



Bluemed

Research and innovation initiative
for blue jobs and growth in the Mediterranean area

Strategic research and innovation agenda





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The BLUEMED
initiative documents



goo.gl/ZbJTWB

*The **BLUEMED** initiative offers a shared strategic framework for working towards a healthy, productive and resilient Mediterranean Sea that is better known and valued. It is designed to tap the full potential of the marine and maritime sectors, structuring transnational cooperation to create new 'blue' jobs and to promote and improve social wellbeing, sustainable prosperity and the environmental status of the region and its surroundings.*

BLUEMED is the result of joint efforts by Cyprus, Croatia, France, Greece, Italy, Malta, Portugal, Slovenia and Spain, with the support of the European Commission.

WHY BLUEMED?

30% of global sea-borne trade by volume

450 ports and terminals

A **quarter** of worldwide sea-borne oil traffic

World's **second-largest** market for cruise ships

A coastal population of **150** million that more than doubles during the tourist season

400 UNESCO sites

236 Marine Protected Areas

Among the seas of Europe, the Mediterranean has no match as regards biodiversity and the links between human activities and environmental characteristics. It is changing fast in response to both natural and anthropogenic pressures. Climate change, growing maritime traffic and pollution, overexploitation of fish stocks and invasions of alien species are among the stressors placing the region at risk. At the same time, the Mediterranean's unique features provide major local opportunities for blue growth and jobs, ranging from fisheries to tourism.

The region's geopolitical complexity may represent a constraint on implementing framework conditions favourable to blue economic growth. Joint efforts are required to successfully address present and future challenges. A global perspective, along with more vigorous transnational and international cooperation, is essential to implement effectively and efficiently tailored actions that are conducive to safe, secure and sustainable development for all.

BLUEMED'S AIMS

According to the Vision Document presented at the EU Competitiveness Council of 5 December 2014, BLUEMED pursues the following objectives:

- developing innovative marine-based technologies, methodologies and approaches with a view to boosting the sustainable economic growth of the European maritime sectors and the conservation and upgrading of the marine environment, resources and cultural heritage;
- fostering innovative multidisciplinary research and cooperation activities addressing the relevant Mediterranean challenges;
- providing knowledge-based support for the implementation of EU policies and directives on marine and maritime issues in the Mediterranean;
- creating an interoperable, fully integrated observing and forecasting system to promote continuous long-term observation based on open data structures to guarantee easy access;
- promoting public awareness and understanding of how important sustainably prosperous resources of the Mediterranean Sea for the surrounding countries and for Europe as a whole;
- training a new generation of scientists, professionals, technicians and entrepreneurs able to tackle complex ecological, economic and societal challenges in a holistic way, thus creating new and qualified 'sea-based' jobs.

WHAT FORM WILL BLUEMED TAKE?

- Joint action, including coordinating, planning and programming research and innovation activities
- Bilateral/multilateral research and innovation initiatives and programming tools
- Cooperation between the public and private sectors
- Fine-tuning of data, knowledge, capacities and projects
- Effective and efficient use of resources and infrastructure
- Maximisation of the leverage effects of research investments and their influence on public policy
- Public understanding of the value of the Mediterranean blue economy
- Improved skills for a well-equipped workforce

BLUEMED IDENTIFIES THE FOLLOWING KEY CHALLENGES

► Key enabling knowledge for the Mediterranean

Relevant knowledge gaps to be overcome

- A. *Mediterranean Sea ecosystems: services, resources, vulnerability and resilience to natural and anthropogenic pressures*
- B. *Mediterranean Sea dynamics: developing services in the field of sustainable adaptation to climate change and plans for mitigation*
- C. *Hazards and the protection of coastal areas in the Mediterranean*

► Key sectoral enablers in the Mediterranean

Specific subsections of the blue growth path

- A. *Innovative businesses based on marine bio-resources in the Mediterranean*
- B. *Ecosystem-based management of Mediterranean aquaculture and fisheries*
- C. *Sustainable tourism in the Mediterranean*
- D. *Maritime clusters in the Mediterranean*
- E. *Maritime Spatial Planning and Integrated Coastal Zone Management in the Mediterranean*

