance for	
successful MSP Plan	
Indicators	- Dredged Surface (sqm) at the project quota, both for basins and
	channels/waterways
	- Surface of newly created basins / channels in ports
• Targets	- Traffic safety by ensuring deepening designed in the port basins
	- Integration of ports in the intermodal transport system

*MTI-Ministry of Transport and Infrastructure; **APC-Constanta Port Administration

Public consultation related the Black Sea MSP process	The practical role of stakeholder to MSP from the perspective/point of view of the own field of activity	Owner of information
AREAS OF ACTIVITY	PORT and NAVIGATION	ANR
Main Role of MSP for Port and Navigation - PN	 Respect for the safety rules of ships and navigation and rigorous framework, concerted with competit other authorities or involved sectors in the adm maritime space, in order to increase the degree improve the response in case of sea pollution and ta measures of prevention in the Romanian sector of th Elaboration of a database (as a practical exercise) updated with contact details of person and responsibilities in coordinating all maritime or connec (including homologous from the Bulgarian border). 	, in a planned ors, allied by inistration of of safety and aking efficient ne Black Sea;), periodically entities with ected activities
PN National strategic documents / intervention plans	- HG nr.1593/2002 privind aprobarea Planului pregatire, tiispuns si cooperare In caz de poluar	National de re marina cu

/ normative acts	hidrocarburi ~i alte substante, stabileste ANR ca autoritate
	responsabila.
	- Planul Regional de Contingenta la Marea Neagra, aprobat de
	Comisia de protectte a Marii Negre impotriva potuan), semnat
	de Romania la 21. 11.2006.
	*By Emergency Ordinance no. 71/2010 on establishing the MSFD,
	the Naval Authority Authority was nominated as competent
	authority (art. 7 para: (1)) for:
	- control the management and delivery of all waste generated on
	ships board and the remnants of transported goods;
	- investigation of the navigation events and accidents, including
	western oil and other harmful substances produced by ships;
	- coordinate the intervention actions at sea, in case of marine
	pollution.
	- GD no. 1593/2002 regarding the approval of the National Plan
	for preparation, response and cooperation in case of marine
	pollution with hydrocarbons and other substances,
	- Regional Contingency Plan for the Black Sea, approved by the
	Commission for the Protection of the Black Sea against Polution,
	signed by Romania on 21. 11.2006.
	"Plan for the snips sheltering in need of assistance and the shelter
	*Agreement concluded between the Romanian Naval Authority and
	the Bulgarian Maritime Administration on the provision of a place
	of refuge for the shelter of ships in need of assistance.
	- Plan pentru odiipoetirea navelor care au nevoie de
	asistenti: ~i soiiatii acordarea unui lac de refugiu.
Main PN initiatives	POIM Program and sectoral projects, leading to:
with impact on	- Information and management system for coastal maritime traffic
WISP process	RO-VTMIS (Coastal VTS), involving an operating system and
	opportunities, and locations: Mangalia - Constanta Sud (Agigea) -
	Constanta - Midia - Sulina - Mahmudia - Sf. Gheorghe - Gura
	Portitei.
	Other initiatives of the Maritime Coordination Center (MRCC) within AND transmitted to ISU Debrages in April 2021;
	- the proposals regarding the updating of GD no. 1593/2002
	concerning the approval of the National Plan for the preparedness
	response and cooperation in case of marine pollution with
	hydrocarbons and other harmful substances:
	- delimitation of the areas of responsibility for the Maritime
	Operations Division (DOM) and the Division of Terrestrial
	Operations (DOT), connected with the process of spatial planning
	of the marine environment.
PN Location	Maritime space: all sectors
MSP interventions	The MSP interventions, as support for the field of Port/Navigation :

for PN	increase navigation safety
	• prevention of potentially dangerous situations
	• streamlining and streamlining traffic
	• prevention of pollution of the marine environment
	• streamlining port operations
	• streamlining piloting operations
	• streamlining photing operations,
	• real-time dissemination of information location in the Romanian
	sector of the Black Sea
Issues in the field of	Specific issues to the field of shipping and pavigation are related to
PN	the safety aspects of pavigation:
	- navigation routes anchorages or
	- navigation routes, anchorages of
	- ports operating bertins
	- protection for the occurrence of naval or shipping accidents,
	consisting of: stranding, diving, fires, collisions, etc.
	Also, the lack of clear delineation of the DOM-DOT responsibility
	area, by not integrating the prevention plans and answer in case of
	pollution, it can lead to:
	\circ the recovery of amount of hydrocarbons discharged at sea,
	\circ delay in protecting the sensitive areas,
	\circ a lesser efficient answer having concerning the impossibility to
	recover the expenses and damages caused by pollution.
Main PN Problems	The problems listed above are taking place precisely in the
	Romanian sector of the Black Sea They are:
	- related to the traffic routes (where they are located) for:
	navigation port lines roads of access
	In a from the ports of the chine, on from the port equatorium
	- In / from the ports of the snips, or from the port aquatorium
	where they are located.
	- Areas with frequent stranding of ships: Sulina, Sf. Gheorghe,
	Sahalin,
	There is an increased risk of pollution in theRomanian Black Sea
	sector, in particular in:
	- the area for drilling, oil terminals, ship routes, docks, ports,
	- the exclusive economy zone, where recent oil transfer
	operations take place, from ship to ship
PN Problems	MSP Plan has a directional and regulatory character Proposals
solution/resolving	regarding the use of the maritime space identified measure such as:
bolteroli, i ebolt ing	- devices separation for ships traffik, taking into account their
	commercial recreational military shine destination at
	commercial, recreational, minitary ships destination, etc.,
	- passing accreditation of smps, at the ports entering and leaving,
	depending on their destination, trade, leisure, mitigation,
	- delimitation of recreational areas (ImbCiiere areas),
	- delimitation of the protected areas, aquaculture areas, etc.,
	where is restricted the access of ships or boats,
	- delimiting the areas of responsibility for the Maritime
	Operations Division and the Terrestrial Operations Division

 on sea, objectively contribution to the fulfillment of some objective that fall within the competence of Naval Authority, increasing the safety on transport routes, preventing marine pollution 	
 objectively contribution to the fulfillment of some objective that fall within the competence of Naval Authority, increasing the safety on transport routes, 	
 that fall within the competence of Naval Authority, increasing the safety on transport routes, preventing marine pollution 	3
- increasing the safety on transport routes,	
preventing marine pollution	
PN Main conflicts - Through the development of economics, especially in the fit	ld
of mineral extraction industry sources of danger can arise	14
regarding the marine, air or human environment implicitly	ha
rights of neural assidents and pollution increasing in the mari	ne
space, accidents suffered by humans or loss of life	IC
space, accidents suffered by numans of loss of file.	
- Overlapping of the traffic separation schemes, docks, currer	t
recommended routes, with areas where other activities could	
take place, economic, fishing, leisure, etc., can be considere	1
confticts.	
PN - LSI elements The navigation infrastructure and personnel is located on the c	oast
and most of services for navies maintenance and repairing are	one
on the coast, with the specifical performances, relations and imp	icts.
I his also needs specifical spaces, gears, equipments and special	ists.
According to the legal competences, the Komanian Navar Auto	ny.
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Meetings/Projects	• They were not organized in this way by meetings
thematic groups	
/Strategies	
PN Importance for	From the perspective of the Romanian Naval Authority, indicators
successful MSP Plan	or targets can be nominated and underlined in the monitoring report
	of the of the MSP Plan, including:
• Indicators (1. events number
	2. doking in the harbour time
	3. number of accidental pollution
Targets	1. increase the degree of traffic safety by reducing the number of
	navigation events,
	2. increase the degree of the traffic flow,
	3. pollution reducing in the maritime area of Romania

*ANR-Romanian Naval Academy

Figure 44. Maritime activities and shipping lines, central south of Romania

Conclusions

The growth of world trade naturally affects the tonnage of goods transported by international shipping, which is increasing and, according to the UN's Second World Ocean Assessment, takes place on a weak competitive background – large proportion of the world's tonnage is associated with a relatively small number of registries, and ownership and control of shipping remains concentrated in firms in a relatively small number of countries. This concentration has significant implications for future port development, as it may result in fewer and larger main ports serving as distribution hubs for intercontinental trade, which is the current case. The two large ports of Constanta and Varna, the main maritime entrances of Europe in the Black Sea basin, have the obligation to face the challenges, develop further and evolve. Part of the potential economic opportunities include the identifying of areas for the maritime transportation and new shipping routes. Those opportunities have the potential to increase the risks associated with the activities, for example, habitat contamination from catastrophes such as oil spills, for this reason the broader usage of alternative fuels is required.

According to the EC, the transition to greener mobility will offer clean, accessible and affordable transport. Important steps to climate neutrality evolution of the sector include the promotion of multi-modality and shift to low-carbon transport modes (such as maritime transport); restructuring the transport charges and taxes to reflect infrastructure and external costs and extending the carbon pricing; tackling shipping emissions using advanced technologies and fuels reducing the usage of polluting fuels; investing in modern mobility infrastructure and recognising the role of better urban planning.

Future investments should focus mainly on the modernisation of the Trans-European Transport Network TEN-T in order to achieve better integration of the area's transport network with the EU and improving connections between the countries which would contribute to balanced regional development. Motorways of the Sea represent the maritime part of the TEN-T, which provides for the concentration of cargo flows on logistical routes in order to improve existing or create new viable, regular and frequent maritime connections in order to reduce the load on the roads. As an intersection of the maritime and coastal transport, seaports are a key element for the development of the transport system. The development of ports will be related to their restructuring and functional and technological renewal, relocation of certain activities outside the conflict zones, construction of specialised port terminals and creation of conditions for reception and processing of large tonnage vessels. Promoting intermodality as an opportunity to shift cargo to more environmentally friendly modes of transport is one of the main measures for the sustainable and balanced development of the transport system, in particular the expansion of ports and connections with the hinterland. Efforts should focus mainly on completing priority rail and road routes and promoting multimodal transport by improving interconnections. The overall goal is to increase cost efficiency and sustainability of transport activities and hence support the regional competitiveness. The development and expansion of maritime tourist routes must be addressed as well. There is a low density and low utilisation of this type of routes in the CBC region. Due to the increasing interest in recent years, investments shall be made also in short-distance sea passages and its supporting infrastructure.

The ecosystem-based approach, as a fundamental principle, supports the balance between sectoral interests and the sustainable use of marine resources. Ensuring the efficiency and safety of transport by minimising the negative consequences for the environment is necessary. In connection with the increased requirements for environmental protection, it should be developed appropriate reception facilities for collection and treatment of ship waste and ballast water management, and infrastructure for onshore power supply for ships. This will support the activities to protect the marine environment's state, alongside with the measures to protect urban areas and infrastructure from extreme weather events as a result of climate change, and to meet global environmental challenges.

The digital connectivity is the imminent way to more efficient and sustainable maritime transport system. The implementation of ICT transforms and improves all of the aspects of life. Joint actions in R&D will ease the process significantly.

2.2.2.4 Submarine cables and pipelines

The Convention on the Continental Shelf²¹, the Convention on the High Seas²² and the United Nations Convention on the Law of the Sea²³ have established the principles that each state is entitled to lay underwater cables and pipelines on the seabed of the high seas and that no littoral state may create obstacles to the laying or maintenance of underwater cables and pipelines on the continental shelf except in the cases where it exercises its right to take justified steps for prospecting in the continental shelf and for developing its natural resources, and the calculation of the routes for laying the underwater pipelines on the continental shelf should take place with its consent. Each state adopts the laws and rules required for implementing the above principles and the obligations and activities resulting therefrom.

²¹ https://eur-lex.europa.eu/legal-content/EN/LSU/?uri=CELEX%3A21998A0623%2801%29

²² https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM%3A4337127

²³ https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A21998A0623%2801%29

Bulgaria

Pursuant to the Maritime Space, Inland Waterways and Ports of the Republic of Bulgaria Act²⁴ (MSIWPRBA) the routes of the underwater cables and pipelines on the continental shelf are selected based on agreement between the Republic of Bulgaria and the respective state concerned. The laying of underwater and aerial cables and pipelines between the Republic of Bulgaria and Romania shall be carried out pursuant to an agreement between the governments of the two countries.

The Executive Agency Maritime Administration²⁵ supports the Minister for Transport, Information Technology and Communications in the coordination of documents for designation of land and aquatic sections for development along the Black Sea coast, in the internal waters and in the territorial sea, as well as in the areas of operation of the tools for ensuring navigation safety, including drafts of detailed development plans and investment designs for building of new or expansion of existing underwater linear installations of the technical infrastructure.

Four underwater communication cables are laid in the Black Sea — Caucasus, KAFOS, ITUR, Georgia-Russia. The following are crossing the territory within the scope of Marsplan-BS II:

- CCS Caucasus Online, connecting under water Bulgaria and Georgia, which has a total route length of over 1,200 km and following an upgrade enables the transmission of 10 Gbp/s above the 1,2 Tbp/s initially provided. Its end points are the towns of Balchik and Poti.
- KAFOS (Karadeniz Fiber Optik Sistemi Black Sea Fibre Optic System), connecting under water Romania, Bulgaria and Turkey, commissioned in 1997. The underwater system has a total length of 504 km and enables the transmission of 622 Mbit/s. Its end points are in the cities of Mangalia, Varna and Istanbul.
- BSFOCS (Black Sea Fibre Optic Cable System), with end points the cities of Varna, Odessa and Novorossiysk and a length of 1,300 km. The line was commissioned in 2001.



Figure 46. Gas and oil pipelines on the Romanian coast (Source: I.N.C.D.M. "Grigore Antipa"; <u>https://submarine-cable-map-2014.telegeography.com/</u>)

²⁴ https://www.lex.bg/laws/ldoc/2134907392

²⁵ https://www.lex.bg/laws/ldoc/2135597666

More than 90 % of the damage to underwater cables is caused by natural factors and human activity. The damage resulting from operation and the impacts of the environment such as storms, earthquakes and volcanic activity typically affect cables located at a greater distance from the shore. Human activity — including entanglement of fishing nets, anchors dropped, underwater operations, etc. — is the main factor leading to damage within the 200 m zone from the shore.

Presently only one international energy corridor is crossing the aquatic area of the Black Sea — the Blue Stream gas pipeline which carries natural gas from Russia to Turkey.

As of now, no underwater pipelines have been built within the territorial scope of the Marsplan-BS II project.

The South Stream project, which was abandoned in 2015, envisaged the construction of a new gas transmission system for supplying natural gas from the Russian Federation to the European market, which was to have a technical capacity of 63 billion m³ of gas per year. The offshore gas pipeline across the Black Sea was envisaged to start from the Beregovaya compressor station on the Russian shore and to end on the Bulgarian shore — in the Pasha Dere locality, south of Galata Cape, city of Varna. The underwater section of the gas pipeline was designed to comprise four steel pipelines, each of a diameter of 32 in. (813 mm). In the Bulgarian section those pipelines were about 230 km long — from the boundary of the EEZ to the location of landfall. Decision No 1-1/2014 exists regarding the project in connection with the environmental impact assessment prepared by the MoEW.

The potential development of the underwater communication routes and pipelines in the Black Sea could generate conflicts in regard to the environment, the underwater cultural heritage and other sectors of the blue economy.

In the course of design, construction, expansion and operation of underwater linear installations of the physical infrastructure, which are required for conducting electronic communications and are located on the seabed or below it within the lines of the internal sea waters and the territorial sea, the provisions of the following acts are applied: the Maritime Space, Inland Waterways and Ports of the Republic of Bulgaria Act²⁶ (MSIWPRBA), the Spatial Development Act²⁷ (SDA) and the Electronic Communications Networks and Physical Infrastructure Act²⁸ (ECNPIA), transposing the requirements of Directive 2014/89/EU of the European Parliament and of the Council of 23 July 2014 establishing a framework for maritime spatial planning²⁹ and Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks³⁰. In this connection it is necessary to update and keep current the lower-level statutory instruments concerning the technical rules and norms on design and construction of underwater linear installations, on determining their servitudes and protection zones.

²⁶ https://www.lex.bg/laws/ldoc/2134907392

²⁷ https://www.lex.bg/laws/ldoc/2135163904

²⁸ https://www.lex.bg/bg/laws/ldoc/2137182374

²⁹ https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32014L0089

³⁰ https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32014L0061

Romania

The inventory of submarine infrastructure in the western Black Sea includes submarine cables and pipelines, as well as cables for electricity transmission and cables for communications.

The national pipeline network connects the port with the main refineries in the country, ensuring a fast and safe transport. The submarine cables in Romanian waters are:

- Diamond Link Global is a submarine cable system with anchor points in Poti (Georgia) and Constanța (Romania) as part of a system that will directly connect Tbilisi (Georgia) and Bucharest (Romania). This system significantly increases the capacity and connectivity of the region. In addition to the fast construction and availability, the Black Link Diamond Cable in the Black Sea region offers significantly higher design capacity, lower unit costs, lower latency through direct connectivity, and the ability to use additional branching units in the future. The main features of Diamond Link Global are: length - 1,083 km; latency 5.415 ms; RFS - Q2-2019; EOL - 2044).
- KAFOS (Black Sea Fiber Optic System) is a submarine telecommunications cable system in the Black Sea that connects Romania, Bulgaria and Turkey. Its anchorages are located in Mangalia (RO), Varna (BG) and Istanbul (TR). Main features are: total length - 504 km; transmission capacity - 622 Mbit / s, latency - 2,265 ms).

The Romanian national oil transport system on the Black Sea coast includes two terminals

- the first owned by Oil Terminal SA Constanța, in the port of Constanța and
- the second managed by KMG International Midia Marine Terminal in Năvodari), main pipelines and local pipelines transporting crude oil from perimeters operating in the country and crude oil imported and delivered to refineries.

Figure 47. KAFOS: Mangalia (Romania), Varna (Bulgaria), Rumeli-Igneada (Turkey), 504 km





Figure 48. Ports, Coastal Wind Farms Oil/Gas platforms, cables and pipes

ACRONYMS

MSIWPRBA — Maritime Space, Inland Waterways and Ports of the Republic of Bulgaria Act SDA — Spatial Development Act ECNPIA — Electronic Communications Networks and Physical Infrastructure Act MoEW — Ministry of Environment and Water

References

- 1. Convention on the Continental Shelf. <u>https://eur-lex.europa.eu/legal-</u> <u>content/EN/LSU/?uri=CELEX%3A21998A0623%2801%29</u>
- 2. Convention on the High Seas. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM%3A4337127
- 3. United Nations Convention on the Law of the Sea. <u>https://eur-lex.europa.eu/legal-</u> content/EN/ALL/?uri=CELEX%3A21998A0623%2801%29
- 4. Maritime Space, Inland Waterways and Ports of the Republic of Bulgaria Act. https://www.lex.bg/laws/ldoc/2134907392
- 5. Rules of Organisation of the Executive Agency Maritime Administration https://www.lex.bg/laws/ldoc/2135597666
- 6. Spatial Development Act https://www.lex.bg/laws/ldoc/2135163904
- 7. Electronic Communications Networks and Physical Infrastructure Act https://www.lex.bg/bg/laws/ldoc/2137182374
- Directive 2014/89/EU of the European Parliament and of the Council of 23 July 2014 establishing a framework for maritime spatial planning <u>https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32014L0089</u>

- 9. Directive 2014/61/EC of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks. <u>https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32014L0061</u>
- 10. https://submarine-cable-map-2014.telegeography.com/
- National programme for preventing and containment of landslides on the territory of the Republic of Bulgaria, erosion and abrasion along the Danube riverside and the Black Sea coast 2015—2020 – MRDPW
- 12. Draft of Updated preliminary flood risk assessment for the Black Sea Region Basin Directorate March 2021, BSRBD

2.2.2.5 Coastal defense/flood protection

The problem of landslides, erosion and abrasion in Bulgaria, along the country's Black Sea coast and in particular in the CBC area is regulated by 4 acts, 2 statutes, 11 regulations, 1 instruction and 1 convention. It is necessary to summarise and reduce the number of the statutory documents, while placing an emphasis on engineering-geological and hydro-geological studies of areas affected by landslide, erosion and abrasion processes, as well as on the methodology required for their conduct.

