



2nd SEAS-ERA STRATEGIC FORUM

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Brussels

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8.1. Strategic Analysis in the Black Sea

- Inventory of existing Science Plans and Strategic Plans
- National Consultation Meetings with key experts to define priority research areas (Turkey and Romania)




State of Environment of the Black Sea 2001-2006/7 (2008)

State of Environment Report: pressures and trends 1996-2000 (2001)



8.1. Strategic Analysis in the Black Sea

1st Regional Workshop to develop the SRA (March 2011, Ankara)

- ❖ The presented template and content improved and accepted
- ❖ Method to develop the document was accepted (BSC and regional experts' participation, TÜBİTAK's coordination)
- ❖ Initially, 14 Research topics were determined under 3 main titles:
 - ✓ Basic research and fundamental understanding
 - ✓ Science supporting society and economy
 - ✓ Research support and cross-cutting issues



8.1. Strategic Analysis in the Black Sea



- **First draft** was distributed in May 2011.
- With support of the BS Commission, key experts were identified for each area of expertise and contacted ;
- Contributions of all experts on the key research issues were finalized by the end of August-2011.
- Experts contributions were compiled and the **second draft** was distributed in November 2011.



Expert contributions		
Specific Research Priorities for the Black Sea Basin:		
Basic research and fundamental understanding		
Understanding the geological structure and dynamics of the Black Sea Basin	Prof. Nicholas Panin	panin@geosecomar.ro
Physical climate, hydrological cycle, ventilation and inter-basin coupling	Prof. Emin Özsoy	ozsoy@ims.metu.edu.tr
Understanding climatic variability and climate change impacts on coastal and offshore ecosystems	Prof. Temel Oğuz	oguz@ims.metu.edu.tr
Changes in biodiversity and habitats, noting the introduction and impacts of invasive species	Prof. Dr. Snezana Moncheva, Prof. Ahmet Kideys, Dr. Violeta Velikova	snejanam@abv.bg kideys@ims.metu.edu.tr
Understanding and governing eutrophication of the coastal and deep parts of the sea:	Prof. Sergey Kononov (Supported by SoE (2008))	servey_kononov@yahoo.com
GES in Water/Sediment/Bioresources/Beach Quality for Human and Ecosystem Health (including litter)	(Developed basing on SoE (2008) and inputs of BSC officers and experts)	
Deep sea research	Prof. Sergei Gulin	s.gulin@bss.org.ua
Applied Research: Science supporting Society & Maritime Economy		
Renewable energy	Dr. Emil Stanev	emil.stanev@ekss.de
Exploitation of mineral resources, energy and	Prof. Nicholas Panin	panin@geosecomar.ro
Maritime transport	Prof. Emin Özsoy	ozsoy@ims.metu.edu.tr
Fishery and aquaculture with focus on preservation and sustainable use of marine living resources	(Developed basing on SoE (2008) and inputs of BSC officers and experts)	
Marine biotechnology	Dr. Vitaliy Ryabushko	ryabushko2006@yandex.ru
Natural hazards and risk assessments	Prof. Atanas Palazov	palazov@io-bas.bg
Socio-economic research	Dr. Duncan Knowler	dk@stj.ca
Marine spatial planning (MSP) and Marine Protected Areas (MPAs)	Prof. Ahmet Kideys, Dr. Violeta Velikova, Dr. Tania Zaharia, Dr. Valeria Abaza	kideys@ims.metu.edu.tr zaharia@alpha.rmti.ro
ICZM, links with MSP & IRBM, coastal scs & eng	Dr. Mamuka Gvilava	MGvilava@ICZM.ge
Research support and cross-cutting issues for fundamental and applied research		

8.1. Strategic Analysis in the Black Sea

- 2nd Regional Workshop (December 2011 – Istanbul)
 - SRA was generally accepted, topics to be included were finalized.
 - After discussions on the whole document, some amendments and additions needed, experts were charged to do so.
- Discussion document launched in February 2012.
- Final SRA submitted in April 2012.