► Enabling technology and capacity creation for the Mediterranean

Innovative human potential and infrastructure required

- A. *Smart, greener maritime transport and facilities in the Mediterranean*
- B. *Observing systems and operational oceanography capacities in the Mediterranean*
- C. *Multi-purpose offshore platforms in the Mediterranean*
- D. *Marine and coastal cultural heritage in the Mediterranean: discovering, protecting and valuing*

THE STRATEGIC RESEARCH AND INNOVATION AGENDA (SRIA)

The **Strategic Research and Innovation Agenda** (SRIA) is a tool for addressing these challenges. It is designed to be a living document offering a handbook for interested implementing bodies, bearing in mind that the BLUEMED initiative:

- allows for different types of action to be taken at different levels, as regards geographical coverage, critical mass, joint funding, coordination of national/regional efforts or the use of EU instruments;
- is designed to involve relevant players and stakeholders such as national ministries, regional authorities, international organisations, organisations that undertake research, research infrastructure, academia, the private sector, non-governmental organizations and the general public;

It details the scope, level and duration of specific joint actions to be taken in order to achieve a particular goal falling within a key challenge.

SRIA IMPLEMENTATION MODEL

***Action**

SCOPE › Typology of activities, e.g. R&I initiative, knowledge transfer, technology transfer, policy initiatives, etc.

LEVEL › National, regional, EU, international (one or multiple)

DURATION › Short (less than 3 years), Medium (5-6 years), Long (10 years)

Mediterranean Sea ecosystems: services, resources, vulnerability and resilience to natural and anthropogenic pressures

GOAL	ACTION	SCOPE	LEVEL	DURATION
Understanding the functioning of the Mediterranean Sea ecosystem	Establish a coordinated network of marine institutes, universities, stations, observatories and companies; define standard monitoring and protection protocols	R&I activities, policy measures	Regional, national, EU, international	Short
	Identify the origin of invasive or alien species and the routes of invasions, the environmental conditions conducive to invasions and their main effects on local habitats	R&I activities	EU	Medium
	Promote and regulate transparency with regard to the results of research conducted or 'owned' by private companies and take action to make them more readily available to the public	R&I activities, knowledge sharing, policy initiatives	EU, national	Medium
	Assess inputs from atmosphere-land-sea and anthropogenic pressures leading to change in marine and coastal ecosystems; limit specific emerging risks and impact on both ecosystems and human health and wellbeing	R&I activities	Regional, national, EU	Medium
Promoting sustainable exploitation of biotic and abiotic resources	Develop and implement management plans for sustainable exploitation of coastal to deep-sea biotic and abiotic resources, including gas hydrates, minerals and molecules of industrial interest	R&I activities, knowledge transfer	National, regional	Short/medium
	Implement managing solutions and conservation plans, including networks of Marine Protected Areas, for coastal to deep-sea ecosystems and their relationship with natural and anthropogenic changes in the environment	R&I activities, knowledge transfer	National, regional	Medium
	Develop strategies, including adaptation and mitigation, for preserving the socioeconomic and environmental sustainability of marine habitats	R&I activities, knowledge sharing, policy initiatives	EU, national	Medium
	Describe the deep sea, mapping the topography of seabed, characterising the geomorphology and substrate types, identifying geo-habitats	R&I activities	EU	Medium/long

Mediterranean Sea ecosystems: services, resources, vulnerability and resilience to natural and anthropogenic pressures

GOAL	ACTION	SCOPE	LEVEL	DURATION
Cleaning the Mediterranean Sea	Identify: areas with potential conflict hot spots that are particularly exposed to the impact of multiple stressors; possible solutions	R&I activities, knowledge transfer, policy initiatives	EU, national, regional	Short
	Develop and test (bio)remediation measures in different areas/places, including the possible re-use and recycling of hazardous materials	R&I activities, knowledge transfer, policy initiatives	EU, national, regional	Short
	Implement coordination/cooperation schemes and comparable risk assessment of the effects of multiple anthropogenic pressures at different depths, including deep-sea areas; comply with regional conventions and the Marine Strategy Framework Directive	R&I activities	EU, regional	Short/medium
	Measure and identify chemical compounds and other sources of pollution, including contaminant dispersal, in different marine matrices; characterise sources, pathways and effects on marine ecosystems; develop early warning tools to detect pollutants	R&I activities	EU, national, regional	Medium

Mediterranean Sea dynamics: developing services in the field of sustainable adaptation to climate change and plans for mitigation