The implementation of preventive measures is of primary importance for overcoming the heavy material losses in the CBC area caused by activation of landslides. Preventive activity must form part of the targeted state policy and be included as a main element of the geo-protection measures. Geo-protection activity has to be focused along two main lines:

- Carrying out monitoring observations to assess the status and dynamics of geodynamic processes and preparation of forecast trends for the development of landslide processes.
- Carrying out specialised construction activities to reinforce terrains along with a number of other activities for the spatial planning of the territory and the investment-project designing.

The deployment of control and measuring systems (CMS) must be expanded in order to ensure quantitative dynamic spatial data for assessment of the condition of the landslide areas. Such systems are put in place after approval of the design solution regarding the type, scope and method of observation.

A shortcoming in the studies of the geodynamic processes along Bulgaria's coast in the crossborder area is the insufficient knowledge about their manifestations in shallow waters. There is no data concerning the manifestations and development of the process of abrasion and washout of the underwater slopes, of the overall development of lithodynamics, the movement direction of alluvium flows and the washout-transport-accumulation interlinkage. Additional difficulties are also encountered due to the lack of processed data regarding the prevailing direction of the sea-swell in the various sections and its annual recurrence. In this regard special attention must be paid to:

- development and application of new methods for quantitative characterisation of the abrasion and washout processes in the above-water and underwater part of the coastal strip;
- conduct of field studies for detailed examination of the coastal tectonics, geomorphology, petrographical and mineral composition of the lithological varieties;
- examination of the interlinkages with the hydrotechnical facilities and the adjacent shore;
- the use of geodetic methods of monitoring and measurement of the deformations and shifts must be resumed and expanded;
- by applying the method of earth photogrammetry, information is obtained on the composition of the geological environment and of the deformations in the cliff zone.

The exchange with Romania in this respect must be stepped up - in terms of scientific research, results of observations conducted, possible applications for coastal protection installations already put in place and the methods of building them.

The provisions of Directive 2007/60/EC on the assessment and management of flood risks (FD) require, with the view of effective flood prevention and mitigation, to ensure coordination and cooperation between Member States when the river basin is situated within the boundaries of the Community.

Within the territory within the competence of the Black Sea Region Basin Directorate, part of the Dobrudzha rivers are situated both in Bulgarian and in Romanian territory. In the spirit of international cooperation, the Republic of Bulgaria took action for coordination with Romania in accordance with the requirements laid down in the FD, already at the time of elaboration of the Flood Risk Management Plan for the 2016–2020 period. In the course of preparation of the preliminary assessment in 2012, the international coordination was assisted by a bilateral agreement with Romania which was in effect. This mechanism will be kept in place and applied also in the course of updating the Flood Risk Management Plans for the 2022–2027 period.



Figure 49. Floods Hazard Areas in Bulgaria

The draft preliminary flood risk assessment prepared for the Black Sea Region Basin Directorate does not establish a need to identify and coordinate a cross-border region of potential significant flood risk, in accordance with the requirements of Article 5 of the FD, as well as in accordance with Article 146c of the Water Act, in regard to international water management districts. As an expression of good will and preparedness for open dialogue with Romania, the Republic of Bulgaria ensures exchange of up-to-date information required for the preliminary assessment.

The cross-border cooperation with Romania in this direction is based on the Agreement between the Ministry of Environment and Water of the Republic of Bulgaria and the Ministry of Environment and Water Management of Romania for cooperation in the area of water management, signed in Bucharest on 12 November 2004. A Joint commission for water management has been set up (Article 5, paragraph 1) for the implementation of the Agreement. Three working groups were established by its decision in 2006. The bilateral coordination issues in regard to the FD are initially subject of expert meetings within the framework of the Agreement and of resolution by the Joint commission. Taking into account the priority importance for both countries of the flood prevention issues, as well as the benefits of closer cooperation and communication, in 2016 the Joint commission for water management established a separate working group on flood risk management. The main task of the group is to coordinate the issues related to flood risk management in accordance with the requirements of the Floods Directive.

Romania

In Romania, efforts to protect coastal areas against erosion and flood risk were halted at various stages of implementation in 1991 and have recently resumed. For coastal protection, "soft" and "hard" structural rehabilitation solutions of coastal engineering have been designed and implemented in the context of Integrated Coastal Zone Management.



Figure 50. Sea Floods Vulnerability Areas in Romania

In order to control the coastal erosion and for the creation of new tourist beaches, through the Master Plan of the Romanian coast, scientific and technical documents were elaborated through two projects, in the period 2005 - 2013, namely:

- "Study on the protection and rehabilitation of the southern Black Sea coast of Romania" (2005 - 2007, JICA)

- "*Technical assistance for project preparation*, Priority Axis 5: *Implementation of an adequate natural risk prevention infrastructure in the most vulnerable areas*. Major field of intervention 2 - Reduction of coastal erosion" (2010 - 2013, ABADL).

The coastal protection plan includes short, medium and long-term protection measures for the next 30 years. It has measures to a) reduce the energy of the incident waves (height) on the shore, b) to construct dams to stabilize the sand and c) to retain the sand on the beach (by building new dams and repairing existing "breakwater" dams", As well as the epi-s construction).

Through the 1st phase of the Master Plan "*Protection and rehabilitation of the coastal area*" the beach protection measures against the accelerated erosion were implemented between 2013 and 2015, in 5 areas, in the central part of the Romanian coast (Mamaia Sud, Tomis Nord, Tomis Center, Tomis Sud and Eforie Nord), covering a 7.3 km length of shore.

Coastal protection works have been planned for implementation both in the northern area (Periboina Dam - Edighiol Dam) and in the central and southern coast: Mamaia, Constanța / Tomis, Agigea, Eforie (already completed), Costinesti, Olimp, Jupiter- Neptune, Venus, Saturn, Mangalia-Venus-Aurora Pond, Mangalia-Saturn and May 2 (ongoing and in progress). The aim is the protection against coastal erosion, the artificial extension of beaches, the construction of coastal structures connected or parallel to the shore, artificial reefs, shore / dam defenses for the shores / cliffs stabilization, retaining walls, etc. A number of measures were also considered, including: the use of satellite monitoring and observation techniques to identify areas affected by erosion (the use of satellite imagery) to highlight the the impact assessment of selected measures.



Figure 51. Coastal protection structures (Source: I.N.C.D.M. "G.Antipa")

Issues under the field of ICZM:

- Inconsistent legislative framework regarding the delimitation of the coastal zone for wich ICZM law is, in present, under discussion for up dating;
- Conflicts between local authorities and the coastal zone administrator, regarding the legal regime of beaches and cliffs;
- Non-compliance with urban plans by the economic agents.

Public consultation	The practical role of stakeholder to MSP	Owner of	
related the Black	from the perspective/point of view of the	information	
Sea MSP process	own field of activity		
AREAS OF	WATER RESOURCES MANAGEMENT WR	NA-	
ACTIVITY	Coastal Erosion, Dredging and Dumping, Coastal	ROWATER	
	Consolidation		
Main Role of MSP	Marine planning plays an important role, in:		
for WR	- implementation of the requirements of the European Directives		
	for achieving the "good status" of water (mainly for the		
	implementation of the requirements of the MSFD-Marine		
	Strategy Framework Directive and the WFD-Water Framework		
	Directive),		
	- reduction of the negative impact on the marine environment,		
	impact due to anthropogenic activities on land,		
	- supporting (implementing) sustainable wate	er resources	
	management,		
	- operation and maintenance of water management	t works in the	
	coastal/terrestrial hydrographic area (Dobrogea-Littoral).		
	- knowledge conservation and protection of water resources		
	- flood protection		
	Practical role of MSP consists in the direct implementation of		
	regulations concerning water management.		
	In the EU's New Territorial Agenda 2030, reported on the "European		
	Green Pact", supporting "environmentally friendly and better		
	livelihoods, climate-neutral and resilient cities and regions," A.N.		
	Romanian Waters (ANAR), from the perspective of the	ne double role,	
	respectively:		
	- public institution of national strategic interes	t, with legal	
	personality, aiming at the knowledge, protection,	enhancement	
	and sustainable use of water resources, natural mono	opoly strategic	
	interest for national security and safety.	1	
	- administrator of the real estate public property of t	the state of the	
	nature of the inland maritime waters and of the terr	the magazine	
	- It is identified with the principle of capitalizing on of the Black See, in the same of developing the blue	a use resources	
	contributes to the sustainable use of marine rag	ources to the	
	creation of new economic opportunities and jo	hs for coastal	
	communities.		
	- MSP plans and strategies may have:		

	 an important impact on the MSP process in the sense, that close correlation is needed between maritime planning as 		
	well		
WR National	National legislation in the field of Coastal Zone Management:		
strategic documents	a. Government Emergency Ordinance no. 202 of December 18,		
/ intervention plans	2002 on Integrated Coastal Zone Management, approved with the		
/ normative acts	following amendments and completions by Law 280/2003;		
	b. GD no. 1015/2004 on the approval of the Regulation on the		
	organization and functioning of the National Committee of the		
	Coastal Zone;		
	c. GD no. 546/2004 regarding the approval of the Methodology for		
	the delimitation of the public domain of the state in the coastal		
	area;		
	d. GD no. 317/2004 on the use of coastal wetlands as anchorage		
	areas;		
	e. GD no. 749/2004 on establishing the responsibilities, criteria and		
	the way of delimiting the strip of land located in the immediate		
	vicinity of the coastal area, in order to preserve the environmental		
	conditions and the patrimonial and landscape value of the areas		
	located near the shore;		
	f. GD no. 898/2004 for the approval of the Instructions regarding		
	the exploitation of groundwater and of the interface areas between		
	fresh and salt waters;		
	g. GD no. 164/2004 for the approval of the Program of measures and		
	works regarding the protection and rehabilitation of the coastal		
	area;		
	h. ORDER of the Minister of Environment and Water Management		
	(no. 38 / SMI of 27 April 2004), of the Minister of Transport,		
	Construction and Tourism (no. 1044 of 31 May 2004) and of the		
	Minister of Health (no. 671 of 31 May 2004) on approval of the		
	Code of Conduct for recreational activities in the coastal area;		
	i. GD no. 432/2020 on the approval of the Program of measures for		
	achieving the good ecological status of the Black Sea marine		
	region;		
	j. A draft normative act for the National Strategy on Integrated		
	Coastal Zone Management and the Integrated Coastal Zone		
	Management Plan is being developed and promoted.		
Main WR initiatives	a. Project: Master Plan Protection and rehabilitation of the coastal		
brocess	area – developed within the Technical Assistance for Project		
Process	Preparation, Priority Axis 5 Major field of intervention 2		
	Reduction of coastal erosion, beneficiary – A.N. Romanian		
	waters Dobrogea – Litoral Water Basin Administration		
	(ABADL).		
	b. Project: The Management Plan of the Danube River, Danube		

	Delta, Dobrogea Hydrographic Area and Coastal Waters and its
	updating – approved by GD 80/2011 and GD 859/2016.
c.	Project: Flood Risk Management Plan of the Dobrogea Litoral
	Hydrographic Area and of the Danube River 2016-2021
	(approved by GD 972/2016).
d.	Investment project – Protection and rehabilitation of the southern
	part of the Romanian Black Sea coast in the area of Constanta
	Municipality (Mamaia Sud. Tomis Nord. Tomis Centru and
	Tomis Sud) and Eforie Nord – PHASE I (2013-2015) – Aiming:
	The Implementation of measures protection and rehabilitation of
	the beach against the risk of accelerated erosion in the areas of
	Momeia Sud Tomia Nord Tomia Contra Tomia Sud and Eforia
	Mamaia Sud, Tomis Nord, Tomis Centru, Tomis Sud and Elorie
	Nord. I nrough this project, the sanding works between Constanța
	to Mamaia and Eforie Nord were completed. Specifically, it is
	about 5 sectors of the beach with a cumulative length of about 7.3
	km and a width of over 100 meters and are accessible to all
	tourists since 2016. At the same time, through the same project,
	the area of the 5 sectors of beach (Mamaia Sud, Tomis Nord,
	Tomis Centru, Tomis Sud and Eforie Nord) was increased by
	60.66 ha.
e.	Investment project - "Coastal erosion reduction phase II (2014-
	2020), Aiming and having as objectives:
f.	reducing the effect of erosion and of the protection works of the
	Romanian coast,
g.	supporting the trend of revitalizing the marine ecosystem and of
	the recover of some lost species in the part of the ecosystem,
h.	protection of marine and coastal biodiversity,
i.	sustainable development of the coastal area, increase of the tourist
	potential.
j.	Contribution to the Project " <i>Improving the capacity of the central</i>
5	public authority in the field of marine environment protection in
	terms of monitoring, assessment, planning, implementation and
	reporting requirements set out in the Marine Strategy Framework
	Directive and for integrated management of the coastal area".
	under The MEWF (Ministry of Environment Waters and Forests)
	running since October 2019 the MySMIS code 127598 / SIPOCA
	608 aiming in collaboration with the National Institute for
	Marine Research and Development "Grigore Antino" and the
	National Administration "Romanian Waters"
ŀ	Contribution to the Project "Improving the canacity of the contral
к.	nublic authority in the field of water management in terms of
	planning implementation and reporting of European
	requirements in the field of water" Cod SECON 599 / Marchine
	Code 2014 126656 under the MEWE?
	Code 2014 120030, under the MEWF ² .

	1. Participation and updating to the Black Sea Marine Strategy	
	elaboration in Romania, according to the requirements of the	
	MSFD 2008/56/EC, mainly contributing to the:	
	• assessment of the state of the marine environment,	
	\circ elaboration and implementation of programs of measures, an	
	economic and social analysis.	
WR Location	The interventions of our field of activity will be located on the entire	
	Romanian sector of the Black Sea / coastal area,	
	- both qualitatively by monitoring coastal water quality, and	
	from the point of view of carrying out the works to reduce the effect	
MCD : 4 4'	of erosion in the coastal area.	
MSP interventions	11 The elements of interaction between coastal water management and MSP including LSL relate mainly to coastal provide and	
	protection of marine ecosystems have proposed:	
	- The <i>Reducing coastal erosion phase II</i> (2014-2020) ensure	
	adaptation to climate change, prevention of the risk of coastal	
	erosion and management of coastal areas of the Black Sea in	
	Constanta County	
	- NARW-DL involves the artificial sanding of beaches the	
	construction extension and replacement of coastal structures such	
	as boulders for beach stabilization and offshore dams	
	rehabilitation of dams consolidation of cliffs and dredging	
	activities to rehabilitate a 30.5 km strip along the Black Sea coast	
	the construction of artificial reafs and the introduction of	
	biostructures and repopulation with marine species are planned in	
	order to conserve biodiversity.	
Issues in the field of	4 The aspects that needs to be considered, are:	
WR	a) Ecological and chemical status of transitional, marine and coastal	
(4)-	water bodies (TMCWB), in accordance with the requirements of	
	the WFD 2000/60/EC, where MSP and ICZM must set the	
	direction of improving the state environmental objectives,	
	achieving the transitional/marine and coastal water bodies quality,	
	where conditions are poor:	
	- taking into account / including the plans of measures	
	(programs of measures) elaborated in the management plans	
	of according to MSFD	
	- maintaining the good condition of TMCWB once they have	
	reached their environmental objectives.	
	- Also, according to the WFD, achieving and maintaining good	
	chemical status for territorial waters is of particular	
	importance in correlation with achieving and maintaining	
	good ecological status of the TMCWB in the Black Sea region	
	b) Physical losses, due to permanent change of the substrate or the	
	morphology of the seabed and the extraction of the seabed substrate.	
	c) Other substances introduction (e.g. synthetic substances, non-	

	synthetic substances, radionuclides) from diffuse sources, point		
	sources, atmospheric deposits, acute phenomena		
	d) Nutrients introduction from diffuse sources, point sources and		
	atmospheric deposits		
	e) Organic matter introduction from diffuse sources and point sources		
	f) Wild species removal of from the marine environment or mortality		
	/ injury (through commercial or sport fishing and other activities).		
	Shipwrecks/vessels with living animal transport, with oversized or		
	unbalanced cargo		
	g) Alien species introduction or spreading		
Main WR	Problems encountered, are:		
Problems	• Introduction of nutrients as main cause of eutrophication, from point		
	sources on land and sea and diffuse emissions		
	• Coastal erosion poses a risk to the environment, the phenomenon in		
	different levels of intensity along the approximately 245 km of the		
	coast, measured from North to South, from the Chilla arm (Musura		
	Bay) and to Vama Veche (border with Bulgaria). There are a number		
	looks at the moment induced by:		
	\circ coastal protection measures port dams		
	\circ development of industrial capacities in the coastal area		
	\circ introduction of alien species into the ecosystem		
	• coastal interventions affecting sediment deposits		
	It was concluded that coastal arcsion reaches in some areas the rate of		
	It was concluded that coastal elosion feaches in some aleas the fate of approx 3.4 m / year, according to research conducted by the		
	Dobrogea-Litoral Water Basin Administration (Halcrow reports)		
	GEOECOMAR INCOMN "Grigore Antina" Royal Haskoning		
	JICA. USAID.		
	• Measures have been taken under different initiatives, programs		
	and and projects		
WR Problems	The MSP plan in developing can implement its objectives taking into		
solution/resolving	account the promotion and approval of a specific legislation for the		
	establishment of principles on the:		
	• defining and delimiting the coastal zone and		
	• required measures ensuring its integrity.		
	ICZM is a process achieving the sustainable development of the		
	coastal zone. It have to be correlated with MSP or, to include LSI		
	(Land–Sea Interraction) under MSP, taking into account:		
	 vulnerability of coastal ecosystems and landscapes, 		
	• diversity of activities and uses and their interaction and impact		
	on both the sea and the land.		
	Achieving ICZM or LSI is necessary:		
	• a cooperation of national, regional and local authorities through the		
	simultaneous application of a top-down approach and vice versa.		
	• an involvement of the local community in the implementation of the		
	coastal zone management process, as very important priority.		
	(eg delimitation of areas with certain prohibitions / special		
	regulations,		

	- the delimitation of areas where certain conflicts need to be resolved?		
WR Main conflicts	The main confilct refers to:		
	- accidental pollution from onshore and offshore sources, which		
	contaminates marine waters.		
	To prevent and reduce the impact of accidental pollution, there are		
	elaborated and implemented:		
	- own plans to prevent and combat accidental pollution of		
	potentially polluting units and		
	- accidental pollution warning system is in implementing.		
	It is also in elaboration the Plan for the prevention and control of		
	accidental pollution of water resources in the Dobrogea Litoral		
	hydrographic area is updated whenever necessary. The purpose of the		
	plan is:		
	- to identify potential pollutants,		
	- to prepare and intervene operatively at critical points by specific		
	technical, human and material means,		
	- to be able to self-monitor the quality of the discharged water, and		
	- to improve the efficiency of pollution control systems.		
	Each water use that can be a potential source of accidental pollution		
	(selected by the Water Basin Administrations and Water Management		
	Systems), develops the own plan for the prevention and control of the		
WP I SL alamante	A successful MSP plan for the Romanian Black Sea sector involves:		
WK - Loi ciements	- drawing up planning documents integrating all relevant aspects:		
	\circ sustainable-integrated management in the use of maritime		
	space		
	o environmental conservation		
	• combating coastal erosion and mitigating the vulnerability of		
	o combating coastal erosion and intrgating the vulnerability of		
	coastal and marine ecosystems,		
	5 social and economic development.		
	- LSI as part of MSP:		
	o integrate the maintime dimension of certain coastar uses of		
	activities, and their impact in double sense,		
	o development of an integrated and up-to-date strategic vision.		
	- This will include sustainable use and management of mineral,		
	biological, marine and terrestrial/coastal resources, taking into		
	account		
	• vulnerability of marine ecosystems,		
	• integrated coastal zone management,		
	o conservation and protection of protected and endangered		
	ecosystems, habitats and species,		
	\circ a protection against the phenomenon of coastal erosion,		
	coastal flood measures.		
European level,	The European Green Deal is an ambitious vision that addresses, to:		
new trends			

	• climate and environmental challenges and to propose answers to		
	these challenges. The pact, concept also aims to		
	• to protect, conserve and strengthen natural capital, and		
	• protect the health and well-being of citizens against		
	environmental risks and related impacts		
	The Climate Change Adaptation Strategy for the Danube Basin under		
	the coordination of the International Commission for the Protection		
	of the Danube River (ICPDR), developed in 2012, was updated in		
	2018, aiming:		
	- to provide the framework and guidelines for integrating climate		
	change adaptation into planning processes in the Danube river		
	basin. in multilateral and cross-border context, including Danube		
	International River Basin District Management Plan (Danube		
	PMBH) and in the Flood Risk Management Plan (PMRI).		
	Under EU law, Green Deal targets, in synergy with other initiatives,		
	by 2030, aim to improve water quality by reducing nutrient losses by		
	50%, plastics released into the sea by 50% and microplastics by		
	30%.released into the environment, as well as 50% of municipal		
WD Factoria	waste.		
WK Future Directions of	Ensuring the unitary development of the infrastructure in the field		
development	of water management, by achieving objectives of national public		
acveropment	interest, consisting of new water sources and flood defense works		
	- Providing water management services at the level of requests.		
	- Monitoring the implementation of the programs of measures		
	established within the (updated)		
	• Management Plans of the Danube River, Danube Delta,		
	Dobrogea Hydrographic Area and Coastal Waters,		
	• according to GD 432/2020 on good ecological status of the Black See marine region		
	- Inform the public about water and environmental issues		
	- Management of coastal beaches implementation		
	Considering the prerogatives of ANAR based on the Government		
	Emergency Ordinance no. 107/2002 regarding the establishment of		
	the National Administration "Romanian Waters":		
	a. The NARW-National Administration "Romanian Waters" applies the system		
	of contributions, payments, tariffs and penalties for the specific activities and common services of water resources management whole year according to		
	the GEO no. 73/2005.		
	b. The system of contributions, payments, tariffs and penalties, according to the		
	provisions of Law no. 10//1996, based on the principles of cost recovery for the knowledge and management of water resources " <i>user navs</i> " and " <i>nolluter</i> "		
	pays".		
	c. The NARW is the only one entitled to apply the system of contributions,		
	payments, tariffs and penalties specific to water management of all water users, regardless of the owner for any purpose of the arrangement as well as from		
	underground sources, except those for which there are specific regulations in		
	force".		