8.1. Strategic Analysis in the Black Sea

Black Sea SRA is a result of;


- 2 National consultation meetings
- 2 Workshops with participation of;
 - 38 (17+21) experts,
 - Partner institutions
 - Regional Organizations (BSEC and BSC)
 - Associated partner
- Written contributions from 19 experts
- Review and editing

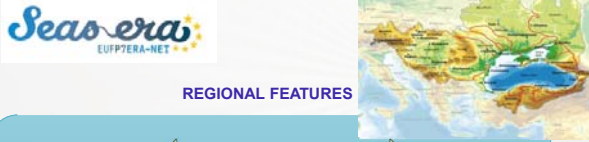



Common Structure of the SRA for Sea Basins:



- Introduction
- A Shared Vision for the [BS] Sea Basin
- The [] Sea Basin: Sea basin specificities, critical regional issues, challenges and opportunities – related to policy, management, environmental and scientific matters.
- A Strategic Research Agenda for the [BS] Sea Basin Objectives and Benefits
- Specific Research Priorities for the [BS] Sea Basin
 - Basic Research & New Knowledge incl. climate change, new frontiers research (e.g. Deep-sea)
 - Applied Research: Science supporting Society and Economy: Applied science themes incl. e.g. blue biotech, marine renewable energy, transport, etc.)
 - Research Support & Cross-Cutting Issues.
- High-level Roadmap. Short, medium, long-term priorities timeline, milestones, review, etc.)






REGIONAL FEATURES

Ecosystem Quality Objectives (EcoQOs) that are set by the BS SAP (2009):


- EcoQO 1: Preserve commercial marine living resources
 - Sustainable resource management
 - Natural specificities of the Black Sea
 - Impacts of anthropogenic forcings
 - Impacts of climatic variability and/or climate change
- EcoQO 3: Reduce eutrophication
- EcoQO 4: Ensure Good Water Quality for Human Health and Recreational Use and Aquatic Biota
 - Reduce pollutants originating from land based sources
 - Reduce pollutants originating from shipping and offshore activities



The vision for the Black Sea is to preserve its ecosystem as a valuable natural endowment of the region, whilst ensuring the protection and rational use of its marine and coastal living resources as a condition for sustainable development of the Black Sea coastal states, well-being, health and security of their population.

Specific objectives of the SRA are:

- Supporting the needs of Black Sea states stemming from international policy/legislation
- Dealing with regional ecosystem problems
- Strengthening international cooperation of the coastal states with ongoing and new actions and tools
- Prioritising new topics and approaches at regional level
- Supporting to multi-disciplinary marine and maritime research in support of good (holistic) governance of environmental protection with human capacity building component at the national and regional level
- Providing scientific and management tools
- Identifying cross-cutting issues to support research and their realization




SPECIFIC RESEARCH PRIORITIES FOR THE BLACK SEA BASIN

Under 3 major categories :

- 7 research topics and 34 key research issues identified for basic research and fundamental understanding (A);
- 9 research topics and 46 key issues identified for applied research to support society and maritime economy (B);
- 4 topics and 18 key issues identified to support fundamental and applied research (C).

- NOT ALL identified as GAPS but as concerns and interests of BS experts
- Some of the topics under the 3 major categories might be considered in a holistic / integrated way for one topic
- Some key issues can still be merged under one single topic (e.g. A.6.1&A.7.4, and others)
- Some key issues put forward in a managerial view or with strategic concerns, they are not research priorities




SPECIFIC RESEARCH PRIORITIES FOR THE BLACK SEA BASIN

A. Topics for basic research and fundamental understanding	Key issues
1. Understanding the geological structure and dynamics of the Black Sea Basin as a primary factor influencing its general evolution	1.1 - 1.4
2. Physical climate, hydrological cycle, ventilation and inter-basin coupling	2.1 - 2.6
BS 3. Understanding climatic variability and climate change impacts on coastal and offshore ecosystems in the Black Sea including the effects of ocean acidification	3.1 – 3.5
BS 4. Changes in biodiversity and habitats, noting the introduction and impacts of invasive species	4.1 – 4.5
BS 5. Understanding and governing eutrophication of coastal waters and open sea: Biogeochemical and primary biological basic processes, mechanisms and consequences	5.1 – 5.5
BS 6. Ensuring Good Water/Sediment/Bioresources/Beach Quality for Human and Ecosystem Health (including litter)	6.1 – 6.4
NE 7. Deep-sea research	7.1 – 7.5