GOAL	ACTION	SCOPE	LEVEL	DURATION
Understanding the functioning of the Mediterranean Sea dynamics	Provide numerical modelling, forecasting, indicators and trends definition in the Mediterranean environmental conditions along with long-term monitoring	R&I activities	EU, national	Short
	Implement downscaling models of climate change for the Mediterranean Sea and sub-basins; assess the (global) impacts on marine ecosystems and their resources, from regional to local scales	R&I activities	EU	Short
Preparing to climate change	Make a comprehensive assessment of climate related risks in the Mediterranean Sea region, including extreme climate events in a changing climate, sea level rise, flooding and weather extreme events	R&I activities	EU	Short/medium
	Assess the climate change risk on the ecosystem and human environment in the coastal zone and in the deep ocean developing climate risk monitoring programmes and services	R&I activities	EU	Short/medium
Climate services for the Mediterranean	Develop, enhance and deliver user-friendly tools for disseminating climate information related to Mediterranean atmosphere, coastal and deep ocean areas	R&I activities, knowledge transfer	EU, national	Medium

Hazards and the protection of coastal areas in the Mediterranean

GOAL	ACTION	SCOPE	LEVEL	DURATION
Reducing the risk of disasters	Develop adapted sampling strategies; improve assessment of marine geo-hazards, from paleo records and from analysis and description of active faults	R&I activities, knowledge transfer	EU	Medium
	Implement high-resolution swath bathymetry mapping; reveal detailed morphology of the seafloor and large-scale and local seismic profiling surveys; locate and study active geological features	R&I activities, policy initiatives	National, international	Medium
	Develop operational platforms and decision matrix for tackling destructive tsunami events generated by different sources, e.g. seismic activity, volcanoes, landslides, atmosphere	R&I activities, knowledge transfer	EU	Medium
	Implement coordinated methods and approach, to achieve a dedicated science-to-policy network on hazards in the Mediterranean	R&I activities, policy initiatives	National, international	Short

Innovative businesses based on marine bio-resources in the Mediterranean

GOAL	ACTION	SCOPE	LEVEL	DURATION
Developing new technologies and tools	New or more robust micro-algae species, eukaryotic and prokaryotic microbial communities and strains for biorefinery schemes and for greening the chemical industry	R&I activities, knowledge transfer	EU	Medium
	Optimise cultivation and metabolic/production potential (omics techniques) of known and new marine microbial species, plus their industrial up-scaling	R&I activities, knowledge transfer	EU	Medium
	Explore and exploit new metabolites and biomolecules, enzymes and genes; promote biotechnological applications and patent deposits	R&I activities, knowledge transfer	Regional	Medium
Generating new products and services	Evaluate the potential of marine litter from macro and micro-pollutants, including nanomaterials and plastics; assess its impact on marine organisms and develop in situ bioremediation actions	R&I activities, knowledge transfer	EU, regional	Short
	Integrated use of by-products and waste from fisheries and aquaculture	R&I activities, knowledge transfer	EU	Medium
	Promote new market opportunities for products derived from marine biomass, as Mediterranean-labelled products	R&I activities, knowledge transfer	EU	Long

Ecosystem-based management of Mediterranean aquaculture and fisheries

GOAL	ACTION	SCOPE	LEVEL	DURATION
Develop optimal fishing strategies, technologies and practices	Develop optimal strategies, technologies and practices for sustainable exploitation of biological resources; take account of socioeconomic and ecosystem considerations, in line with the Common Fisheries Policy and the General Fishery Commission for the Mediterranean	R&I activities, knowledge transfer	EU, national	Short
	Adapt fishing gear, reduce discards and by-catch, and reduce other effects of fishing	R&I activities, knowledge transfer	EU, national	Medium
	Develop appropriate monitoring, assessment, management and governance regimes for sustainable small-scale and recreational fisheries	R&I activities, knowledge transfer	EU, international	Medium/long
Develop optimal aquaculture strategies, technologies and practices	Adapt aquaculture activities (species and systems) and capacities in a changing environment	R&I activities, knowledge transfer	EU, international	Medium
	Develop new strategies, technologies and practices to make aquaculture sustainable	R&I activities, knowledge transfer	EU, international	Medium/long
	Promote the diversification of aquaculture and the use of multi-trophic marine farming systems	R&I activities, knowledge transfer	EU, international	Medium/long