	The following activities, uses and areas according to GO. no. 18/2016		
	are proposed for consideration within the areas of competence of the		
	NARW:		
	a) Aquaculture areas:		
	b) Installations and infrastructure for the exploitation of crude oil.		
	gas and other energy sources, mineral resources, as well as for the		
	production of energy from renewable sources.		
	c) Raw material extraction areas:		
	d) Routes of submarine cables pipelines safety and protection		
	areas:		
	a) Tourist activities:		
	 f) Constal protoction manufactor against arosion; 		
	1) Coastal protection measures against crossion,		
	g) Accidental pollution plans of intervention in case of occurrence		
	of a marine natural nazard with risk also for the coastal area;		
	h) Areas where there are ports and hydrotechnical infrastructure.		
	1) Scientific research, including facilities and infrastructures for		
	scientific research and monitoring of the marine environment;		
	In the context of the methodology, according to the provisions of		
	Article 48, Section 4 Regime of works that are built on water or that		
	are related to water, of the Water Law No. 107/1996, as subsequently		
	amended and supplemented, the following works which are built on		
	water or which are connected with water, have applicability in the		
	marine environment:		
	a. works for the use of water, with the related constructions and		
	installations: [] fishing facilities, facilities for navigation,		
	floating bridges, tourist or leisure facilities, other works of this		
	kind;		
	b. crossings of watercourses with the afferent works: bridges, pipes,		
	power lines, etc .;		
	c. works, constructions and installations that are executed on the		
	seashore, on the bottom of the inland maritime waters and of the		
	territorial sea, on the continental shelf [];		
	- d) prospecting, exploration / exploitation works by land or sea		
	drilling [].		
WR Future Benefits	- improving and streamlining coastal zone surveillance by		
and opportunities	organizing the integrated coastal zone control and monitoring		
for MSP	system.		
	- evaluation of the effectiveness of the protection measures		
	implementation monitoring and observation mechanisms		
	implementation, monitoring and observation mechanisms,		
	- establishing of an indicators system for the coastal zone.		
Meetings/ thematic	Under the projects mentioned at the third point were analyzed the		
groups for	following documents / projects:		
Projects /Strategies	- Master Plan "Protection and rehabilitation of the coastal		
	zone";		
	- Management Plan for the Danube River, Danube Delta,		
	Dobrogea Hydrographic Area and Coastal Waters and its		
	undating $_{-}$ approved by GD 80/2011 and GD 850/2016.		
	$\frac{1}{2} \frac{1}{2} \frac{1}$		
	- Flood Kisk Management Plan for the Dobrogea Litoral		

	Hydrographic Area and the Danube River 2016-2021		
	(approved by GD 972/2016);		
	- Coastal Area Diagnostic Report Technical Assistance for the		
	Project Preparation Priority Axis 5, Implementing the		
	appropriate structure to prevent natural risks in the most risky		
	areas at Major area of intervention 2,		
	- Reducing coastal erosion, by Halcrow Romania S.R.L., for		
	A.N. Romanian Waters Dobrogea Water Basin		
	Administration - Seaside;		
	- Investment project - Protection and rehabilitation of the		
	southern part of the Romanian Black Sea coast in the area of		
	Constanța Municipality (Mamaia Sud, Tomis Nord, Tomis		
	Centru and Tomis Sud) and Eforie Nord - PHASE I (2013-		
	2015);		
	Investment project - Coastal erosion reduction phase II (2014-2020).		
WR Importance for	Preparation of the periodically monitoring report, by MSP Authority,		
successful MSP	will structured in thematic sections on the main areas of competence		
Plan	of each Committee.member		
• Indicators	- Achieving the environmental objective of good health provided		
	by the WFD 60/2000 EC it is proposed the monitoring of the		
	evolution of biological, hydromorphological, physico-chemical		
	(e.g. nutrient group) indicators.		
	- Reduction of coastal erosion imposes monitoring of coastal		
	erosion phenomenon evolution/stopping, after the		
	implementation of the Project Reduction of coastal erosion		
	phase II: indicators regarding the situation before and after the		
	implementation of the project.		
Targets			

*NA-ROWATER -ROWATER - NA-ROWATER National Authority for Romanian Waters

2.2.2.6 Dredging and dumping

with their unicity in Europe. Taking into account that expertise of ABADL, GEOECOMAR Institute, INCDMN – "Grigore Antipa", ROYAL HASKONING, JICA, USAID and the Studies based on which HALCROW, Romania developed the Master Plan "*Protection and rehabilitation of the coastal area*", which concluded that coastal erosion reaches in some areas of approx. 2 m / year. The success registered with the projects financed in Phase I, 2007-2014 lead to the implicit promotion and finance of the projects in Phase II 2014-2020, to create a unique, stable, and maximum efficient defense line against coastal erosion of the Romanian coast.

- Phase I. The structural measures carried out through the projects included the following areas: Mamaia Sud; Tomis Nord; Tomis Centru; Tomis Sud; Eforie Nord
- Phase II. The structural measures that will be carried out for this project include the following areas: Stavilare, Mamaia, Tomis, Agigea, Eforie, Costinesti, Olimp, Jupiter-Neptun, Balta Mangalia-Venus-Aurora, Mangalia-Saturn and 2 Mai.

In this sense, according to the feasibility studies, in order to reduce the coastal erosion and to rehabilitate the beach cells are presented the location of study areas from the southern coast: Costinesti, Olimp, Jupiter-Neptun, Balta Mangalia-Venus-Aurora, Mangalia-Saturn and 2 Mai.

1. THE CURRENT STATE of the coastal system in south part of Romania coastline

Costinesti Area

The area is delimited by:

- wreck "*Evanghelia*" in the north and
- Forum Hotel in the south.

The length of project the shoreline: about 2.6 km. Two beach cells are defined:

- in the north part: the entrance to the lake (Beach Cell 1)
- in the south part of the entrance to the lake (Beach Cell 2).

*Beach cell 1 is characterized by narrow beaches, protected by large coastal structures (coastal structure C1 and entrance to Lake Costinesti), various beach protections and cliff protections. **Beach cell 2 consists of a relatively wide and low sandy beach in the southern area. To the north of this area, the beach gradually narrows, in the northernmost area 1 km from the shore, the beach being very narrow of only a few meters. The cliff is protected by a low structure.

***The beach cell is in poor condition, given that a severe storm can lead to significant damage or even destruction of coastal structures. This would lead to the destruction of buildings and infrastructure in the land area.

Figure 52. Costinesti area, (*source Google Earth*)



Olimp area

The project area consists of seven relatively small sections of beach, protected by coastal structures. In the southern part there are three relatively small beach cells, formed mainly of sand. Further north there is a protection structure of the cliff, protected by a narrow beach. The coastal structures with the role of protection of these beaches (O5, O6 and O7) are recently built, their demolition is not being allowed. The northernmost beach cell is bounded by a natural promontory in the north. The Olimp area contains a total of 7 coastal structures, all of which are located near the shoreline, at a relatively shallow water depth of about -2 m to -3 m. Between the structures, there are small, curved beaches. In the area of the beach cell water line, there are some small coastal stabilization works, but in general, the coastal sections do not seem to erode significantly. Coastal structures are in a state of degradation anyway. Once these structures disappear, erosion will continue.



Figure 53. Olimp area, beach pockets and dike structures

Neptune - Jupiter area

The project area consists of two main coastal sections. The Neptun project area contains three relatively long sections of beach, with a total length of approximately 2.25 km. The length of the beach cell 1 is about 800 m. In the southern part, the beach is relatively narrow with a width of about 55 m between the shoreline and the lake, and in the northern part, the beach is relatively wide with a width between 60 m and 130 m.

The location of the investment is in Constanta County, Mangalia Municipality:

- northern limit: N2 structure in the presidential area;
- southern limit: southern limit: A3 coastal structure in the Cap Aurora area.

The central cell of the beach has a length of about 600 m, of which the northern part, with a length of about 300 m, is part of the presidential residence. The presidential beach is separated from the public beach by an artificial dam of stabits. The southern beach cell has a length of approximately 750 m. In the south, the beach is relatively wide.

Figure 54. Neptun - Jupiter



The Jupiter area contains a total of 5 coastal structures, all of which are located near the shoreline, at a relatively shallow water depth of about -2 m to -3 m. Between the structures, there are small, curved beaches. In the area of the beach cell water line, there are some small coastal stabilization works, but in general, the coastal sections do not appear to erode significantly. Coastal structures are a state of degradation anyway. Once these structures disappear, erosion will continue.

Venus Aurora area

The project area consists of three main beach sections. Mangalia Pond is an unprotected beach of relatively large width. The bay in the center of Balta Mangalia section is oriented towards the annual average direction of the wave propagation. At both the northern and southern ends, the beach is curved as a result of wave diffraction around the ends of the S5 and V1 coastal structures. Both in the north and in the south, the Balta Mangalia beach cell is delimited by cliff areas.



Figure 55. Venus - Aurora area

The Venus beach section consists of three beach cells, delimited by dikes connected to the "T" shaped shore. The current plan for the Venus coastal section is relatively young given that the "T" -shaped coastal structures are built around 1990.

Before this date the beaches were able to respond more easily to natural processes. However, the protection of the cliffs is increased with the help of coastal protection structures. An sandy beach is present only in the northern beach cell. In other beach cells, the cliff is protected against erosion with the help of walls and shore protections.

The Aurora beach section consists of two beach cells. These beach cells are bounded by three coastal structures. The shoreline is fixed with stones in several locations. In the northern part, the beach cell has a curved shape and initially consisted only of sand. Again, the shoreline is fixed with stones in several locations.

In Balta Mangalia-Venus-Aurora area there are a total of 4 coastal structures in an advanced state of degradation.

Mangalia-Saturn area

The Mangalia area contains of three relatively large beach cells, and four relatively small beach cells in the Saturn area. In regard of Mangalia beach cells, only the southernmost cell has an appropriate beach width (ranging from 40 to 100 m). The sand is more or less absent in the other two beach cells. Saturn's beach cells are very small and therefore more or less fixed to coastal structures.

Relatively wide beaches are available in this area. Due to the small distance between the coastal structures, the water circulation is limited, thus increasing the risk of algae development.

Beach cells have additional stone protections where the shoreline has receded so that the action of the waves endangers the cliff. Also, significant accumulations of algae are observed in the beach cells.

In the Mangalia-Saturn area there are a total of 9 coastal structures in an advanced state of degradation.

Figure 56. Mangalia Saturn area



Figure 57. 2 Mai Area

2 Mai Area

The area is located spatially just south of the port of Mangalia. The analysis length of the project area is about 1.6 km and contains two beach cells.

The length of the northern beach cell is about 1,050 m, the beach is sandy and relatively wide (approx. 70 m). Further south there is a relatively narrow sandy beach, however a gradual erosion is observed.

The northern beach cell is separated from the southern beach cell by the 2M1 coastal structure, which is in an advanced condition of degradation. In the southern part of this structure, the sandy beach is absent and the cliff of about 16 m high gradually erodes.

The gradual erosion of the seafront endangers the existing administrative buildings in the seafront area, at the base of the cliff, several construction debris can be seen because of collapsed buildings.

Also, in both cells of the beach the algae are present and accumulates on the shore, causing an inconvenience to tourists. It should be mentioned that the current state of the coastal structures, not only do not reach their purpose for which they were executed, but it is also considered that access tothese structures endangers the population, the constructive elements o f the structures being in a state advanced degradation.

All the above coastal protection structures are damaged in one way or another and it consists of:

- Areas where concrete slabs are missing;
- Areas where concrete slabs have cracks and dislocated portions;
- The concrete joints between the tiles are washed;

- Areas in which under washing of the unsorted stone core under the concrete slab are identified, existing situation also in areas where the slab itself is not destroyed;
- Detachment of the protective jacket from natural blocks;
- Dislocation of stabits from the protective jacket;

Maintenance of the dam perpendicular to the shoreline with unsorted rough stone

2. FUTURE STATE of the coastal system for the south of the Romanian coast

Costinesti Area: The structures to be executed will constitute a complex system, with a length of 2550 m. The design of the protection system can be seen below.

Olimp Area: The structures to be executed will constitute a complex system, with a length of 3500m. The design of the protection system can be seen below.

Neptune - Jupiter Area: The structures to be executed within the Contract will constitute a complex system, with a length of 2550 m. The design of the protection system can be seen below.

Figure 58. Figure 59. Conceptual layout 60. Conceptual Figure Conceptual layout Costinesti, ADADL Costinesti (ADADL) layout Neptun – Jupiter LEGENDA Bracken mellen priodel Designet menne er state OnBS2 Onlying California Charles sales and the Delute phase proceeds Descend Assets Cost The automatic provider of the second Reent i ma ---------Carrier Constant

Venus Aurora Area: The structures to be executed within the project for the Venus-Aurora lot will constitute a complex system, with a length of 3100 m



Mangalia-Saturn Area: The	2 Mai Area: The structures to be executed in the future for
structures to be executed for the	the 2 Mai lot will constitute a complex system, on a length
Mangalia-Saturn lot will	of 1650 m, to protect the coastal area.
constitute of a complex system,	
with a length of 2500 m	



Figure 62. Conceptual layout Mangalia-Saturn

Figure 63. Conceptual layout 2 Mai

The protective systems for all the above mentioned areas will include but is not limited to, the design and execution of the following types of structures within the protection system, as follows:

- Removal / rehabilitation and consolidation, respectively extension of structures existing coastal areas;
- Execution of new coastal structures connected to the shore;
- Re-sanding the beach;
- Construction of one or more temporary access roads that will be demolished upon completion of the works;
- Arranging the site organization.

Dumping and Pressures

Currently, the Black Sea Basin is a region with a growing population and continuous economic developments, with various coastal and marine uses, such as the tourism industry, shipping and maritime transport, fishing and aquaculture, oil and gas exploitation, dredging, etc. On the other hand, due to its geographic location, the Black Sea will be strongly affected by global climate change and the related sea level rise. At the same time, the Black Sea, one of the most vulnerable inland seas in the world, due to its strategic position for better coordination and specific synergies between the different sectors dependent on the sea (i.e., the "Blue Economy"), as also highlighted by the EC Black Sea Synergy (Joint Staff Working Document Black Sea Synergy: review of a regional cooperation initiative economy', Brussels, 20.1.2015, SWD, 2015). It is considered a salty internal sea, with a salinity of 17%

under the main impact of rivers, mainly the Danube, sedimentary and anthropogenic influence.

General assessment of waste water in the coastal zone

A wide range of human activities can affect the marine environment. Several regional sea conventions have developed a significant list of activities, and some of them can have a negative effect on marine habitats and species.

Examples of possible human activities and their effects;

- Coastal construction, including pipelines, oil facilities and wind farms;
- Exploration and extraction of mineral resources: oil and gas, sand, gravel;
- Transport, navigation, transport infrastructure;
- Pollution: Liquid pollution: chemical, nuclear, biological; organic and mineral waste;
- Fisheries, Aquaculture;
- Activities of military maneuvers, research, waste;
- Tourism, leisure, and marine sports.

In this respect, Romania has recently issued Order 19 of 2010, the Ministry of Environment and Forests for the approval of the methodological Guide on the appropriate assessment of the potential effects of plans and projects on protected natural areas of Community interest.

Human activities in Natura 2000 marine sites are governed by the same command of the Habitats Directive as regards land area. Article 6 of the Habitats Directive applies where the influences of an activity or a combination of activities are likely to be significant.

The Commission Communication to the Council and the European Parliament of 24 October 2005 entitled *'Thematic Strategy on the Protection and Conservation of the Marine Environment'* is also a relevant reference document identifying the different pressures on the marine environment.

Related pressures include commercial fishing, oil exploration and gas transport, storage of harmful and hazardous substances and nutrients into the environment, waste disposal, including the discharge of contaminated dredged sediments, underwater noise and physical habitat degradation as a result of dredging and extraction of sand and gravel.

At the Romanian seaside there are several sources, along the coast, but the primary ones are found in or around ports (Table 1).

Domestic, rainwater and industrial wastewater are collected in the sewerage network (709,155 km length) and discharged into the Black Sea after being treated in two treatment plants:

MIDIA Petrochemial Plant	Constanta North Wastewater Station	Constanta South Wastewater St.
Location: northern part of Mamaia	The Constanta North	Treatment Plant
resort. Treatment plant installations:	treatment plant for the	Constanta Sud has a
Wastewater resulting from the	northern part of Constanta	maximum capacity
petrochemical station: technological pre-	and Mamaia resort	of 3200l/s. Location
treatment plants processes, as subjected	completely rehabilitated.	Constanta Port: near
to the physical separation and decanting	- new capacity is 1920 l/s.	Gate 6. It takes over
processes in a series, subsequently being	- equipped with tertiary	and purifies the
discharged to final.	gear, with extensive	urban, industrial
	aeration, technology for	and rainwater

The final treatment plant collects and	the removal of nitrogen	through the
treats the industrial waters resulted from	and phosphorus.	mechanic -
Petromidia Rompetrol refinery, Midia	- discharge in the Black	biological treatment
thermal power plant, Petromar and the	Sea (fishery area) at the 15	plant with the
wastewater of Navodari city, of three	m isobath, through a pipe	tertiary gear stage,
stages: mechanical-chemical, biological	(3860m length) and	gravitational
and a secondary biological stage	through a short pipe (493m	evacuations in the
(biological self-purification), with an	length) on the 3.5m	port, berth 86.
average flow rate of about 1880 l/s,	isobath, only for	Maximum capacity
discharged into the Black Sea through	emergency situations.	is 3200 l/s.
the Buhaz canal.		