SPECIFIC RESEARCH PRIORITIES FOR THE BLACK SEA BASIN

B. Applied Research: Science supporting Society & Maritime Economy		Key issues
NEW	1. Renewable energy	1.1 – 1.4
	2. Exploitation of mineral resources, energy and communication projects	2.1 – 2.3
BS	3. Maritime transport	3.1 – 3.2
BS	4. Fishery and aquaculture with focus on preservation and sustainable use of marine living resources	4.1 – 4.5
NEW	5. Marine biotechnology	5.1 – 5.5
Cross-cutting issues:		
	6. Natural hazards and risk assessments	6.1 – 6.8
	7. Socio-economic research	7.1 – 7.8
	8. Marine spatial planning (MSP) and marine protected areas (MPAs)	8.1 – 8.5
BS	9. ICZM, links with MSP & IRBM, coastal sciences & engineering	9.1 – 9.6



SPECIFIC RESEARCH PRIORITIES FOR THE BLACK SEA BASIN

C. Research support and cross-cutting issues for fundamental and applied research	Key issues
1. Development of support tools for policy implementation	1.1 – 1.6
2. Observation and forecasting systems for operational oceanography	2.1 - 2.5
3. Marine research infrastructure	3.1 – 3.6
4. Human capacity building	4.1




A. Topics for basic research and fundamental understanding

Topic A.3. Understanding climatic variability and climate change impacts on coastal and offshore ecosystems in the Black Sea

Key research issues:

- xxxxx 1. Effects of climate-induced changes in hydrographic, hydrochemical structure and circulation patterns on structure and function of the food web.
- xxxx 2. Feedback mechanisms between the dynamic processes leading to anthropogenic global warming and natural modes of climate variability.
- 3. Identification of ecosystem vulnerability (resilience) during abrupt transitions in response to climate change.
- 4. Climate-adaptation management strategies to preserve ecosystem goods and services
- 5. Develop knowledge of multiple sources and scales of ecosystem change to design management strategies.




A. Topics for basic research and fundamental understanding

Topic A.4. Changes in biodiversity and habitats, noting the introduction and impacts of invasive species

Key research issues:

- xxxx 1. Development of novel tools for research and monitoring of non-native species and ecological impact assessment.
- xxxxx 2. Habitat mapping design for development of a classification system of Black Sea habitats (including pelagic domain).
- 3. Assessment of the effects of marine biodiversity in food-web energy transfer (structure and functioning) and ecosystem resilience.
- xxxx 4. Synthesis of biodiversity results into operational indicators of ecological state (MSFD/GES relevant) based on scenario analysis and model simulations under various natural and anthropogenic pressures.
- 5. Taxonomic revisions of species based on modern research tools (genetics and genomics) including microbes and viruses.




A. Topics for basic research and fundamental understanding

Topic A.5. Understanding and governing eutrophication of coastal waters and open sea: Biogeochemical and primary biological basic processes, mechanisms and consequences

Key research issues:

1. Evaluation of different sources of nutrients and their importance for the stock and distribution of nutrients in waters
- xxxx 2. Understanding the impact of changes in physical conditions and climatology, changes in the load, stock, distribution and N/P ratios on the rate and pattern of eutrophication or dystrophication
3. Understanding the impacts of eutrophication on biodiversity and ecosystem functioning and on the C, N, P, Si cycles and biogeochemical dynamics of shelf and open sea ecosystems
- xxxxx 4. Modelling scenarios and relevant economic valuations of eutrophication consequences and nutrient reduction schemes
5. The role of coccolithophorids in removal of CO₂ in the BS with respect to potential impact of pH increase




A. Topics for basic research and fundamental understanding

Topic A.6. Ensuring Good Water/ Sediment/ Bio-resources Beach Quality for Human and Ecosystem Health (including litter)

Key research issues:

- xxxx 1. Identification of key contaminants for the Black Sea with their sources, levels and effects on water/sediment/bio-resources quality, biota and human health (MSFD relevant).
- xxxxx 2. Common environmental quality objectives (EQOS or GES) must be identified to improve assessments as a pre-requisite of management procedures (MSFD relevant).
3. Origins, quantity, quality and impacts of marine litter (MSFD relevant).
4. Condition of benthic community based on multi-metric indexes and other parameters.