Promoting sustainable tourism in the Mediterranean

GOAL	ACTION	SCOPE	LEVEL	DURATION
Linking tourism and environment	Define and assess environmental value, risk mitigation and conflicts of use by involving scientific and coastal communities	R&I activities, support to policy and training initiatives	National, EU, regional, international	Short/medium
	Develop strategies and practices to improve the wellbeing of coastal communities and their economy	R&I activities, support to policy and training initiatives	National, EU, regional, international	Short/medium
Developing smart technologies and dedicated services	Develop smart technologies and dedicated services for sustainable tourism; tackle environmental protection and human wellbeing	R&I activities, support to policy initiatives, cooperation between the public and private sectors, knowledge/technology transfer, training initiatives	National, EU	Medium
	Design and develop innovative infrastructure solutions to improve the sustainability and management of marinas, with special reference to energy efficiency	R&I activities, knowledge/technology transfer	Regional, EU, international	Medium

Maritime clusters in the Mediterranean

GOAL	ACTION	SCOPE	LEVEL	DURATION
From traditional maritime economic to blue growth activities	Encourage and facilitate cluster development in the Mediterranean area through cooperation between local small and medium enterprises, large companies, scientific institutes and innovative players	Policy initiatives	National, regional	Short
	Consolidate existing infrastructure that supports the development of innovative green technologies performed by the Mediterranean clusters	Policy initiatives	National, regional	Short
	Implement training/mobility programmes to share knowledge and best business practices in maritime clusters with other regions	Policy initiatives	National, regional	Short

Maritime Spatial Planning and Integrated Coastal Zone Management in the Mediterranean

GOAL	ACTION	SCOPE	LEVEL	DURATION
Strengthen synergies among science, industry, policymakers and society	Promote innovative devices for and approaches to limiting coastal erosion and pollution; strengthen the synergy between science, industry and policymakers, and foster joint initiatives with European marine regions	R&I activities, policy initiatives	National, regional	Short
	Promote the knowledge-based approach to tourism, developing educational initiatives including citizen science, e.g. jellyfish/litter-watch, recreational activities at sea	Science-policy initiatives, sharing practices	EU	Short/medium
	Develop tools/software to describe impacts on coastal environments taking into consideration the social and economic aspects	R&I activities	EU	Medium
Effective maritime spatial planning in the Mediterranean	Improve knowledge of the land-sea nexus and develop coastal ecological engineering solutions and measures to reach the Good Environmental Status	R&I activities, policy initiative	National, regional	Long
	Develop tools to assess the cumulative impact of human activities, to ensure that exploitation of marine resources is ecologically sustainable	R&I activities	EU	Short
	Identify the trade-offs between ecological dynamics and socioeconomic needs in order to improve adaptive management scenarios for resource use	R&I activities	EU	Medium
	Research into the governance and management of multi-stakeholder processes to support maritime spatial planning and integrated coastal zone management policies	R&I activities, policy initiatives	National, international, regional	Long
	Use integrated decision tools to select appropriate sites for offshore installations, to ensure that they meet energy and environmental requirements	R&I activities, policy initiative	National, regional	Long