Possible sources of pollution	Location
Petromidia Refinery	Black Sea – through Buhaz channel
Maritime Ports Administration - Midia Port	Black Sea – Midia Port
Midia Navodari shipyard	Black Sea – Năvodari – Midia Port
Marin Midia Terminal	Black Sea – offshore floating terminal with buoy located 8.5 km from the shore
Midia Navodari Thermal Power Plant	Black Sea – Petromidia
RAJA Constanta NORTH - Communal household	Black Sea – Fishing area - 3.5m / 15m isoflava
RAJA Constanta SUD - Communal household	Black Sea – breakwater 86
Maritime Ports Administration – Constanta Port	Black Sea – breakwater 79
Oil terminal	Black Sea – breakwater 69
Constanta Shipyard	Black Sea – Domestic and technological wastewater that requires purification reaches the sewerage network
RAJA Constanta - Eforie SUD - communal household	Black Sea – 10m isobates, near Eforie Sud resort
RAJA Constanta - Mangalia - communal household	The black sea – Mangalia outpost area near the treatment point
Maritime Ports Administration - Mangalia Port	Black Sea

Table 1. The main sources of discharge from the Romanian seaside [1]

Constanta Port sources and potential pollution

Management: Maritime Ports Administration of Constanta

The wastewater is specific to the activities carried out in the port area, domestic, meteoric and bilge water from ships. Wastewater treatment plants are composed of: bilge water treatment plant, mechanical pretreatment plant, wastewater treatment plant, domestic treatment ministries and leachate treatment plant. Mechanically and biologically purified wastewater is discharged into the port area at berth 79.

Eforie Sud wastewater treatment plant

It receives domestic wastewater and a part of the industrial water from the economic agents that are collected in the sewerage network, with 284.63 km length (from Eforie Sud, Nord, Agigea, Schitu, Tuzla and Costinești). The discharged is into the Black Sea through the Eforie Sud treatment point.

The treatment plant has a capacity of 745l/s during summer, 322l/s in the rest of the year. The technological scheme has two stages, mechanical and biological, with nitrification - denitrification and reduction of phosphorus content. The drain pipe ends in the Black Sea (by a dispersion system), has 1350m length and stops at the 10m isobath.

Mangalia treatment plant

domestic wastewater and part of the industrial water from economic agents are collected in the sewerage network (with a length of 170.7 km) and are discharged into the Black Sea after being treated. It serves Mangalia municipality and the tourist resorts in the area, namely Olimp, Neptun, Jupiter, Venus, Aurora and Saturn and is located in the southern area of Mangalia.

The Mangalia wastewater treatment plant has a capacity of 740 l/s, it treats the wastewater mechanically and biologically, with the removal of nitrogen and phosphorus by two internal recirculations of the sludge. After the wastewater has been treated, it reaches the Black Sea, in the Mangalia port area, the purified water being discharged through a pipe of 1200mm, 4m length, 2.50m depth. The new wastewater pipe is completed, in the reception period.



Figure 64. The main sources of discharge from the Romanian seaside

Using Land Use, hydrological, soil and hydrogeological data collected in geographic information system (GIS) and statistical information for different administrative levels Defining significant pollution sources for diffuse emissions is a very complex theme. In point discharges, the load on the substances are counted, basis of measured concentrations and flows. **From diffuse sources,** the emission of substances cannot be measured. **For small river basins** the load can be estimated; for **medium and large riverbasins** the estimation of diffuse source pollution is possible only through mathematical modelling, particularly for Danube, as large cross-border river basins.

Low and high levels of diffuse pollution are the main problem to be distinguished/located

The absolute values of the significant diffuse sources of pollution are also difficult to define.

- They depend on anthropogenic factors such as land use and land use intensities, also on natural factors such as climate, flow conditions and soil properties.
- These factors influence the pathways of diffuse nutrient emissions, retention and losses on the way from origin to entrances to the river system. This is because the level of land use intensity as the main indicator for diffuse emissions into the river also depends on the population density in the river basin.
- The criteria for estimating significant diffuse sources, which ignore natural and basic anthropogenic conditions, are not reliable to distinguish between significant and insignificant levels.
- Therefore, a number of uncertainties must be taken into account when data are analysed.

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2.2.2.7 Tourism

Bulgaria

Tourism is among the mostly harmed sectors by the continuing pandemic. Considering the current serious restrictions and the complete lockdown of the sector in 2020, within the context of the emerging economic crisis and sharply declining revenues, it can be expected that the global tourism figures will not recover to their pre-crisis 2019 levels in the short-term (1-2 years) and even in the medium-term (3-4 years).

The outlook for Bulgarian and Romanian tourism and specifically, for the maritime tourism is similar. In recent years, most of the tourist flows were generated by the European markets. By simple interpolation of the expectations for a deep stagnation in these markets, the outlook for the Black Sea tourism is also decidedly negative. The question about the actual figures of the decline remains open, though rough estimates already exist. The 2021 season will most likely be marked by restarts and adaptations to the new sanitary restrictions for all traditional services.

Pursuant to the World Tourism Organisation data, between January and August 2020, the number of international tourist arrivals has diminished by 70% in a global scale. The pandemic caused crisis in the tourism sector is expected to whipe out between 1,5% and 2,8% of the world GDP.

Minding the ranking of Bulgaria and Romania by the last edition of the Travel & Tourism Competitiveness Index (respectively 45 and 56), recovery will need more efforts and time compared to the more competitive tourist markets.

Against the backdrop of the pre-crisis challenges (strong competition, weak protection by the state, adverse effects of climate change, seasonality and downmarket tourism products), the development of tourism is expected to face even more complicated obstacles. The new systemic factors (political, regulatory, economic, ecological, sociocultural and technological) will be much different, probably for the worse, and the quick adaptation of the tourist industry to the dynamic context will be decisive for the recapturing of the past market positions.

While strong local economies like Kostanta and Varna have other alternatives, tourism is the main support of small Black Sea municipalities and therefore needs to be put back on its feet, adapted and stabilised at all costs. A major portion of this 'cost' is the implementation of the principles of sustainable development and of measures for limiting the adverse consequences of climate change. The latter require of the tourist industry efforts for reducing GHG emissions and of the Black-Sea destinations - adaptation to changes via diversification of the tourist product offered and overcoming the excessive dependence on the short tourist season. A positive projection in the medium term could be motivated, if from this point onward the efforts of Black Sea municipalities would be aimed at achievement of 'sustainable all-season tourism'.



Figure 65. Location of major urban, transport and tourism center

Romania

Tourism, especially coastal tourism, is recognized as a socio-economic priority and provides a wide range of tourist services. Tourism sector is very important, because:

- stimulates growth by generating income, jobs and investment,
- contributes to the support of the cultural and natural heritage,
- provides revenue to finance facilities and infrastructure appreciated by visitors and residents, and
- promotes our European identity, where it belong and stands out for its diversity.

From the point of view of maritime spatial planning, the marine tourism is not yet very developed in Romania, but the impact of coastal tourism on the sea and other maritime activities is significant.

The Danube Delta Biosphere Reserve: coastal-wetland and marine tourism

Danube Delta has one of the most attractive landscapes in Europe. Its promotion is not sufficiently achieved; the transport infrastructure is poorly developed. The seasonality of the non-fishing sector is predominant for tourism and agriculture. The duration of the tourist season has been extended from April to October, but the demographic peak is reached in August-September, when the period of appearance and multiplication of "mosquitoes" passes.

Rural tourism or agrotourism is spread throughout the Danube Delta Biosphere Reserve starting from the seashore to wetlands and is an important source of income for local communities. Locals use their own houses to accommodate tourists. Similar in the southern part of the coast, rural tourism is practiced on May 2 and Vama Veche.

The coastal area has approx. 40% of the total tourist accommodation capacity in Romania, although the significant seasonality is only June-September. The standard network of hotels,

Horizontal support for innovation, internationalization and development of entrepreneurial communities

motels, houses, camping, restaurants, etc., is completed on the coast by the private accommodation system, also from locals. The number of accommodation is about 120,000.

The tourist resorts are classified as resorts of national interest: Mamaia, Eforie, Costinesti, Jupiter, Mangalia, Neptune-Olympus, Saturn, Techirghiol and Venus. It is in increasing the demand for SPA coastal tourism and relaxation for the tourist demand on the international markets. The number of tourists on the coast has been Techirghiol, Costinești, Olimp, Neptun, Jupiter, Cap Aurora, Venus, Saturn, Mangalia, with recreational facilities, modern hotels, facilities for adventure sports.

Maritime and coastal tourism steadily increasing in the last 15 years, being up to 2 million / year. In the last 2 years, due to the pandemic, specific situations have occurred.

In the case of cruise tourism on the Black Sea, in the Port of Constanța (the largest port in the Black Sea, the fourth in Europe, cruise tourism activities have been developed on the sea, coastal lakes and effluents. The new passenger cruise terminal has continued to be developed since 2005.

Seasonal sports such as shore cycling, catamaran or yacht rides, surfing, water skiing, windsurfing, diving, and excursions are practiced. It is recommended to develop ecotourism (entertainment and sports): scuba diving, paragliding (in Mamaia, Eforie Sud, Cape Tuzla and

Vama Veche), parachuting (in Tuzla), cycling, horseback riding (Mangalia Herghelia and Hippodrome), recreational fishing (Razelm-Sinoe lagoon complex, Taşaul, Siutghiol lakes, Corbu lakes, Agigea, Tatlageac, Hagieni, Limanu, Mangalia).

The coastal area overlaps a territory rich in natural and anthropogenic tourist resources. According to the National Spatial Planning Plan - Section VIII (areas with tourist resources), the administrative-territorial units with natural resources include Mangalia, Eforie and Istria (Constanța County) and Murighiol, Sfântul Gheorghe (Tulcea County).

Types of tourism in the south of the coast	Location
Năvodari, Mamaia, Eforie, Olimp, Mangalia, 2	Mass tourism
Mai, Vama Veche	
Techirghiol, Eforie Nord, Mangalia, Murighiol	SPA, balneology and therapeutic mud
	treatments
All resorts located on the Black Sea coast	Heliomarine curative tourism, Business
	tourism, Event-based tourism
All resorts in the southern part of the coastal area	Leisure tourism, Sport tourism - sport
	hunting, sport fishing, water sports
Biosphere Reserve, Movile Cave Reserve	Tourism for scientific purposes
(Mangalia)	
Podișul Dobrogei Dobrogea plateau	Wine Tourism

The operational capacity of the tourist accommodation of the coastal area is expressed in the number of places occupied daily. It exceeds 10 million seats. Due to the pandemic situation, the number of occupied places has increased since 2019 in the northern area more, in the Danube Delta due to the need to spend holidays in more isolated areas.

Objectives

- Creating communities, clusters, innovation and development hubs in order to increase the productivity of companies, for efficient competition at national and international level.
- Encouraging business association (eg clusters, business networks) and, respectively, business promotion / entrepreneurship (matchmaking), especially internationally;
- Using European funds for aid schemes for SMEs.

Directions for action

- Development of the cooperation between universities and other collaborative support institutions, the business sector and relevant government agencies to help existing clusters thrive and become more sophisticated and competitive, while providing a favorable environment for training and growth new economic clusters;
- Creation of Digital Innovation Hubs (HDIs) based on partnerships between the digital business community and technical universities and research institutes;
- Development of local business structures and infrastructures accelerators, hubs, coworking spaces, training centers, industrial, science parks, etc.;
- Development of entrepreneurial social networks and market-place business communities;

- Creation of urban functional areas (ZFU) and areas of economic activity (ZAE) where land is allocated, new infrastructure of the highest quality and creates an ecosystem of companies that establish their activity in those areas, with minimal negative impact on the sea;
- Development of rural entrepreneurship and support for rural communities & food hubs through dedicated support services (counseling, financing, etc.)
- Creation of bridgeheads in destination countries and of partnerships (match-making), by transition (traditional promotion measures example: fairs and exhibitions) aimed at strategic sectoral priorities for the development of the national economy in an international context;
- Reforming economic diplomacy to truly and effectively support the internationalization of national companies;
- Identifying positive examples (bright spots) in which national companies have managed successfully foreign markets and whose example can be replicated;
- Facilitating the transfer of technology, knowledge and know-how.
- Establishing the economic sectors declared a priority for the national economy in the medium and long term;
- Development of a growth pole in certain fields, such as IT and establishing a national brand;
- Encouraging the use of new technologies in high tech production.



Figure 66. Tourism activities vs. environment protection

Tourism development

Objectives

- Development of tourist destinations with the involvement of all tourism actors by encouraging partnerships, quality and performance increasing, destinations and routes management;
- Increasing the notoriety of quality tourism on the international tourism market;
- Reducing the seasonality, increasing the average length of stay and the degree of tourists loyalty;
- Development of all forms of tourism, identification of new development opportunities and stimulation for the growth of domestic and international tourist traffic;
- Making investments in tourism;
- Simplification of the authorization system in the field of tourism;
- Ensuring the protection of both tourists and economic operators in the event of a crisis;
- Digitization of public services provided by the central public authority;
- Supporting the entrepreneurial environment in the field of tourism.

Directions for action

- Updating the legal framework on the development of Destination Management Organizations (MDGs);
- Formulation and adoption of the national strategy for the development and promotion of tourism, the marine sector strategy and the implementation of the related action plans.
- Development of an IT system for recording the tourism activity; continuous professional training of qualified personnel;
- Implementation of projects for the digitization of public services in the field of tourism;
- Elaboration of a crisis management plan in the field of tourism;
- Carrying out marketing actions to increase the notoriety of the tourist destination at national and international level;
- Identifying tourism niches where there are comparative advantage and support through public policies;
- Updating the legal framework for investments in tourism;
- Updating beach-specific legislation;

The MARSPLAN BS II questionnaires for tourism analyzed sample consists of 71 participants - stakeholders, each with economic, ecological, planning, research, and/or decision-interests regarding the use of marine space. The structural analysis of the sample highlighted 32 public sector entities: national, regional, and local authorities, research institutes, universities or educational institutions, and 39 private sector entities: local and national economic agents, NGOs. Approximately 86% of the respondents work in the coastal area, more precisely in Constanța and Tulcea counties, the rest operating in territories adjacent to the analyzed coastal area.

It is well known that coastal areas have a major role in socio-economic development given the multitude of economic activities: tourism, maritime transport, fishing and aquaculture, oil and gas research and extraction, cables and pipelines, etc. In this context, out of the number of stakeholders who were asked: *Which are the main economic and social problems in the coastal area of the Black Sea?* almost half, namely, 42.3% indicated *inadequate, outdated, unmodernized infrastructure.* On the other hand, 19.7% believe that *pollution prevention and*

control is a problem, 18.3% believe that *the authorization and regulation of economic activities for commercial customers*, while 14.1% believe that it is *the lack of transport infrastructure*, and only 5.6% indicates *the protection and restoration of the river basin*. Therefore, the main problem identified cannot be eliminated from the research results, namely the importance of the economic and social development of human activities in the coastal area; this is also essential from an environmental perspective, as the sustainability of the coastal zone can only be attained by achieving a symmetry between the three piles, namely the economic, environmental and social. Figure 67:



One conclusion that can be drawn is that stakeholders perceived the quality of the environment compared to that for coastal infrastructure as having higher importance, even if only 18% of respondents specified that they had obtained environmental certification for tourism.

Proposals for the period 2021-2024: instead of conclusions

- Development of sustainable **Ecotourism**, with the protection of the natural heritage and efficient management of the resources wich represent a priority direction of action.

2.2.3 Military training

Bulgaria

Military zones, or training areas, are intended for training and conducting of military exercises and operations of military units from the Republic of Bulgaria, alone or jointly with military units from other countries. There are special training areas for the preparation of divers from the Navy, located within the territorial sea when required, the navigation, shipping, and other underwater activities are prohibited in the areas. The coordinates of the regions are proclaimed by Regulation No H-7 of 12.06.2008 for the performance of diving and other underwater activities. The zones in question for conducting military exercises are situated in the littoral area. There are some nuances in the introduction of the concepts for the littoral zone and the meaning assigned to them to reflect the specifics of each particular zone of the maritime space in geographical, geopolitical and naval aspect. The security environment for the maritime transport system is the space where the coastal state independently or as part of an alliance counters the adverse effects from the materialization of threats and hazards against the economic activities. There is a real possibility for crisis resulting from environmental catastrophes, natural disasters, and major accidents sea.



Figure 68. Military Training Areas

Romania

Military and restricted areas

In the coastal area, there are certain areas for military exercises. In the marine area, the entire surface of the territorial sea is used for military practices, with specific rules regarding maritime navigation and activities, resources exploitation, etc.

The coexistence of military activities with other maritime activities, such as tourism, fishing or even maritime transport, is not prevented. In some cases, measures such as temporary closures can often be used.

In general, conflicts may arise between the conservation needs of the marine environment and maritime economic activities. These are:

- The exploitation rights of the natural resources from the Danube Delta;
- The competences and roles of the various institutions, including the rights of control over the way in which they comply with the legislation in force;
- Conflicts between the local population, local councils, the county council and the Danube Delta Biosphere Reserve Authority regarding access to different areas and poaching;

• The need for communication and coordination between institutions and organizations. Institutional coordination can be complicated by a lack of communication or the existence of incompatible interests.



Figure 69. Zones for the military exercices (Soursa: GEM)

The most important polygons for military exercises are the area of Sf. Gheorghe, Histria, Corbu and Constanța, in addition to the military infrastructures in Tulcea, Sulina and Mangalia.

2.2.2.9 Underwater cultural heritage

Bulgaria

Underwater immovable cultural properties are registered within the project scope — in the aquatic area of the Republic of Bulgaria — shipwreck remains, ancient ports and pre-historic settlements. Potentially promising human activities related to underwater cultural heritage are the underwater tourism, the archaeological excavations and studies.

The area to the north of Kavarna Cape has the greatest potential for development of underwater tourism and socialisation of underwater sites. Two diving clubs are functioning (in Rusalka resort community and in Tyulenovo village), which offer training for beginners and for experienced divers. Accessible for divers are the sunken ships near Durankulak village, Krapets village and the town of Shabla. Yailata Archaeological Reserve is located on a broad terrace above the sea, separated by high cliffs from the Dobrudzha Plateau. A late Hellenistic fortress

was discovered in the territory of the reserve, as well as stone tombs, sacrificial stones, wine cellars, cave complexes, etc. Underwater cave dwellings and stone slabs from the fortress wall may be viewed in the aquatic area of Yailata. At the seabeds of the ancient ports near Shabla Cape, Yailata Cape and Kaliakra Cape various anchors, amphorae and other isolated finds may often be found. Attractive options for adventure underwater tourism are the submerged coves near Rusalka resort community and Tyulenovo village. The best-known among them is Tyulenova Cove, which is 107 m long. In the past it was a habitat of the monk seal (Monachus monachus).

Future archaeological excavations could be carried out at the wreckage sites of the wooden sail boats from the XVII-XIX century in the coastal area near Durankulak village, Krapets village and the town of Shabla. Two archaeological geophysical explorations were carried out in the waters of the Durankulak Lake and in the sea to the east of it. In one of them a positive shape of the sea bottom is registered, which has similar parameters to a settlement mound and which could be the site of underwater excavations. In the second half of the XX century 12 prehistoric settlements dated to the Late Chalcolithic and the Early Bronze Age were found in the waters of the Varna and Beloslav Lakes. Newer studies have proven that some sections of 6 of them are still preserved, while the location of one of the settlements connects it historically to the Varna Chalcolithic Necropolis. In view of their high scientific value, it is important to conduct archaeological excavation.

Scientific studies have found that the coastline at the end of the last Ice Age has been along today's 30—40 m isobaths. It is quite likely that in the area between them and the present day shoreline pre-historic settlements and necropolises may be discovered. Two zones were explored in the course of the implementation of the deep-water project MAP Black Sea, in which shipwrecks dating between the V century B.C. and the XIX century A.D. were registered and documented with a similar frequency of shipwreck sites of 1 per 4 sq. km. Joint Bulgarian-Romanian deep-water studies may be conducted in the cross-border zone, which would yield new information on ancient navigation and the commercial contacts in the Black Sea.