A. Topics for basic research and fundamental understanding

Topic A.7. Deep Sea Research

Key research issues:

1. Assessment of ecological and environmental role of methane seeps and the active mud volcanoes in the Black Sea anoxic basin.
2. Evaluation of significance of the methane-derived microbial reefs as a biogeochemical barrier controlling the input of the seeping methane to the Black Sea water column and atmosphere.
3. Studies of conservation properties of the Black Sea anoxic sediments for cyst, spores and the possible influence of this factor on the biodiversity in contemporary Black Sea ecosystems.
4. Assessment of the current levels and trends of radioactive contamination of the Black Sea environments with special focus on development of radiotracer techniques to identify sources, pathways, cycling and trapping of redox-sensitive nuclear and non-nuclear pollutants in anoxic waters and sediments.
5. Development of models evaluating the carbon sequestration in the Black Sea.



B. Applied Research: Science supporting Society & Maritime Economy

Topic B.1 Renewable Energy


Key research issues:

- xxxx 1. Perform an inventory of the potential of various marine energy resources in the Black Sea (mapping).
2. Investigating the interaction between waves and (floating or moored) structures, and the optimum positioning of wind turbines within an array.
3. Conducting wind wave climate re-analyses and forecasting (short-, medium- and long-term).
4. Measuring, monitoring and mitigating environmental impacts of the use of renewables (alteration of water circulation and sediment transport patterns, physical and biological disturbance of the seabed and benthic habitats).

Topic B.5 Marine Biotechnology

Key research issues:

1. Growth management of cultured BS microalgae: the theoretical and experimental simulation.
2. Microalgal screening for commercially promising producers of biologically active substances (BAS).
3. Growing microalgal biomass as a biochemically optimal fodder stimulating growth and survival rates of different developmental stages of cultured bivalve molluscs, fishes and crustaceans.
4. Designing the biotechnology for acquiring biologically important pigments from BS microalgae.
5. Screening macrophytes having adapted to the present BS environment as commercially interesting objects for the biotechnologies.



B. Applied Research: Science supporting Society & Maritime Economy

Topic B.4. Fishery and aquaculture with focus on preservation and sustainable use of marine living resources



Key research issues:

- xxx 1. Understanding the condition of stocks and assessments at species level, including the spawning stocks of major commercial fish species via agreed methodologies (MSFD relevant). Evaluation of stock enhancement and aquaculture development.
- xxxx 2. Assessments of the biological safety limits for commercial exploitation of marine living resources, impacts on biodiversity and habitats.
- 3. Development of model-based management tools.
- xxx 4. Investigations on the effects of the Turkish Straits System (local fishing pressure, acoustic and chemical pollution, algal and toxic blooms, mucilage, jellyfish) on the migrating fish of the Black Sea.
- xxx 5. Impacts on the market and non-market economic values of the losses in fisheries and fish biodiversity. Integration of socio-economic indicators towards ecosystem-based bio-resources management.

B. Applied Research: Science supporting Society & Maritime Economy

Topic B.7. Socio-economic research

Key research issues:

- xxxx 1. Development of socio-economic data systems and analytical capability to support research, especially offering integration of natural with social and economic data sources.
- 2. social impacts of environmental disruption (e.g. health concerns, loss of employment, revenue, etc.)
- 3.
- 4. integrated ecological-economic modelling, with special emphasis on the socio-economic implications of non-linear processes and ecological thresholds in the Black Sea marine system.
- 5.
- 6. Non-market valuation of ecosystem services associated with the Black Sea marine system.
- 7.
- 8.