At all deep-water shipwreck sites, a very high degree of conservation of the remains of wooden ships is observed, which is attributable to the specific conditions in the Black Sea basin. The Republic of Bulgaria and Romania could cooperate in preparing a joint application for declaring the deep-water shipwrecks located in the aquatic areas of both countries as UNESCO world cultural and natural heritage sites.

Romania

In Romania, the main underwater archeological discoveries are represented by ancient settlements from Tomis (now Constanța), Callatis (now Mangalia) and Histria (now, far of coast because of swamping, wrecks (more than 70 wrecks) and six protected areas, respectively sunken Romanian landscapes. Ancient archeological sites have been the subject of scientific research through the HERAS Project.

The underwater cultural heritage of Romania's coastal waters also includes ancient archeological remains. The accumulative sites overlap objects from different historical epochs with objects from previous epochs. These sites, also called submerged structures, have a great

diversity (dams, port facilities, cities from all historical periods, etc.) and cover areas between a few hundred square meters or tens of hectares.



Figure 70. Underwater cultural Heritage in Bulgaria

The underwater cultural heritage have a number of problematic aspects:

- In the cross-border area of Romania and Bulgaria, the underwater cultural heritage is still insufficiently explored and there are no maps of the points, types and periods of underwater archaeological discoveries; maritime spatial planning have to aim and resolve this situation mainly to make possible the development of different maritime activities;
- Lack of regulated areas for exposure and monitoring of sites and information on the exact perimeter for underwater inspections, control of exploration of areas, both in terms of maritime traffic and in terms of protection of underwater archaeological artifacts;
- Lack of information on: visiting sites in the identified areas; the exploitation of which may increase the tourist interest and, respectively, the pressure on the environment;
- Insufficient knowledge of national legislation and the UNESCO Convention, in this field;
- Improper use of the Black Sea underwater heritage;
- Lack of support, and low awareness of local authorities for underwater heritage.

2.2.2.10 Research

Systematic scientific research of the Black Sea has been taking place since the end of the XIX century. During the said period a series of important scientific discoveries were made related to the presence of hydrogen sulphide, the occurrence in the Black Sea ecosystem of major changes disrupting the environmental balance, and the origination of the Black Sea.

Bulgaria

The main institutes which conduct scientific research in the Bulgarian aquatic area of the Black Sea are the Institute of Fish Resources, the Institute of Oceanology, the Underwater Archaeology Centre and the Institute of Biodiversity and Ecosystem Research.

The Institute of Fish Resources — Varna was established in 1932 as a Marine Biological Station with Aquarium. The Institute's scope of activity includes biodiversity in the Black Sea and changes in its ecosystem under the impact of anthropogenic and climate factors; research of the commercially important marine fish and shellfish resources, of marine aquaculture; research of the main functional links of the marine trophic web — phyto- and zooplankton, phyto- and zoobenthos, nekton; the population dynamics of numerous species of commercially important fish; study of marine mammals; development of new technologies for mussel and fish farming; research of the condition of the commercially important species of molluscs. In recent years the institute is involved in the implementation of the National Data Collection Programme in the field of fisheries and aquaculture — determining the stock of turbot through bottom trawl surveys, surveys of rapana landings, as well as determination of by-catches of marine organisms in some major types of fishing operations in the Bulgarian waters of the Black Sea.

The Institute of Oceanology was established in 1973 in the city of Varna under the name of Institute of Marine Studies and Oceanology with the Bulgarian Academy of Sciences. The Institute engages in fundamental and applied scientific research in the field of oceanology, in accordance with national priorities and global trends. The fundamental and applied research and the expert activities are aimed at the elaboration of a strategy for sustainable development and management of the Black Sea ecosystem, in compliance with regional and EU legislation, while following an ecosystem-based approach. The activities of the Institute of Oceanology include scientific research and education in the priority areas: marine biology and ecology, dynamics of the coastal zone, marine geology and archaeology, ocean technologies, physics of the sea, chemistry of the sea. The researchers from the Marine Geology and Archaeology sector prepare maps and 3-D models and maintain the geoinformation system of the Bulgarian sector of the Black Sea and the littoral zone. The oceanographic data centre at the Ocean Technologies sector provides access to maritime data and information, maintains databases and creates information products and services in support of the domestic and European research areas and of businesses.

The Underwater Archaeology Centre was established in 1978 in the town of Sozopol and it is a state institute of culture with the Ministry of Culture. The Centre's purposes of activity include: studying, documenting and protecting of the underwater archaeological heritage of the Republic of Bulgaria (Bulgaria's Black Sea coast, rivers and lakes) by applying cross-cutting scientific research methods; scientific processing and interpretation of the data and the finds from underwater archaeological excavations; research, scientific information, expert and consultancy activity in the field of underwater archaeological studies; organisation and conduct of domestic and international scientific events in underwater archaeology; exhibitional, public awareness and editorial activity both in Bulgaria and abroad; education an qualification of specialists in underwater archaeology. Specialists from the Underwater Archaeology Centre exercise control over the conduct of underwater, hydraulic-engineering and dredging activities. They perform underwater archaeological studies, geophysical and geomorphological surveys focused on the change of the coastal strip since the antiquity until present, chemical, botanical, zoological and other studies, with the view to ascertain the paleoclimate conditions along Bulgaria's Black Sea coast and the evolution of the climate. The Underwater Archaeology Centre is the lead Bulgarian partner in the marine archaeological project Black Sea MAP.

The Institute of Biodiversity and Ecosystem Research at the Bulgarian Academy of Sciences was established in 2010. It conducts scientific research in the fields of theoretical and applied aspects of ecology, biodiversity, environmental protection and the sustainable use of biological resources. The Institute provides scientific information, renders methodological assistance to state institutions and civic society structures and represents Bulgaria in the European Research Area in the spheres of its competence. A Laboratory of Marine Ecology is operating in the town of Sozopol and is equipped to conduct studies of the biodiversity and functioning of the coastal marine ecosystems. Specialists from the laboratory are conducting functional monitoring of the coastal marine wetlands and evaluations of the anthropogenic pressure on the coastal marine zone. They are developing methods for science-based management of the ecosystems of the coastal marine zone and their resources. The Institute operates an ecological station in the territory of the Atanasovsko Lake Reserve, at which monitoring ornithological and hydrobiological studies are conducted.

In 2021 the implementation of the BRIDGE-BS and DOORS started in connection with the blue growth of the Black Sea region, funded by Horizon 2020 — the Framework Programme for Research and Innovation of the European Union.

The BRIDGE-BS (Advancing Black Sea Research and Innovation to Co-Develop Blue Growth within Resilient Ecosystems) project brings together 33 partner organizations from 7 Black Sea littoral states, 8 European Union Member States and international organisations. The main goal of BRIDGE-BS is to develop marine studies and innovations in the Black Sea in order to define jointly the paths for blue growth and for sustainable use of the ecosystem resources. A framework for ecosystem-based management will be developed, which will enable the embracement of the policy and promote civic participation. By focusing on three main priorities, including service dynamics, blue growth incubators and empowered citizens, BRIDGE-BS aims to achieve a healthy, sustainable and productive Black Sea by 2030.

The DOORS (Developing Optimal and Open Research Support for the Black Sea) project is coordinated by the National Institute for Scientific Research and Development of the Marine Geology and Geoecology — GeoEcoMar, Romania. The project brings together experience and technologies of 37 research, academic and business organisations from 16 European states, including also all Black Sea states. The main goal of DOORS is to achieve a climate neutral, sustainable and productive blue economy. To achieve their goals, the team of DOORS will work in close cooperation with the relevant stakeholders in order to develop an open research

system for support of the Black Sea community. DOORS will implement three Work Programmes: a System of Systems ensuring free access to information obtained from on-site measurements, marine expeditions, satellite observations and numerical simulations; a Blue Growth Accelerator — creation of new work opportunities by developing mechanisms for connecting the business to scientific research; Knowledge Transfer — capacity building and sharing best practices among stakeholders from the Black Sea states.

Projects in the field of scientific research in the Black Sea can be funded from the new EU Framework Programme for Research and Innovation over the 2021—2027 period: Horizon Europe. The goal of the programme is to further develop the research and technological capacity of the EU, while placing an emphasis on the ecological and digital transition. The programme also contributes to achievement of the objectives for sustainable development and stimulates the competitiveness and growth. Horizon Europe consists of three pillars:

- Excellent Science: Pillar I strengthens European scientific leadership by encouraging the development of high-quality knowledge and skills. Support is provided under this pillar through the European Research Council to cutting edge research projects, and investments into research infrastructures are stimulated. The Marie Skłodowska-Curie actions provide funding for activities related to mobility, training and professional development of researchers.
- Pillar II Global Challenges and European Industrial Competitiveness supports scientific research and innovations oriented at social challenges and industrial technologies in areas such as healthcare, digital technologies, climate, energy, mobility, public security, foodstuffs and natural resources.
- Pillar III Innovative Europe is oriented at encouraging all forms of innovations and more specifically breakthrough and revolutionary innovations, through the European Innovation Council.

The Black Sea states are facing a number of challenges, such as countering pollution, restoration of the environmental balance, study and conservation of the underwater cultural heritage, etc. In order to overcome them successfully, the future marine scientific research, pooling together the efforts of the research, academic and business communities, will be essential.

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- 4) <u>http://www.iber.bas.bg/?q=en</u>
- 5) <u>https://www.consilium.europa.eu/en/policies/horizon-europe/</u>
Romania

The research infrastructure aims to underpin sectoral policies targeting the Black Sea area, with the aim of providing information in the field of marine protection and biotic resources management, in order to meet the requirements of national and international interest.

The infrastructure for monitoring the marine environment within the Monitoring Program dedicated to the Romanian Black Sea sector, established in the 1970s, has been developed over time to provide data necessary to assess the state of the marine environment, including pressures and impact, various activities in the marine. Among the research activities based on the data obtained from the monitoring network was the evaluation of the enrichment effects with nutrients and organic substance of the marine waters from the Danube and entire coast.

The monitoring network includes 45 stations, arranged on 13 profiles along the Romanian coast, between Sulina and Vama Veche (figure...). Samples collected from the monitoring network during the sampling expeditions with a research vessel "Steaua de Mare".

The main fields of activity of the National Institute for Marine Research and Development "Grigore Antipa" Constanța also include general and operational oceanography, marine and coastal engineering, environmental engineering, marine ecology and biology, management of Black Sea living resources, and environmental impact. NIMRD "Grigore Antipa" hosts the Regional Black Sea Activity Center for Fisheries and Other Living Marine Resources Management (RAC FOMLRM), as well as the National Center for Oceanographic and Environmental Data (CNDOM), with the role of systematic observation of the marine environment. During 2015 and 2018, NIMRD was Focal Pont for regional (Black Sea) MSP Platform.

The National Research-Development Institute for Marine Geology and Geoecology - GeoEcoMar operates the National Center for Monitoring - Alarming to Marine Natural Hazards EUXINUS. It stores and processes the information transmitted by the equipment networks that make up the Black Sea Security System, namely the three complex beacons called EuxRO 1, EuxRO 2 and EuxRO 3, which are located on the Romanian continental shelf, in territorial waters, at a distance of approximately 160 km from the coast.

Both institutes have contribution to European and international networks concerning marine and oceanographic research.

Important governmental goals at EU level, supporting:

- the EU's leadership in combating climate change and the implementation of the objectives set out in the European Green Pact, taking into account the specificities of the Member States, so that the transition to climate neutrality is socially sustainable; leading to economic development without developmental differences. The network of green / climate diplomacy missions, created in 2021 will continue to expand and consolidate;
- the Union level adoption and implementation of a sustainable migration management policy, including migration on the maritime space;

- active involvement in the debates on the concept of EU strategic autonomy, maintaining and strengthening the transatlantic relationship and complementarity with NATO; linking this concept more closely with the strategic resilience concept of the EU Member States;
- continuing the efforts to promote a consolidated presence in the European institutions.

The development of an innovation ecosystem at national level has five strategic axes of the digital transformation: Digital public administration, "smart government", Digital economy, Digital education, Digital communications and technologies of the future, Cyber security. The integrated approach aims:

- research and development capabilities;
- infrastructure for component production and finished product assembly; development of software applications and related communications;
- installation and maintenance services; export activities; recycling capabilities

Targeted industrial ecosystems for the Development of the sector dedicated to the production of green technologies (goods and services for environmental protection and resource management)

Objectives

Development of the production of goods and services for environmental protection and resources management;

- Development of the production of equipment for the production of clean energy and intelligent management equipment: photovoltaic panels, storage capacities, smart meters, smart lighting systems, etc.;
- Increasing the number of companies producing green technologies "Made in Romania";
- Absorption of funds dedicated to R&D, production and distribution of green technologies, in the period 2021-2024
- Exports of green technology starting with 2025.

Directions for action

- Creating strategic partnerships with EU members with more developed skills and knowledge in green technology development (e.g. Austria, Germany, Italy, etc); with Bulgaria in the Black Sea basin.
- Supporting digital platforms to facilitate the presentation of the supply and demand of green technologies, together with research and development institutions (universities and research institutes).
- Participation to the financing programs dedicated to Start-ups in the main sectors producing green technologies: environment and clean water, clean energy and transport, technologies for infrastructure, IT&C subordinated to the circular economy, organic food.

Medium-Term Vision _ M EU Funds

The importance of European funds for Romania can be measured, mentioning:

- Economic cohesion, by improving competitiveness and supporting innovation in business and the public system;
- promoting green investments, supporting Romania's digital transformation and adapting to climate change and shaping a proactive response to potential risks;

- development of quality public services;
- increasing access to social, employment, health and education services;
- recovering development gaps between different regions;
- overcoming the economic and health crisis caused by Covid 19.
 - 4. IDENTIFYING POSSIBLE ALTERNATIVE FUTURES FOR THE PLANNING AREA

Rationale

Development of scenarios is an important tool for assessing different development alternatives, as well as for the MSP visions and strategies development processes. Here a common approach of parallel development of several different scenarios is applied. Then scenarios are compared each other to illustrate different future developments and relevant consequences.

The scenarios are built on identified maritime resources and uses, on blue economy activities and relevant sectoral policies. The generation of maritime spatial development scenarios is based on different uses' projections being a function of sectoral policies and determining factors (driving forces). Different policies and public priorities are usually conflicting development choices.

Sustainable development and the ecosystem services of the sea are the main reference points of both, the scenarios and the future MARSPLAN II. The three poles of sustainable development (economic, social and ecological) are the basis for three different scenarios with relevant priorities:

Scenario A – Blue economic growth
Scenario B – Social balance in the whole project space
Scenario C – Ecology and biodiversity - ecosystem services

Each of the above scenarios could be elaborated and applied within a distinct sectoral approach. Namely this is the actual practice in maritime uses and relevant sectors development. In the case of the scenarios for maritime spatial development, all of them contain elements of the 3 aspects (economic, social and ecological), but just one is dominant in each.

Though needing more mutual efforts, a new contextual approach is possible, containing potential for a consent on the final goal "sustainable maritime ecosystem" even at the stage of scenarios' elaboration. Its application would require changes in value systems, in the focus and goals of planning. In the current situation of pandemic restructuring the probability for achieving of such a scenario becomes higher and higher (its feasibility score would have been much lower at the end of 2019). Thus we come to a fourth scenario:

Scenario D - "One for all" - integrated interests for the Black Sea use and preservation

A considerable privilage of this scenario is its' set of three development ranges – a) balancing of the three sustainable development aspects (economic, social and ecological); b) conducting an integrated maritime policy for the Black Sea Basin; c) combining maritime spatial planning with integrated management of coastal zones (MARSPLAN II and masterplans for the adjasent hinterland). This scenario integrates the best ideas of the previous 3 basic scenarios.

To achieve credibility and feasibility of scenarios, two preliminary assessments have been carried out: a) analysis of the factors (drivers of development) - the socio-economic prerequisites for change in the maritime uses and current sectoral policies' goals; b) constraints on the use of maritime spaces - legal frameworks, natural conditions, marine resources, sustainability of ecosystems, spatial separation of incompatible functions (such as oil/gas extraction platforms and intensive navigation corridors or naval training areas).

The last step in scenarios' elaboration is the provision of an objective opportunity for their assessment and relevant choice of an optimal scenario to follow. Such an opportunity is provided through a set of selected socio-economic and ecological indicators.

Scenario A: Blue economic growth

Bulgaria and Romania are among the weakest EU economies and desparately need catching up economic development.

This scenario is elaborated assuming full exploitation of marine resources. It is aimed at an economic breakthrough driven by the competitiveness and high value added of the maritime industries. It includes development of ports, of cargo and passenger maritime transport, of cruise and recreational tourism, of prudent and measured expansion of resorts. Development of technologies and innovations will be an encouraged priority in all sectors of the maritime economy. The development of commercial fishing will take into account the fish stocks available and the internationally established quotas. The concessions for prospecting and extraction of oil and gas will enter their 'extraction' stage characterised by energetic pursuit of the interests of international and domestic companies. The unprecedented crisis will postpone the high ideals of the development of tourism for a time after the end of the struggle for the survival of the sector, by offering the products in highest demand and such that are most accessible and offer a quick return. Mass tourism with quantitative characteristics will be developed in an environment of intensified competition and risk of redistribution of the emitting markets.

This scenario is the reflexion of an "aggressive" strategic goal – "accelerated economic development". Accomplishment of this goal would mean catching up development through acceleration of economic cohesion in the context of the EU. Substantial state support for branches of high technological and research intensity would be inevitably needed. The timely technological transformation of the economy related to the sea, as well as the increase in its resource efficiency would have the potential to put it on a higher growth trajectory and to bring it closer to the philosophy of the blue economy. At the same time, the insufficient experience and knowledge regarding the blue economy carry a risk of making of decisions, harmful to nature, in the form of environmentally friendly innovations.

Driving forces of Scenario A

Driving forces of a political nature in the implementation of this scenario would be:

• The priorities of both countries' Recovery and Resilience Plans (green transition, digital transformation, smart growth, social and territorial cohesion, health and resilience, youth policies);

- The Common Maritime Agenda for the Black Sea³¹, namely Goal II: A competitive, innovative and sustainable blue economy for the Black Sea;
- The Strategic Research and Innovation Agenda for the Black Sea³²;
- The EU policies for Blue Growth, European Maritime Transport Space without Barriers, as well as the newly established fund for the blue economy;
- Funding of programmes targeted to clusters with export potential.

Economic factors and driving forces:

- Businesses which are concentrated primarily in both economic centres (Konstanta and Varna) and the big resorts in the CBC area. The maritime clusters (in process of formation), including export-oriented companies, suppliers of raw materials, tourist structures, scientific research centres and smart services' providers.
- The increasing market demand for raw materials and consumer goods also brings about an increase in maritime cargo transport;
- Economic growth continues to be a leading goal, and intensification of all economic activities is on the agenda in mass tourism, in manufacturing, in investments. The latter tends to concentrate in areas that offer the highest profits;
- Economic growth and higher profits lead to increased consumption of energy and energy resources. Motivation for expansion of coastal wind farms and start development of offshore wind farms becomes probable;
- The intensification of maritime cargo transportation and tourism also necessitates reciprocal measures in relation to the requisite onshore infrastructure;
- Information and communication technologies mark clear progress in their mobile capabilities;
- The innovations in the field of leisure activities offer new solutions for usage of the sea, for water sports and recreation. The safety and security measures and the capacity of the lifeguard services are increased and concentrated in major resort structures with heavy tourist traffic and respectively higher risks.
- Expected strong support for marine and maritime research and innovation;
- Expected new emerging sectors based on new technologies;
- Expected rapid development of zero emission transport systems and relevant infrastructure
- Expected rapid development of blue skills and know-how, sufficient to ensure adequate standards of services in sectors like tourism or ports;

Social driving forces:

• Against the backdrop of negative demographic projections on national level, Konstanta and Varna are able to retain their population by ensuring sufficient qualified labour for the development of powerful industrial centres and blue economies;

 ³¹ https://blackseablueconomy.eu/sites/default/files/common_maritime_agenda_for_the_black_sea_final_1.pdf
³² https://ec.europa.eu/info/news/launch-european-black-sea-strategic-research-and-innovation-agenda-2019-may-08_en

- The smaller municipalities in the MARSPLAN II project area are losing economic energy and population;
- Small population densities in the smaller municipalities lead to underdeveloped social services' systems and deterioration of quality;
- Income differentiation in local communities deepens and this leads to economic migration and growing social tensions;
- The traditional summer pulsation of the anthropogenic presence along the sea coast continues, leading to increasing deficits on the labour markets and respectively to seasonal imports of labour from abroad;

The vision for the economic scenario A is illustrated in the Map 1 below:



Map 1: Scenario A: Blue economic growth, Figure 71

Environmental and natural conditions:

- The natural resources available are used up to their maximum capacity;
- The current environmental standards are complied with in the development of the separate economic sectors, but nevertheless the overloading with functions and the full exhaustion of resources inevitably leads to negative effects and to deterioration of the overall state of the environment. Clear evidence of this is provided by the zones of the bigger ports (Constanta and Varna), the oil terminals, the big "industrial" tourist destinations and resorts;
- The first noticeable effects of climate change are already a fact in the spatial scope of the MARSPLAN II project. The processes of coastal abrasion accelerate, the negative effects of sea storms are observed ever more frequently, the droughts in the inland areas are becoming increasingly persistent and prolonged;

• The overexploitation of natural resources leads to depletion of fish stocks, deterioration of sea water quality, biodiversity loss and decline of the natural attractiveness of the Black Sea coast as a tourist destination and space for living;

Likely environmental impacts of Scenario A (if implemented)

Economic development – the rapid economic rise attracts population to the big development centres (Constanta and Varna in MARSPLAN II project area). Expansion leads to new urbanised spaces for dwellings, offices, services, industries and all kinds of necessary technical infrastructure. But such a development is not sustainable – it leads to rapid depletion of easily digestible resources. After a cycle of upword development, leading industries fall into non-competitiveness, loss of markets and finally, loss of work places. Meanwhile, spaces outside development centres have degraded in economic, social and ecological terms as all development energy has been concentrated in Constanta and Varna. These are foreseeable consequences of imbalanced spatial development.

Maritime transport - the intensive development of the sector leads to increased noise pollution. Most affected are marine mammals, whose number and distribution ranges show a downward trend, especially in the areas of both large ports - Constanta and Varna. The marine environment in the port aquatic areas is damaged beyond recovery. The illegal dumping of solid and liquid wastes into the sea declines significantly.

Commercial fishing - fish stocks in high seas areas continue to decline. Despite the fact that fishing is conducted within the limits of the quotas established, the maximum sustainable yield is not feasible due to the existence of pollutants, marine waste and biological invasions. A major part of fish produce is imported in order to meet market demand, but at the expense of small-scale fishing, thus limiting the development opportunities of the smaller coastal settlements. Wide use of sparing techniques for industrial fishing is encouraged, but will hardly neutalize the other negative factors. In any case, an integrated approach would be needed;

Marine aquaculture: From Constanta south, the coast is open with steep shores, and is subject to high wind waves during storms. The protected areas all have sandy beaches which are developed for tourism. There seems to be little scope for development of aquaculture along this section of the coast. On the contrary, North from Varna, due to favourable conditions and exposure of the coast between Cape Kaliakra and Balchik, intensive development of marine aquaculture is observed. Despite the positive environmental effect of the cultivation of mussels as natural filters of sea water, the high density impairs the purity of sea waters and creates conflicts with coastal tourism. The high concentrations of some pollutants which tend to accumulate in mussel meat have an unfavourable influence. A part of the operations are moved to deeper waters, but at a greater cost and a risk of potential conflict with maritime traffic.

Maritime tourism - the traditional pulsations of summer tourism result in excessive burden on the waste water treatment plants. Still there are settlements in which the degree of purification is insufficient. Deep-water discharge is performed and leads the treated waste waters away from the shore. In instances of favourable circulation of air flows wind waves are generated and the currents push polluted waters towards the swimming zones, thus impairing the conditions for coastal tourism. The crowding of many people on a limited beach strip causes destruction of

the sand dunes, compacting of the seabed and damage to shallow seabed habitats. The use of high-speed pleasure craft generates underwater noise in the shallow coastal zone and repels fish and marine mammals. Birds are disturbed in their feeding and nesting grounds as a result of the lack of specific actions for putting an end to random access. Hopefully, the positive effect of the Covid 19 pandemic will be expressed in dominating preferences to sustainable forms of tourism rather than "industrial" forms.

Coast protection - the approved investment proposals for coastal protection facilities and marinas, which are substantiated from a legal and engineering point of view, cause irreversible hydrological alterations in the long term due to insufficient research of the coastal and environmental processes in the construction sites.

Marine energy – in principle, aggressive prospecting and extraction of oil and gas lead to increased noise pollution, loss of natural seabed substrata and pollution of the benthic layers. This causes changes in the behaviour of many species of fish and marine mammals which are sensitive to noise, and that in turn changes their distribution. The risk of oil spills is not to be underestimated, because life in the Black Sea is concentrated primarily in the surface layer (100 m) and this renders it exceptionally vulnerable. The combination of intensive extraction of oil and declining depth of the oxygen layer make significant areas of the seabed habitats (at depths between 60 m and 100 m) unfit for living organisms. This leads to depletion of the stock of commercially exploited demersal species of fish.

Scientific research: Shipbuilding continues to rely on diesel engines (being economically more advantageous in the short term), despite the existence of less noisy and therefore more environmentally friendly turbo-electric engines and electric propulsion systems. *Monitoring* of the environment covers both the existing invasive methods (requiring catching and killing specimens), as well as new non-lethal and remote methods of monitoring of sea organisms. Studies of the *cultural heritage* are carried out, but economic interests related to extraction of oil and gas as well as intensive fishing are placed first. This leads to destruction of some of the underwater archaeological sites. The *marine energy* relies primarily on traditional energy sources for which extraction installations are available, and therefore the prospecting activities are focused mainly on the discovery of potential deposits of oil and gas in the continental shelf.

Land-sea interactions: Just the issue of waste water treatment is observed under this topic. Unarguably, the building and modernisation of waste water treatment plants (WWTP) reduce the pollution caused by settlements and industry. Further, the development of organic farming in the adjacent territories reduces the degree of anthropogenic eutrophication and the pollution of coastal waters with pesticides. Still, some WWTP provide insufficient degree of purification. The deep-water discharge moves the pressures away from coastal sea waters and the bathing areas, but in instances of wind and sea currents from the east the treated waste waters, which are lighter, come up to the surface and are returned back to the coastal zone.

Sea-land interactions - the poor state in the marine environment has a negative influence on the development of coastal tourism, fishing and marine aquaculture and as a result the revenues from them decline. Social inequalities between the smaller settlements and the blue economy centres - the cities of Constanta and Varna, are deepening.

Finally, the Blue Economy Scenario tolerates the two urban centers in the project area (Constanta and Varna) concentrating all substantial blue economy sectors including sea related science, research, innovations and technologies. Progress in both locations is guaranteed, but but at the expense of suppressed development of smaller municipalities and realistic ecological hazards.

Scenario B: Social balance in the whole project space

Maritime spatial planning (MSP) aims to achieve sustainable development (SD) by balancing a range of economic, social and environmental goals in decision-making over use of marine space. The EU Maritime Spatial Planning Directive (2014/89/EU) can be seen as a serious recent attempt to achieve SD across European seas by harmonizing environmental protection with economic development opportunities. Commonly MSP policymaking explicitly incorporates environmental (protection) and economic (Blue Growth) components and goals, but very rarely social aspects are addressed. Usually it is assumed, that social benefits will come by realizing a balance between economic growth and environmental protection without paying explicit attention to the social pillar of sustainable development.

To compensate the mentioned gap, a social scenario is developed where the starting point is the human being. That is why it is built on the social cohesion policy principles. Its' essence is expressed in:

- A balanced development of all Black Sea municipalities along the shore from Constanta to Varna;
- Diversified local economies ensuring employment not only during the active tourist season but all year-round;
- Setting up of new businesses with high value added that generate high incomes;
- Striving for social cohesion and full democracy in decision making among stakeholders.

Priority support is targeted to maritime activities which provide high employment and attractive incomes - tourism and recreation (together with all accompanying activities such as yacht clubs and water sports), fisheries and aquaculture, passenger transport (including boat tours). The tourism offer in specific market niches with personalised services is increasing at the expense of limitation of the mass 'all inclusive' product and is gradually shifting from 'mass', quantitative tourism into sustainable, nature sparing and efficient tourism. Apart from the urban centres Constanta and Varna, all the remaining MARSPLAN II municipalities are developing networks for cooperation, education and capacity building for SMEs.

The revival of agrarian activities is stimulated, such as growing of fruits and vegetables in the hinterland areas of the sea coast, which improves the interaction between coastal zones and rural regions and supplies organic food to local residents and tourists. Maintenance of high-quality infrastructure along the entire coast is ensured, including roads, water supply and sewerage networks, power supply, broadband Internet access, coverage by mobile operators and equal access to quality social services for local communities.

The social scenario corresponds to the core of the EU cohesion policy - reduction of inequalities. Despite the significant progress made in the improvement of living standards over the last decade, the economic growth achieved was not significant enough to contribute to

reducing social inequalities. Though experiencing a very significant decrease in the risk of poverty and social exclusion over the last decade³³, the relative shares in both countries are still among the highest in the EU. The risk of acute deficits in the reserves accumulated is great. Not everybody is directly or indirectly employed in the tourism sector. The differences in incomes continue to increase because the measures for reducing poverty and inequalities are not backed by sufficient resources and therefore have a limited impact. The imbalances in development of both the community of MARSPLAN II municipalities, and between the coastal and the interior parts of those municipalities, are deepening. The continuing pandemic restrictions worsen the situation.

Driving forces of Scenario B

Driving forces of political and philosophic nature:

- The EU and relevant regional policies of both countries, aimed at reducing the inequalities and balanced development at all territorial levels;
- Both national economic policies which stimulate entrepreneurship, SMEs, research and innovations. Tourism, fisheries and aquaculture are directly concerned;
- Both National Recovery and Resilience Plans contain among others, the plans contain social inclusion measures.
- Both national policies for development of water supply and sewerage sectors will have a positive impact on those systems in all settlements and urbanised territories along the entire MARSPLAN II coast thus avoiding water pollution and pressures on marine ecosystems;
- Relevant national policies for development of transport infrastructure will improve the accessibility, connectivity and communications along the MARSPLAN II coast and will increase traffic safety;
- The hypothetic change in the main criterion of progressive development from the current aim at rapid economic growth (a purely quantitative approach) to a slower growth for the sake of better quality of life (qualitative approach) in a cleaner environment, with more time off and shorter working hours, coupled with a better culture of consumption.

Driving forces of economic nature:

- Due to the even spatial distribution of state support, entrepreneurship will develop, although at slower rates, along the entire MARSPLAN II coast, ensuring broad employment, high economic activity and, as a result, reduced imbalances in incomes and improved wellbeing of all local communities;
- The small ports (such as those Balchik, Kavarna, Mangalia, Costinesti and Eforie) will have greater opportunities for renovation and development via financial instruments, appropriate for this purpose;
- Due to the upward development and the broadening time span of tourism along the entire coast, as well as to the expected relative levelling of incomes of local

 $^{^{33}\} https://www.europeandatajournalism.eu/eng/News/Data-news/The-risk-of-poverty-in-Romania-and-Bulgaria-is-falling$

communities, the demand for consumer goods will grow in terms of both quantity and quality. Power consumption will increase, not on account of renewable sources in the region, but rather of selected priorities in the ecosystem services of the sea;

- Support for fisheries and aquaculture within the framework of the relevant EU operative programmes will contribute to the development of fish processing industry both for the local market and for export;
- The cultural, rural, eco- and other forms of alternative tourism will enrich the range of the tourist offer along the subject coast, while covering a broadening time span. In parallel, services in the higher price ranges are developed, leading to gradual shift to more affluent groups in the emitting foreign markets.

Technological driving forces:

- Improvement of education quality (in the whole range from primary schools to regional universities in Constanta and Varna) is a basis for building of competencies and skills in younger generations, a prerequisite for development of innovative entrepreneurship along the entire coast space of the project;
- The new EU programmes will ensure support and investments in technological upgrading of SMEs. Innovative solutions tailored to the specific needs of project municipalities will be supported;
- Technologies such as digital marketing and remote payments become increasingly relevant. This is a way to overcome the 'centre-periphery' problem.

Social and demographic driving forces:

- Due to the overall socio-economic policies of both member states, the demographic indicators are stabilising and gradually showing improvement increased life expectancy, reduced mortality, rising birth rates, diminishing migration;
- The negative mechanical population change is gradually subsiding and tending to become positive. This hypothesis is supported by the expected higher attractiveness of the sea coast in view of the renovated and completed infrastructure, developed and ecological living environment, availability of services and year-round employment in different sectors;
- The risks of marked social segregation have been reduced, unlike the polarisation, which will result from the economic scenario;
- Owing to the support for a broad range of SMEs, traditional industries and crafts will be reintroduced, family ties among generations will be improved, the identities of local communities will be better defined and strengthened.

Environmental and natural conditions:

- The natural resources of the sea and of the coast will be utilised within the limits of sustainable reproduction. Relevant norms (such as fishing yield quotas, maximum anthropogenic load on beach strips) will be imposed and complied with for that purpose;
- High pollution risks will be avoided due to more even spatial distribution of human activities of all kinds and the lack of zones of extreme concentration as those in the economic scenario;

- The currently applicable environmental standards of coastal tourism and recreation will be preserved and supplemented by stricter requirements in regard to quality and security of environment;
- Preventive measures in regard to coastal landslides, abrasion and erosion are strengthened, investments in prevention of natural disasters are increased;
- Urbanisation of the coastal strip is limited to the unavoidable minimum.

The vision for the social scenario B is illustrated in the Map 2 below:



Map 2: Scenario B: Social balance in the whole project space, Figure 72

Likely environmental impacts of Scenario B (if implemented)

Maritime transport - sustainable economic development slows down the expansion of maritime transport, which reduces pressures from biological invasions, underwater noise and pollution. Biological invasions affect both the water column and the sea floor, but there is a trend towards decline in the numbers and concentrations of new species in the long term. Coastal navigation is also a factor of pressure via underwater noise and changes in the distribution of fish and marine mammals.

Coastal and maritime tourism – more even spatial development of coastal and maritime tourism will utilise existing tourist infrastructure and diminish anthropogenic pressure on the sea. Expansion of large resorts will stop and their capacity will be not fully utilized. The tourist season will be prolonged from 3 to 6-7 months.

Commercial fishing - environmentally friendly methods and practices and small-scale fishing are encouraged, and are spatially limited to the coastal area and permitted outside the spawning season (spring and autumn). This helps replenish fish stocks in broader maritime spaces.

Marine aquaculture - the optimal positioning of installations and tracking of the permissible load on environment prevent the pollution of marine environment as a result of the high density of cultivation. This has a positive influence on development of the sector.

Coastal protection - the construction of facilities on the seabed leads to increased pressures on habitats at a depth of up to 7 m. The protection from abrasion, landslides and floods is ensured.

Marine energy - both traditional (oil and gas) and non-traditional (utilising wind and solar energy) sources are developed. The more conservative economic development does not allow investments into riskier cutting-edge technologies, which slows down the development of prospecting for extraction of energy from gas hydrates and hydrogen sulphide.

Scientific research - the Black Sea strategic research and innovation agenda pools together the research efforts of the countries of the Black Sea region and supports development in the priority sectors of fisheries and aquaculture. New and remote methods for monitoring of marine organisms are used. The creation of a network of connected marine protected territories increases the synergy between the conservation of the marine environment and of archaeological sites on the sea bed. The timely introduction of new energy sources is prevented by a research funding shortage.

Land-sea interactions – the even spatial distribution of human activities along the whole project coastline prevents urban expansion of the centres (Constanta and Varna) and anthropogenic overload on the sea. Construction, enlargement and modernisation of waste water treatment plants help reduce pollution from settlements and industry. Deep-water discharge is not necessary and avoided due to the sufficient degree of purification of waste waters and overall lower intensity of summer tourism. Organic farming development in the hinterland contributes to a reduced anthropogenic eutrophication and pollution of coastal waters with pesticides.

Sea-land interactions – the achievement and maintaining a good status of marine environment is favourable for development of coastal and maritime tourism, fisheries and aquaculture. This contributes to development of local economies and respectively has a favourable impact on employment and quality of life of local communities. Preventive measures including relevant investment projects are undertaken to avoid or diminish the aggressive impact of the sea on the shore like wave/storm abrasion.

Scenario C: Ecology and biodiversity – ecosystem services

Ecosystem service modeling should begin by quantifying the risks of human activities to the structure and function of natural habitats³⁴, followed by modeling the benefits provided by natural habitats for local communities' well-being through ecological production functions. By combining multiple ecosystem services in different spatial scenarios that compare alternative management options, it is possible to highlight how proposed marine spatial plans create synergies and trade-offs among activities in maritime space.

The focus of Scenario C is on maintaining a clean environment and a resilient/sustainable marine ecosystem. This is the basic pre-condition for sustainable development and for the

³⁴ Done in chapter 1.2.1.

wellbeing of local communities. The conservation of the unique and fragile ecosystem of the Black Sea becomes a priority and a constraint in the development of all marine uses. Adequate attention and resources are directed for accomplishing the global goal for reducing greenhouse gas emissions in the context of goal 13 'Take urgent action to combat climate change and its impacts" and goal 14 'Conserve and sustainably use the oceans, seas and marine resources' of the UN Sustainable Development Strategy and the 'green deal'. The goals' horizon of the 'green deal' is 2050, still the measures should start immediately.

Many EU countries have considerable achievements in decarbonization, but Bulgaria and Romania are lagging behind. In parallel, both countries play an important role in the EU policies for the Black Sea basin being otherwise dominated by countries not fully sharing the EU objectives. Being in this delicate situation, both neighbours can rely on solid support behind. The Recovery and Resilience Plan of te EU is a fact. Being bound to the long-term EU budget, the plan contains the largest package of incentives ever financed. About 30% of envisaged budget is the share targeted to climate change mitigation. Leading the pollution rankings, the Black Sea is among the most severely affected. Through the Just Transition Mechanism (2021-2027), it can rely on substantial financial help.

Further, the availability of many NATURA 2000 zones favours an appropriate environment and potentials to achieve the EU biodiversity conservation objectives. Linking all NATURA 2000 zones in the MARSPLAN II project space into a "blue biodiversity corridor" would be a feasible start in future building of a Black Sea Basin ecological network. The presented context indicates the environmental scenario as appropriate for the subject water and shore area.

The maritime policy under this scenario would support mainly activities that guarantee safe and clean maritime transport, sustainable fisheries and aquaculture, efficient and sustainable tourism. In order to ensure the integrity, viability and biodiversity of the marine ecosystem, new protected zones may be established in the maritime space, outside the boundaries of the territorial waters. This would also contribute to the fulfilment on international agreements on biodiversity protection.

Driving forces of Scenario C

Driving forces of a political nature of this scenario would be:

- Achieving awareness and motivation of local communities and the business (through a reasonable communication strategy). "A step backwords" in fact is a step forward. And this is the first most difficult step and the greatest challenge of the Scenario C.
- Achievement of a durable good environmental status in the Black Sea by adopting strict environmental requirements and a respective programme of measures, binding on all economic sectors, a common policy and shared responsibility of the Black Sea countries;
- The updated maritime strategies of both countries, that are setting up frameworks for ecological policies;
- The relevant aspects in the Black Sea Strategic Research and Innovation Agenda;
- Utilisation of renewable energy sources (mostly the wind energy) is one of the key priorities;
- The extraction of minerals is eliminated;

• The sectoral policies of both countries on tourism have launched the concept of 4 seasons and of 'slow tourism', implying a diversification of the offer and more sparing exploitation of resources by forms of cultural and eco-tourism.