B. Applied Research: Science supporting Society & Maritime Economy

Topic B.8. MSP & MPAs **Topic B.9. ICZM, links with MSP & IRBM**

Key research issues:

- xxx 1. Determine new and/or expansion of existing protected areas, including trans-boundary areas
- 2.
- 3.
- xxxx 4. Develop MPA networks.
- xxxx 5. Development of spatial planning (in the sea), taking into consideration multiple uses, economic benefits and sensitivity of ecosystems.

Key research issues :

- 1. ...
- xxxx 2. Develop monitoring and research capacity in the Black Sea region to comprehensively study the state of the coast, with special focus on sensitive coastal resources and ecosystems (beaches, dunes, wetlands, estuaries, lagoons, bays, river mouths, etc.).
- 3. Compile data in agreed formats for regular calculations of statistical, spatial and progress indicators for ICZM, including indicators defined for MSP and IRBM needs
- 4.

C. Support for fundamental and applied research

Topic C.1. Development of support tools for policy implementation

Key research support issues:


- 1. Identification of suitability and introduction to routine monitoring of new parameters to improve the BS state of the environment assessment under the new conditions (recovery from eutrophication, climate change)
- 2. Harmonization of monitoring and assessment methodologies used in the region, including fish and other marine living resources, cetacean surveys, marine litter in the sea, contamination of marine sediments and marine biota
- 3.
- 4.
- xxx 5. Determination of GES and decision on GES objectives/targets relevant for the Black Sea, in line with ecosystem quality objectives and management targets established in the BS SAP 2009
- 6.

C. Support for fundamental and applied research

Topic C.2. Observation and forecasting systems for operational oceanography

Key research support issues:

1. Creating collaborative objectives among riparian countries for the development and support of observing systems infrastructure in the Black Sea, real-time in-situ data collection, process studies, coastal and open sea moorings, profiling systems, research vessels and ships of opportunity, observing platforms such as floats, gliders, ferry-boxes etc.
- xxx 2. Development of earth systems forecasting capacity, integration of atmospheric, hydrological, ocean and climate models, improving predictability through data assimilation.
3. Integration and experimental design of observing systems, common data transmission, storage and backup facilities.
- xxx 4. Data sharing policy development, availability of observing and forecasting system products to the general public and the special users.
5.




C. Support for fundamental and applied research

Topic C.3. Marine research infrastructure

Key research support issues:

- xxxxxx 1. Identify important marine research infrastructure gaps and needs, and long-term marine research infrastructure requirements and investments.
2. Identify the cost-efficiency of mechanisms to shift from project based short-term and unsystematic observational programs to long-term and long-time series systematic sustained observations.
- xxxx 3. Identify mechanisms to link marine research infrastructure needs with funding opportunities.
- xxxx 4. Establish an interactive web-based information system to provide access to information on the Black Sea and Europe's marine research infrastructures.
5.



 IMPLEMENTATION.....Basics

SRA Implementation Principles

- Utilization of knowledge, achievements, outputs and products of past and ongoing projects based on lessons-learnt and building on current EU and Black Sea Regional initiatives
- Streamlining ongoing project activities to avoid overlap
- Consultation and stakeholders involvement
- Capacity building and networking
- Promoting ownership and public-awareness at the national levels
- Regional partnership and international cooperation


 IMPLEMENTATION.....Human Capacity


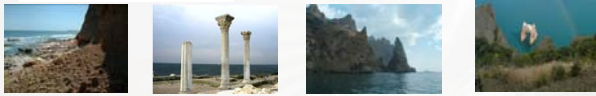
Human Capacity Building activities and programmes are crucial both for supporting and creating new capacities of marine scientists and managers.

In order to consider this huge gap (ageing of scientists but increase of RTD demand), a review and modification of education and training programmes could be suggested especially to support the new research topics and multi- disciplinary research.

 **IMPLEMENTATION.....convergence**

- Review of possible tools and existing structures : ERA NETs, ERA NET+, BONUS
- And synergies with them
- BSEC advice -
- BSC adoption mechanism – regional support
- EU funding mechanisms for the region – external funds
- JPI Oceans - SRIA





THANK YOU !!!