Economic factors and driving forces:

- Entrepreneurship in the area of the Black Sea coast is concentrated in both big centres Constanta and Varna where clusters based on smart technologies in maritime industries develop on a priority basis;
- The livelihood in smaller settlements is provided maily by ecotourism and small scale organic farming compensated by higher prices. An opportunity exists to restore small fishing crafts and their linking to tourism;
- In view of the strict environmental standards, cargo transportation is phased out of the small ports and becomes concentrated only in the ports of Constanca and Varna. Thus the efficiency of investments into environmental protection measures also increases;
- The clean environment, adequate infrastructure, beaches holding Blue Flag certification and natural heritage preserved enable the creation of high quality and attractive opportunities for recreation of tourists who value nature and intangible values. This is an opportunity for valorisation and, at the same time, for protection of cultural assets along the coast and in the adjacent maritime space. This is the way to sustainable development of a tourist destination;
- The good environmental condition of the sea ensures sufficient fish stocks and the opportunity for stable catch within the limits of the maximum sustainable yield;
- The preserved sea ecosystem creates a long-term and economically justified environment for significant investments into 'green' technologies, such as maritime transport and energy.

Technological (neutral) driving forces are of particular importance for achieving scenario C:

- Research and innovations are oriented primarily at environmentally friendly technologies. Higher environmental requirements and goals have been set for the other sectors and are at the core of development in accordance with this scenario;
- The rerional cooperation of bothh countries is towards increasing of wind energy productionand smart integration of renewable energy sources that leads to reduction of greenhouse gas emissions at lowest possible costs;
- Bulgaria and Romania are an integral part of the European energy market, which is fully integrated, digiitaluized and respecting technological neutrality;
- Digital technologies are entering in more and more sectors, becoming a decisive factor for achieving the objectives of sustainability, tackling climate change and environmental protection;
- Transition to sustainable and intelligent mobility is being accelerated road, rail, air and water transport reduce emissions with up to 90%. Public transport bikes and other motorless alternatives start to prevail for the sake of traditional private cars.

Social and demographic driving forces:

- Owing to the good environmental status achieved, the coast becomes attractive not only for recreation, but also for settlement of people who value natural factors in their standard of living. This becomes yet another reason for the positive mechanical population growth in the settlements along the coast;
- At the same time, the increased expenditure for environmental protection at the expense of the real economy generate social tensions among the supporters of this scenario and its opponents;
- The tolerance by local communities of foreign cultures and values, as well as of tourists in general, increases together with the change of their profile from one of tourists who are consumers to a new one of tourists who appreciate natural and cultural heritage.

Environmental and natural conditions:

- Good environmental status is achieved in the marine environment. The values of the status indicators are maintained within the range characterising the good status.
- The conservation status of natural resources and biodiversity is good. Biodiversity increases in certain habitats and among certain communities of species;
- Owing to the domestic measures and the international cooperation in the Black Sea basin, the possible negative consequences of climate change for the sea coast are reduced or prevented.

Likely environmental impacts of Scenario C (if implemented)

Maritime transport - a register of *underwater noise* is created in a close partnership, which enables monitoring and control of noise levels and supports the accomplishing of the goals and measures envisaged in the Maritime Strategy. Pressure on noise-sensitive fish and marine mammals is reduced. Their numbers increase in the vicinity of the big ports and not just in the remote areas. Improved control over *ballast waters* of ships reduces biological invasions. The use of remote methods leads to putting an end to the illegal dumping of pollutants and waste from ships into maritime spaces. Further, promotion of *ships with low and neutral carbon emissions* and freight transport in accordance with international standards for safety and the principles of circular economy for achieving sustainable and green shipbuilding, repair and modernization. Freight transport is gradually removed from small ports and concentrates in Constanta and Varna. The transparency of sea waters in the aquatic areas of ports visibly improves and the water blooming of the Noctuluca scintillans species, as an indicator of eutrophication, is reduced. The red algae of the species phyllophora return.

The vision for the ecological scenario C is illustrated in the Map 3 below:

Commercial fishing - fishing is performed outside protected zones using *selective fishing devices* which are environmentally friendly. The pressures on the pelagic and seabed habitats in the shelf in the areas of Constanta and Varna decline, which contributes to their recovery. The catch of fish species does *not exceed the maximum sustainable yield* and is concentrated in the two commercial fishing centres – Constanta and Varna. In smaller settleements, local artisanal fishing is developed in combination with forms of sustainable tourism. A part of the seafood is produced by aquaculture, another part - by local fishermen. This provides a way to

make living in the smaller coastal settlements and corresponds to the vision of the social Scenario B as well.



Map 3: Scenario C: Ecology and biodiversity – ecosystem services, Figure 73

Marine aquaculture – several locations with favorable mainly southern exposure are developed along the Bulgarian part of the project coast, while the Romanian part doesn't offer suitablel conditions for the purpose. Opportunities are sought for development of deep-water aquaculture and synergy between aquaculture and wind farms. Multi-trophic aquaculture which combines cultivation of fish and non-fish species (mussels) is also developed, though with great caution to artificial fish breeding as it can easily change the local ecosystem.

Tourism - the anthropogenic load on the beach strips is reduced by determining the numbers of beds depending on the optimum beach area per person. This reduces revenues from mass tourism, but overall revenues grow due offering products in a higher price niche of the tourist market. Among other basic services, they include offering ecological and alternative tourism forms as well as conditions for development of activities outside the summer season. The pressures on sand dunes, beach vegetation and shallow-water habitats is reduced. Despite the reduced numbers of tourists and revenues in the short term, the attractiveness of the Constanta – Varna coast as a sustainable tourist resource is preserved, especially that of the Bulgarian part. New, innovative tourist products are developed and offered - like underwater archeological tourism whose added value is a motivation of tourists to preserve natural and cultural values.

Coastal protection - the introduction of more environmentally friendly coastal protection facilities of the type of underwater reef breakwaters, the remote coastal protection and the artificial supplementation by beach aggradations are encouraged. Thereby the natural landscape is preserved. The use of permeable installations reduces pressures on the seabed habitats. Opportunities are sought for using aggradations from dredging works in port zones in order to reduce the deficit of aggradations.

Port activities - the bulk of port activities is concentrated in the ports of Constanta and Varna. The higher environmental requirements help to prevent the ingoing of pollutants and oil spills into the sea aquatic areas (as a result of loading and unloading activities). Investments in intermodal terminals are made to encourage the use of public transport for the sake of personal cars. The smaller ports of Balchik, Mangalia and Eforie are used preferably for maritime tourism. The good status of the marine environment in ports enables the use of aggradations from dredging works for artificial supplementation of neighbouring beach sections, using the so-called bypass method.

Marine energy – visible reduction of carbon emissions from the energy system is decisive for this scenario. The search for and extraction of oil and gas from the shelf is stopped or at least highly restricted. Alternative sources of energy are looked for. Instead of the original purpose, the load-bearing structures of platforms for prospecting and extraction of gas and oil are used for mounting installations for power generation from wind at sea. In addition, they provide opportunities for synergy with marine aquacultures and their transfer, depending of location, to deep waters or in conditions of an open coast.

Scientific research - the Black Sea Strategic Research and Innovation Agenda (SRIA) pools together the research efforts of the countries of the Black Sea basin, whereby the synergy effect is increased. The more strict environmental requirements in shipbuilding open fields for new research. New, non-lethal and remote methods for monitoring of marine organisms are used. The creation of a network of connected marine protected territories enables a synergy between the conservation of the marine environment and the protection of archaeological sites on the sea floor. Pilot projects for development of promising renewable energy sources are implemented in maritime spaces, still with a great caution.

Land-sea interactions - the building and modernisation of waste water treatment plants (WWTP) contributes to reduced pollution originating from settlements and industry. Deepwater discharge is not necessary in view of the sufficient degree of purification of waste waters. The development of organic farming in the adjacent coastal territory reduces anthropogenic eutrophication and pollution of coastal waters with pesticides. Obstacles are removed from waterways and continuity of water flows, migration of bridging and fresh-water species of fish and inflow of aggradations of terrigenous origin to beaches are ensured. As a whole, pollution is drastically reduced and processes of noticeable natural regeneration are observed.

Sea-land interactions - the good status in the marine environment leads to growth in revenues from sea fishing and aquaculture. The restoration of marine ecosystem services contributes to the development of coastal and maritime tourism. The sea birds are returning to the sea some of the phosphorus washed away into the sea by water and wind erosion. The biological productivity of land ecosystems and wetlands, which are natural storages of atmospheric carbon, is increasing.

Scenario D: "One for all"³⁵ - integrated interests for the Black Sea use and preservation

By integrating all positive features of the previous 3 "sectoral" scenarios, we come up to the unity of a sustainable development structure, having less trade-offs and vulnerable aspects.

³⁵ The Black sea is just one and should serve all the communities in its' basin

Another specific aspect is trans-boundary and basin-wide cooperation in use and preservation of the Black Sea.

This is Scenario D. It has three different scopes of development: 1) balancing of the three aspects of sustainable development (economic, environmental and social) in the national maritime spaces; 2) integrated maritime policy for sustainable development of the Black Sea region, involving the six states bordering on the Black Sea - Bulgaria, Romania, Ukraine, Russia, Georgia and Turkey; and 3) combining maritime spatial planning with the integrated coastal zone management.

This scenario integrates the best ideas from the economic, environmental and social scenarios. The economic aspects are developed on the basis of enhanced competitiveness and value added, modern technologies applied and innovations in all marine sectors. The greatest development potential is observed in port activities and maritime transport provided that ports are renovated and modern port equipment is installed to enhance the efficiency and quality of the handling of passengers and freight. Fisheries cannot develop beyond the framework of the available fish stocks and the quotas established at international level but could be supported through timely modernisation of the fishing fleet, improvement of fishing techniques and more strict control over these activities. All this will preserve the good environmental status of the marine spaces thus providing the vital conditions for protection of species and their reproduction.

Tourism optimises its parameters with regard to the existing infrastructure and ceises its pressure on urbanization of new shore spaces while enriching its product range and improving quality. Alternative forms of tourism, "garnished" with innovative recreational and sports activities in maritime spaces are widely developed. Offering of high-end tourist services is an aspect of this scenario too. This is a way to generate more revenue at a lesser environmental footprint. The extraction of lye and medicinal mud is among supported ecosystem services as production of cosmetic and medicinal products will draw interest to the accompanying therapeutical and cosmetic procedures offered in SPA tourism.

Sea-related biotechnologies will be developed and a better and more efficient links between businesses, research and education will be sought. The searching for oil and gas will continue under more strict control and environmental standards. Development of innovative technologies³⁶ for renewable sources energy production will be supported and funded from the new Recovery and Resiliance plans of Bulgaria and Romania, but being in an experimental phase, caution and strict control should prevail. Production of sea salt by traditional technologies will continue in the well established sustainablel mode.

Research activities in underwater maritime spaces will be intensified to reveal more fully the cultural layers of this specific heritage and where possible and reasonable, exhibit its artefacts in an attractive, informative and safe way. Military and naval exercises will increase their importance for the training of personnel in the field of maritime research and rescue operations.

Similar to the ecological scenario, the conservation and restoration of marine environment's good status as well as protection of biodiversity are among the priorities. They are not just objectives of the "one for all" scenario, but inevitable necessity for successful development of

³⁶ Like extracting energy from hydrogen sulphide and extraction дo gas hydrates from the seafloor

all marine/blue economy sectors. The efforts to reduce anthropogenic pressure³⁷ on the vulnerable marine environment should be considerably increased and relevant investments provided for.

The "one for all" scenario envisages the prerequisites needed for reduction of disparities and negative demographic processes, for equal treatment and support to local communities. Motivation for active and responsible involvement of all interested parties is the main prerequisite for the feasibility of this scenario.

Driving forces of Scenario D

Driving forces of a political nature of this scenario would be:

- The EU Recovery and Resilience Plan desaggregated to the relevant national plans of Bulgaria and Romania. Among priorities to receive substantial funding are: research and innovation, fair climate and digital transitions³⁸, fighting climate change³⁹, biodiversity protection;
- The EU policies of Blue Growth and European Maritime Transport Space without Barriers, which are applicable, in parallel with the national policies for smart development of activities related to the sea.
- The Three Seas Initiative for cooperation and integration of the countries of the regions of the Baltic, Adriatic and Black seas and establishment of greater connections among them in the spheres of energy, transport, communications, information technologies, and business;
- The national economic policies that stimulate entrepreneurship, SMEs, research and innovations in the sectors of the blue economy;
- The tourist policies of both countries directed to higher quality sustainable tourism in 4 seasons, implying a diversification of the offer and more sparing exploitation of coast and maritime resources;
- The transport policies of both countries supporting intermodality, connectivity, accessibility and mobility along the entire Black Sea coast.

Economic factors and driving forces:

- Concentration of businesses mainly in both urban centres (Constanta and Varna) and in the big resorts. Maritime clusters, which are oriented at strategic networks, will be formed and will include export-oriented companies, suppliers of raw materials, tourism structures, research centres and smart services providers;
- In smaller settlements, opportunities will be sought for small businesses support and cooperation, for overcoming development imbalances and uneven access to high quality services;
- The good environmental status in the marine environment will provide sufficient fish stocks and stable fishing opportunities within the maximum permissible limits. Further,

³⁷ From waste water, ballast water, underwater noise, invasive species, pollution from industrial accidents, deposition of dredged material, illegal, unreported and unregulated fishing

³⁸ Via the Just Transition Fund and the Digital Europe Programme

³⁹ With 30% of the EU funds, the highest share ever of the European budget

the sea aquaculture sector will experience supported development. Any additional state aid and support from EU funds will contribute to the development of the processing industry as well;

- The preserved sea ecosystem creates a long-term and economically justified environment for significant investments into 'green' technologies, such as maritime transport and energy;
- The enrichment of the range of the tourist product by appropriate alternatives, naturefriendly forms and forms utilising more fully local resources, would attract a new type of tourists of a different mindset and adequate behaviour;
- Information and communication technologies mark clear progress in their mobile capabilities. The competitiveness and development of nearly all sectors of the marine economy (from fishing to maritime traffic management) would depend on the supply of electronic services, on direct access to precise, current and exhaustive information, on the supply of innovative solutions.

Technological driving forces:

- Research and innovations are oriented primarily at environmentally friendly technologies. In tourism, eco-innovations are developed and utilised. The the importance and supply of ecotourism and cultural tourism products are increasing. Alternative forms of transportation which do not pollute the environment are beginning to predominate;
- The technological modernisation of ports, fishing vessels, aquaculture installations and facilities, of research activities and studies of the sea, will open up new niches and new types of workplaces and reduce the negative consequences of the activities in marine spaces;
- The support for education⁴⁰ is a basis for building of competencies and skills in younger generations, a prerequisite for development of innovative entrepreneurship along the entire coast. The increasing of culture in using of the sea is an important aspect and need too.

Social driving forces:

- In the context of negative demographic projections for both, Bulgaria and Romania, the project area urban centres Varna and Constanta succeed to retain their population by ensuring sufficient employment opportunities in diversified local economies including various blue economy's sectors;
- Due to the good environmental status achieved, the coast becomes attractive not only for recreation, but also for arranging living environment with high value natural factors. This would help to reduce the imbalances in spatial distribution of the population.
- Due to the overall socio-economic policy of both states, the demographic indicators are stabilising and are gradually showing improvement life expectancy and birth rates increase, infant and child mortality decrease;

⁴⁰ Across the entire range from elementary and primary schools to regional universities

• Traditional industries and crafts will be supported and where possible, reintroduced. Family ties among generations will be improved, the identities of local communities will be better defined and strengthened.

Environmental and natural conditions:

- A good status in the marine environment is achieved and maintained, as well as high biodiversity and good conservation status of the endangered species and their habitats. Pollutants are still present but in concentrations which do not cause harm to marine ecosystems;
- Owing to the domestic measures and the international cooperation in the Black Sea basin, the possible consequences of climate change for the sea coast are reduced or prevented and adequate adaptation measures are introduced;
- The natural resources, both, of the sea and of the coast, will be utilised within the limits of sustainable reproduction and in compliance with current environmental standards. Norms with regard to fish catch and to maximum anthropogenic load on the shore will be imposed;
- Preventive measures in regard to coastal landslides, abrasion and erosion are strengthened. Investments into prevention of natural disasters and removal of damage from anthropogenic activity are provided for and substantially increased over time.

Finally, the core idea of this scenario is to coordinate all sectoral policies of maritime industries in order to achieve sustainable use of the Black Sea and its ecosystem services in the name of the sustainable development of local communities. The big challenge is to achieve this coordination not only at national level, but at regional level - the level of the Black Sea basin countries. In view of the spatial limitations of the prerogatives of the MARSPLAN II project and the lack of interstate agreements in the context of the development desired, this scenario would apply only to the project maritime space, i.e. the sectors between Constanta and Varna, relying on following all guidelines of the Integrated Maritime Policy of the EU.

The vision for the integrated scenario D is visualized in the Map 4 below.

Likely environmental impacts Scenario D (if implemented)

Maritime transport - the ship routes do not cross the established network of protected territories. This reduces the impact of underwater noise and the risk of direct impact on fragile ecosystems. Usage of less noisy turbo-electric engines, both, in new ships or retrofitting old ones is a potential solution for reducing underwater noise. In the longer term, opportunities exist for synergy between ship building, the navy and environmental protection in the form of research and applied projects for the development of even more modern engines. As the energy capacity of batteries increases, fully electric engines will become applicable. This would contribute to the revitalisation of the 'shipbuilding and ship repair' sector and to achievement of a good environmental status of the marine environment.



Map 4: Scenario D: "One for all" - integrated interests for the Black Sea use and preservation, Figure 74

Commercial fishing - pressures exist not only in the area of Constanta and Varna, but also inbetween. Permits are issued only in instances of proven use of environmentally friendly fishing methods and practices, while small-scale fishing is spatially limited to the coastal area and outside the spawning season - spring and autumn, depending on the species. A part of the market demand is met by high-tech marine aquaculture and biotechnologies. The recovery of fish stocks contributes to the restoration of marine birds and mammals populations too.

Marine aquacultures - traditional mussel farms and multi-trophic aquaculture⁴¹ are widely developed in coastal waters (mainly the Bulgarian section), in the territorial sea and in the exclusive economic zone. This reduces the dependence on natural fish stocks and contributes to their normal reproduction. The market demand for commercially exploited fish species⁴² and the strict control over fish stocks necessitate transfer of a part of the activity onshore in the form of farms for artificial breeding of deficite fish species. This would both, create jobs and support development of research in the Fisheries and Aquaculture sector.

Coastal protection – reducing of abrasion is achieved by special schemes of coastal protection in vulnerable zones. Thus, stabilization of beach strips is achieved. The knowledge of the biogeochemical turnover in the coastal area and its application in coastal protection reduces the deficit of deposites. The use of permeable reef breakwaters which support highly productive reef-builders (mussels and other shellfish), contributes to beach formation. The clean port aquatic areas are a source of beach sediments which are reused for reducing the deficit of sand

⁴¹ It combines cultivation of fish and non-fish species (shellfish, marine algae)

⁴² Both, demersal (such as turbot) and pelagic

at rocky beaches and underwater coastal slopes, where the firm coastal protection installations are not appropriate in view of the existence of natural rock reefs.

Coastal and maritime tourism – similar to the ecological and social scenarios, even spatial development of sustainable tourism along the whole shore is supported. This would mean development of small-scale locations outside big resorts for "industrial" tourism while carefully preserving locations that have not been affected yet by tourist expansion. In some sections the natural sand dunes have been irreparably destroyed due to economic interests. This impairs the environmental conditions and the natural attractiveness of the shore in ecological tourism areas.

Marine energy - the development of new technologies for power generation from wind is supported. Research on energy production from gas hydrates and hydrogen sulphide is encouraged too, though beang still far from mass practical application and needing caution and strict control. Oil and gas deposits are investigated, but they are viewed as a strategic reserve rather than a resource for current use. On one hand this would lead to reducing of pressures from prospecting and extraction of oil and gas and on the other - to limiting the carbon footprint and to mitigating the impact on climate change.

Scientific research - the Black Sea Strategic Research and Innovation Agenda⁴³ pools together the research efforts of the countries of the Black Sea region, whereby the synergy effect of their implementation is increased. New and more environmentally friendly vessels are produced in shipbuilding as a result of the cooperation among research institutes and businesses. New, non-lethal and remote methods for monitoring of marine organisms are used. The creation of a network of connected marine protected territories enables a synergy between the conservation of the marine environment and the protection of archaeological sites on the sea floor.

Land-sea interactions - the building and modernisation of waste water treatment plants contributes to reduced pollution by settlements and industry. Deep-water discharge is not necessary in view of the sufficient degree of purification of waste waters. The development of organic farming in the adjacent coastal territory reduces anthropogenic eutrophication and pollution of coastal waters with pesticides. Obstacles are removed from waterways and continuity of water flows, migration of bridging and fresh-water species of fish and inflow of deposits of terrigenous origin to beaches are ensured. As a whole, pollution is considerably reduced and processes of natural regeneration are observed.

Sea-land interactions - the good status of the marine environment leads to growth in revenues from tourism, sea fishing and aquaculture. The birds feeding on marine fish are returning to the sea. Some of the phosphorus is being washed away into the sea by water and wind erosion. The biological productivity of land ecosystems and wetlands, which are natural storages of atmospheric carbon, is increasing.

⁴³ Sopporting: Sustainable fisheries and high-tech aquaculture; innovative tourism offers and services; lowemission, carbon-neutral ships and freight operation; innovative marine litter management; basin-scale programmes for the conservation and valorisation of marine cultural heritage; incubators and techno parks for promoting SMEs, start-ups and innovative businesses for blue economy

At this point, the motivated set of scenarios is "served" and the selection of an optimal is forthcoming, based on both - wide involvement of stakeholders and objective instruments/indicators.

4. Optimum spatial scenario selection for the identification of the main measures for the Maritime Spatial Planning

General Part

The process of selection of scenarios is the concluding part of the forecasting phase of MARSPLAN-BS II. In its course a comparative evaluation is performed of the scenarios developed from the point of view of optimum accomplishment of the goals and development priorities set for the maritime space.

The evaluation of optimality is based on the possibility for the scenarios to meet simultaneously and to the highest extent all mandatory conditions defined in the statutory and strategy documents concerning development in the maritime spaces.

The selection of scenarios is a key part of the logical chain of activities in the process of implementation of MARSPLAN-BS II.

The development of an appropriate conceptual GIS model for the national maritime spatial plans, the preparation of a joint strategy for the cross-border maritime region of Bulgaria and Romania, the introduction of a process monitoring and evaluation framework, etc. are directly related activities which follow the selection of scenarios under MARSPLAN-BS II.

Based on the specific features of the task the appropriate work method is selected. The choice of optimal scenario is based on a combination of the methods of multi-criteria analysis and expert evaluation. The many criteria are individually evaluated by experts participating in MARSPLAN-BS II. The expert evaluation is based on a "mechanism for synthesising information from a range of sources, drawing on a range of viewpoints, in order to arrive at overall conclusions"⁴⁴. In the case at hand the various viewpoints are presented by experts from the different areas, who are taking part in the implementation of MARSPLAN-BS II.

According to the "*Evalsed_sourcebook: Methods and techniques*"⁴⁵ the quality of the outcomes reached depends on the level of expertise of the participating specialists and on their balanced and impartial responses to the evaluation questions. A possible risk for arriving at the most credible evaluation is the relatively new approach of maritime spatial planning (MSP) in both states and the lack of traditions and a greater number of proven specialists in this field. Its potential negative effect is to some degree offset by the participation in MARSPLAN-BS II of proven specialists in science, in marine studies, spatial planning and, last but not least, of participants in MARSPLAN-BS.

⁴⁴ Evalsed_sourcebook: Methods and techniques

https://ec.europa.eu/regional_policy/sources/docgener/evaluation/guide/evaluation_sourcebook.pdf ⁴⁵ Evalsed_sourcebook: Methods and techniques

https://ec.europa.eu/regional_policy/sources/docgener/evaluation/guide/evaluation_sourcebook.pdf

The criteria for choosing an optimum scenario are aligned with the development priorities and goals for the maritime space and the methods of their accomplishment. Given that MARSPLAN-BS II is a cross-border project between two EU Member States — Bulgaria and Romania, the guiding documents for defining maritime policies are at EU level — the Maritime Spatial Planning Directive⁴⁶.

With the aim to perform a more realistic and sufficiently exhaustive evaluation, the scenarios are rated using four thematic groups of criteria: outcomes expected, individual maritime uses, likelihood of realisation and spatial impact.

The groups of criteria are complementing each other to form an evaluation package, which is complete in aggregate. The four packages create the prerequisites for a targeted and at the same time sufficiently comprehensive evaluation.

The evaluation is performed using a point system consisting of 7 values — from -3 to +3:

Strong positive impact	+3
Moderate positive impact	+2
Mild positive impact	+1
Neutral impact	0
Mild negative impact	-1
Moderate negative impact	-2
Strong negative impact	-3

Thus a possibility is created for clear evaluation of the scenarios as having a "positive" and a "negative" impact, according to the evaluation criterion. Most options for selection of grade using the point system are also suitable for keeping track of the balanced impact of the scenarios. In order to present the degree of balancing of the individual scenarios the results of the evaluations are visualised also in graphic form.

Subject of evaluation are the four scenarios defined in the process of work on MARSPLAN-BS II:

Scenario A – Blue economic growth

Scenario B – Social balance

Scenario C – Ecology and biodiversity

Scenario D – "One for all" - integrated interests for the Black Sea use and preservation The results of the evaluation for each package of criteria are presented in two ways — in tabular form and in graphic form. The presentation of the results in a table and the clarification to the individual issues provide an opportunity for a better visualisation — the viewing area of the reader simultaneously covers the evaluation question, the clarifications to it and the outcomes from each scenario. Such an approach facilitates the comprehensive perception of each step of the process and the possibility of comparison among the different scenarios by each individual criterion. The chart forms the basis for evaluation of the criteria in regard to their balanced nature — which is one of the main requirements of the maritime spatial planning framework.

⁴⁶DIRECTIVE 2014/89/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 July 2014 establishing a framework for maritime spatial planning <u>https://eur-lex.europa.eu/legal-</u> <u>content/EN/TXT/PDF/?uri=CELEX:32014L0089</u>

Outcomes Expected

The outcome expected from the selection process is identification of the scenario in which, by taking into account the economic, social and ecological aspects, by applying an ecosystembased approach and by promoting the co-existence of the respective activities and manners of use, optimum sustainable development would be achieved in the maritime sector. The evaluation criteria proposed provide an opportunity to evaluate the sustainability of the positive effect of each scenario over time, its flexibility and adequacy to changing conditions of varying nature.

i doite it his diddent of the outcomes enpected	Table 1.	Evaluation	of the	outcomes	expected
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Criteria	Α	B	С	D
Short-term outcomes (what do we stand to gain, to what extent it will help increase the competitiveness of the region as a place for living and doing business, how it will affect the environment and biodiversity)	2	1	0	1
Long-term outcomes (what do we stand to gain, to what extent it will help increase the competitiveness of the region as a place for living and doing business, how it will affect the environment and biodiversity)	-2	1	-1	2
What room does it leave for different options (scenarios in a future development period, in cases of different conditions and interests of society)	-2	1	-1	2
What opportunities does it provide for long-term adequacy to the rapidly expanding technological opportunities (taking into account not just the advent of new technologies, but also the opportunities for their use by the public and by the business community in the region under review)	1	1	0	2
What opportunities does it provide for long-term adequacy to the ambition for a better quality of life (taking into account not just the material well-being and the chances for access to high quality services, but also a clean and healthy living environment)	0	1	1	2
TOTAL	-1	5	-1	9

Source: Expert evaluation by experts from the team

The evaluation provides an overview of the possibility to achieve a better quality of life for the local population under the various scenarios. Predictably, the positioning of economic development or environmental protection as ends in themselves receive the lowest scores. The need for a balanced approach and joint action in the areas of economic, social and ecological development, the interdependence and impact of which are unavoidably and inextricably linked to the notions of sustainability and high living standards, pre-determined the high score of scenario D.





Source Table 1. Evaluation of the outcomes expected

Likelihood of Realisation

The likelihood of realisation of the scenarios is of key importance for their evaluation. This makes each of the criteria chosen decisive, i.e. even if only two or even just one of them would not be met by a certain scenario, the latter may be regarded as rejected in its current form. The likelihood of realisation of each scenario is directly related to the European guidelines for the integrated maritime policy. The optimum scenario in this case must encourage the coordinated and coherent decision making for the achievement of the development goals, including via international cooperation.

Table 2. Evaluation of the likelihood of realisation

Criteria	Α	B	C	D
Compatibility with the statutory framework (the scenario would be impossible without it; the fact is also taken into account that the statutory framework may be changed and the possible directions of change are also taken into account)	2	2	2	3
Compatibility with the vision of local communities for their future development (without the support from stakeholders, who are actually the people carrying out the activities in the scenario, progress would be impossible; in what degree it is desired by the majority of the public and in what degree that majority act in real life in accordance with the goals and methods of the scenario; would it be possible to garner sufficient public support for the initial steps of the implementation of the scenario and to continue to strengthen that support over time)	2	1	0	1

Criteria	A	B	C	D
Resources required for realisation (likelihood of easy access to funding and interest on the part of investors — ensuring compatibility with European policies and the goals of ESIF would significantly increase the financial resources available for investment into the realisation of the scenario; is an opportunity of financial profit which would attract a comparatively large number of investors expected)	1	0	0	2
Compatibility with European, national and regional strategic documents (it should meet the conditions and lead to accomplishment of the objectives — failing which it would lack support both on the part of society and from a statutory (to the extent domestic legislation is aligned with EU legislation) and financial perspective (ESIF); the possibility of changes in the statutory framework is taken into account and it is expected that its trends would largely remain the same)	-1	-1	-1	2
At what cost (what would need to be forgone in order to accomplish the goal of the scenario, including environmental pollution and the carbon footprint of the funding required, as well as loss of interest on the part of some investors, lack of opportunities for rapid growth, etc.)	-2	0	-1	1
Likelihood of being fully completed (a scenario that is not fully realised in fact becomes another scenario; is it possible that it would turn out to be "a tall order" for local communities and the authorities)	1	0	-1	2
TOTAL	3	2	-1	11

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Figure 76. Evaluation of the likelihood of realisation



Source Table 2. Evaluation of the likelihood of realisation

Scenario D has the highest "viability", while the options that are more outlying in one direction or another have relatively similar and significantly lower scores. Quite logically for a territory, which is characterised by low level of socio-economic development and a significant natural resource when compared to other similar territories in the EU, the accomplishment of the goals of the cohesion policy is related primarily to a strive for economic progress.

The answer is economic growth — sustainable and as rapid as possible, within the limits of what is permissible in view of the environmental and social goals. From a historic point of view the original accumulation of capital — financial, infrastructure, technological and expert — requires rapid growth at the expense of nature and of a significant part of society, but here this would not be necessary in view of the cohesion and development policy of the EU — an unique opportunity which we need to take advantage of.

In conclusion it could be stated that the accomplishment of the EU and national goals in a local context, supported by the financial resources accompanying them, would provide the opportunity for realisation of the most appropriate scenario from the point of view of the local communities.

Maritime Uses/Activities (Outcomes Expected For Each Individual Use)

The coordinated shared use of maritime spaces that provides an opportunity for development of the various maritime uses is at the basis of this point of view for evaluation. The scenarios are evaluated from the point of view of the opportunities for development of the individual activities. In the course of evaluation both the current development of the sector in the territory specified and the strategy adopted for its development in future are taken into account.

	MARITIME USES/ACTIVITIES	А	В	C	D
1	Navigation and ports	3	-1	-2	0
2	Military proving grounds and ports	0	-1	-2	0
3	Exploration and extraction of raw materials	3	-2	-3	1
4	Fisheries and aquaculture	-2	3	2	2
5	Tourism and recreation	-2	3	3	2
6	Scientific research	1	1	3	1
7	Nature protection	-3	2	3	1
8	Cultural heritage	-1	1	1	1
9	Technical infrastructure	2	-2	-3	1
10	Cross-border maritime zones	2	0	2	1
11	OVERALL SCORE	3	4	4	10

Table 3. Evaluation by maritime uses/activities

Source Expert evaluation by experts from the team





Source Table 3. Evaluation by maritime uses/activities

Logically the scenarios receive high scores for those activities that fall within the leading area of development for the individual scenario. Based on the same logic, their scores for activities which are traditionally in conflict with the leading area of the scenario are negative. The figure visualises clearly these wide divergences in the scores earned. Scenario D — the fourth one — clearly stands out not only in terms of its highest score, but also in terms of its balanced nature.

Spatial Impact of the Scenarios

This package of criteria is oriented at the spatial aspect of the scenarios. The criteria in themselves evaluate the scenarios in accordance with the goals and policies of MSP.

Criteria	Α	B	C	D
Development of maritime spaces	-1	2	1	3
Combining of different uses	1	1	0	2
Land-sea interactions	1	2	2	2
TOTAL	1	5	3	7

Table 4. Evaluation of the spatial impact of the scenarios

Source Expert evaluation by experts from the team

The process of accumulation of knowledge and of uncovering of the interlinkages between the activities in the maritime spaces and their ambient environment and among themselves is a complex one, and from a temporal point of view it is a process without a time limit. The need for in-depth knowledge requires cautious science-based approach and a large body of reliable information, technological and expert support. The knowledge and experience will minimise the chances for erroneous decisions and will ensure the optimum use of the maritime spaces. This is also true for the application of an ecosystem-based approach — which is indispensable for the MSP.



Figure 78-81. Schemes of the scenarios

Source MARSPLAN-BS II

All of this requires a lot of resources and most of all time. On the other hand, the ambition for economic growth and improvement of the material situation of the populations of both EU Member States, which need strong catch-up growth, requires swift and bold actions. All of this eliminates from the competition on that point scenarios A and C.



Figure 82. Evaluation of the spatial impact of the scenarios

Source Table 4. Evaluation of the spatial impact of the scenarios

The first one in view of the utilisation — which is excessive and runs ahead of the level of preparedness in terms of knowledge — of large areas of the maritime spaces, and the second one due to the other extreme — an insufficient ambition in the utilisation of maritime spaces. The balanced and, to a certain degree, similar uses of maritime areas under scenarios B and D have the greatest potential for realisation of the essence of the MSP — to accomplish, by analysis and organisation of human activities in the maritime areas, the ecological, economic and social development goals.

Outcomes of the Selection of Scenarios

In all three packages of criteria the winning scenario is D (Tables 1, 2, 3, 4). In the case of "Outcomes expected" — due to its focused nature and flexibility, in the case of "Likelihood of realisation" — due to its connection to actually achievable goals, enjoying broad public support, and in the case of "Maritime uses" — due to its approach of "limited, but not prohibited" and subject to specific conditions taking into account the context.

The lack of balance in providing favourable conditions for development of the various maritime uses in some of the scenarios is the result of preferences for certain uses from the outset and is not a result of the local context and the goals of MSP. This obviously leads to missing opportunities for optimum shared use of maritime spaces and significantly reduces the chance for accelerated sustainable and balanced development of the territory under review. Therefore, although they do have a number of strengths, the "specialised" scenarios are bound to fail.

The four selection categories award the highest score to scenario D — "One for all" — integrated interests for the Black Sea use and preservation. By combining ambitious targets in all development areas with a balanced approach and attention to each maritime activity, a high likelihood of realisation and a bold, but responsible attitude to harnessing the potential of maritime spaces, it is the logical and perhaps the only realistic choice.

It should be noted that the evaluation relates to the specific territory (based on the local context) and is not made in principle (the scenarios would have been evaluated quite differently for a territory that is more economically and socially developed).

Scenario D is a clear winner, but the preparation and review of the other three scenarios provides important information in case of a potential policy shift in future and as to how abrupt such a shift could be without "running off the rails".

Application of the decision rule criteria aiming good measures for msp

The criteria proposed for selection of appropriate measures for MSP are effective only in package, i.e. it would be appropriate to make a comprehensive evaluation only based on the whole package of criteria. The package of criteria is divided into two parts — general (standard and characteristic for nearly all evaluations) and specific (reflecting the specifics of the task).

General criteria (for preliminary evaluation and selection)

- impact (what is the change to which the intervention would certainly lead)
- adequacy (to what extent the change would match the objectives set in advance)
- effectiveness (to what extent the objectives set would be accomplished)
- efficiency (what is the cost of the accomplishments/how well the resources are utilised)
- sustainability (how sustainable is this change)

- coherence (how well does the intervention fit into the multitude of different development measures)

• Specific criteria (for preliminary evaluation and selection)

The specific criteria for selection of appropriate measures are a yardstick of the adequacy of a specific measure in regard to the general goals of the scenarios and to the specific goals of the scenario selected. The common characteristic features among the scenarios predetermine the strategic measures of the MSP — they are present in all development scenarios. The specifics of the optimum scenario pre-determine the specific measures of the MSP. The measures must correspond to the overall strategic goals of the scenarios plus the specific goals of the scenario selected. The thing in common is the strive for achievement of top results in the various areas, but if in the case of the first three scenarios they are expected in one of the three main spheres (social, economic, environmental), in the scenario selected a maximum outcome is sought in all three spheres at the same time — the conclusion being that it would be realised by a balance and interrelated measures based on the integrated approach.

- criteria for selection of appropriate measures, demonstrating the adequacy of a certain measure to the goals, common for all scenarios
- strive for achievement of top results
- taking into account of the land-sea interactions
- coordination with the integrated coast management
- ensure the involvement of stakeholders in the process of development, coordination and implementation of policies
- create pre-requisites for sustainable development
- criteria for selection of appropriate measures, demonstrating the adequacy of a certain measure to the specifics of the optimum scenario:
- balancing of the three aspects of sustainable development (economic, environmental and social) in the national maritime spaces, via an integrated approach, reflecting the interconnections among the individual development spheres

Appropriate methods for evaluation of the proposals for measures for the MSP

The appropriate methods for evaluation are taken from "Evalsed_sourcebook: Methods and techniques"⁴⁷ and have characteristics that reflect the specifics of the task — selection of appropriate measures for the MSP.

Expert panel — drawing on a range of viewpoints of independent specialists in the areas related to the MSP. The conclusion is reached by consensus on the issues subject to evaluation. It is considered appropriate in the evaluation of the quality and adequacy, in the preliminary evaluation of the impact (likely impact of a certain measure). The main problem here is the lack of experts having broad experience in regard to MSP, but the evaluation may be conducted by sectors related to the MSP, where a significant expert capacity is available. The expert panels are appropriate to "provide an interpretation and development of findings from evaluation work using other techniques". Particularly important in this case is its presumed capability to identify

⁴⁷ Evalsed_sourcebook: Methods and techniques

https://ec.europa.eu/regional_policy/sources/docgener/evaluation/guide/evaluation_sourcebook.pdf

potential synergies. Another very useful feature of the method is its capability to "formulate an independent, authoritative judgment, which is particularly useful in a partnership context, especially if there are differences in the partners' views".

Theory-based impact assessment — relies on a number of assumptions and hypotheses which are logically interconnected and verifiable by evidence. The more active involvement of the stakeholders in the process of MSP renders this method particularly appropriate for the case at hand.

Multi-criteria analysis — used for comparative evaluation of heterogeneous measures. This technique allows to take into account several criteria at the same time in a complex situation. The method is intended to support decision-makers in integrating the various options, reflecting stakeholder views, in perspective or in retrospect. The involvement of decision-makers in the process is central to the approach. The results are usually oriented at providing operational advice or recommendations for future activities. The method is suitable for preliminary evaluation of projects of significant public interest.

SWOT analysis — its main advantage is that it is a familiar and frequently used method. Its concept is based on the "strategic fit" — the idea that if the characteristics (strengths and weaknesses) of a certain measure align with the features of the environment where it will be applied (opportunities and threats), it is very likely that the measure would be successful. Having in mind that the individual measures are usually aimed at resolving certain problems in a given context, it could be assumed that this method evaluates mainly the adequacy of the measures.



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