Smart, greener maritime transport and facilities in the Mediterranean

GOAL	ACTION	SCOPE	LEVEL	DURATION
Greening vessels and facilities	Implement multidisciplinary integrated methodologies to evaluate the impact of ships and harbours on the environment at transnational level, in the light of the specific characteristics of the Mediterranean basin	R&I activities, knowledge and policy initiatives	Regional, international	Short
	Develop innovative design and management solutions for eco-friendly vessels, e.g. greener propulsion for transport, leisure and fishing boats, fuel saving and noise reduction materials for vessel-water interface	R&I activities, knowledge sharing and transfer, policy initiatives	National, regional	Medium
	Design and develop innovative infrastructure solutions to improve the sustainability of ports, with special reference to energy efficiency and externalities relating to the surrounding built environment	R&I activities, knowledge/technology transfer	Regional, EU, international	Medium
	Improve the rational treatment of ballast water for protection against alien species, e.g. by locating platforms at the entrances to Mediterranean waters	Science-policy initiatives, cooperation between the public and private sectors	National, regional	Medium
	Develop new vessel concepts, i.e. hybrid systems, with lower manufacturing, construction, installation and decommissioning costs	R&I activities	EU, international	Long
Safer maritime transport in the Mediterranean	Develop a new generation of Decision Support System tools for emergency response to marine pollution from accidents, including analysis of the state of the damaged platform/carrier	R&I activities, knowledge and policy initiatives	Regional, international	Short
	Improve transport systems for smart, safe mobility in coastal zones, lagoons and restricted areas	R&I activities	EU	Short
	Develop new tools, materials and methods to ease and improve the decision-making process in managing on-board emergency situations	R&I activities, knowledge sharing and transfer, policy initiatives	EU	Short
	Develop ship detection and classification tools to interpret satellite images	R&I activities, knowledge and policy initiatives	Regional, international	Medium
	Develop innovative technologies for safer vessels, with real-time structural monitoring, the ability to navigate in sub-optimal conditions (safe return to port) and the ship's continued capacity to sail. Operate in extreme environmental situations (resilient ships) and sensitive areas, which may involve using the European Global Navigation Satellite System	R&I activities, knowledge sharing and transfer, policy initiatives	EU	Medium
	Identify and implement safer, secure and clean offshore installations/devices	R&I activities	EU, international	Long

Observing systems and operational oceanography in the Mediterranean

GOAL	ACTION	SCOPE	LEVEL	DURATION
Towards an observing system of systems	Develop an integrated Mediterranean observing system, based on existing European networks and consortia, including European Strategy Forum on Research Infrastructures, and national infrastructure, in line with the overall European contribution to global observing systems	R&I activities, support to policy initiatives, policy measures	National, EU, international	Short
	Ensure long time series (repeatability of observations) at key locations	Policy initiatives	National, regional, international	Short
	Implement data storage, management and sharing	R&I activities	National, EU, international	Short
	Maintain updated data and information on erosion phenomena and coastal risks, standardising and expanding coastline monitoring systems across the Mediterranean region	R&I activities	National, regional	Medium
	Develop standard methodologies to implement the Marine Strategy Framework Directive in shared waters, improving coordination and cooperation among Member States to achieve the Good Environmental Status	R&I activities, policy initiatives	National, EU	Medium
Tailor-made sensors and platforms	Develop new ideas for robotic systems and devices to explore and work on the seabed in deep-sea areas	R&I activities, technology transfer	EU	Short
	Develop new technologies and systems to enable spatial and temporal resolution and observation parameters to be improved in the coastal region (using both in situ and remote tools)	R&I activities, technology transfer	EU	Short/medium
	Develop and market environmental sensors to assess human impact and implement the Marine Strategy Framework Directive	R&I activities	EU	Short/medium
	Develop Unmanned Autonomous Vehicles and related infrastructure that can extend the area - on the sea surface and underwater - for different types of operation, e.g. monitoring illegal activities, supporting search and rescue activities, helping the Civil Protection service respond to disasters, supporting offshore economic activities	R&I activities, knowledge transfer	Regional, international	Medium

Multi-purpose offshore platforms in the Mediterranean

GOAL	ACTION	SCOPE	LEVEL	DURATION
Changing the rationale: one platform, multiple uses and activities	Spatialise and cross-check: offshore fixed and mobile infrastructure distribution and environmental monitoring and surveillance needs from coasts to open sea	Science-policy initiatives, cooperation between the public and private sectors	National, regional	Short
	Develop new concepts and protocols with private companies and maritime operators to maximise the use of infrastructure, ships and platforms for scientific and environmental monitoring, safety and security purposes	Science-policy initiatives, cooperation between the public and private sectors	National, regional	Short
	Develop tailor-made technologies to improve efficiency on installations for the exploitation of marine renewable energies (wind, current and waves)	R&I activities	EU	Medium

Marine and coastal cultural heritage in the Mediterranean: discovering, protecting and valuing

GOAL	ACTION	SCOPE	LEVEL	DURATION
Towards a shared management approach to cultural heritage in the Mediterranean	Creation of a common disclosure and data sharing policy	Policy coordination	National	Short
	Exploit large-scale seabed mapping databases to locate shipwrecks and target areas for high-resolution seabed mapping	Policy coordination	National	Short
	Explore and protect natural and cultural heritage underwater through a multidisciplinary approach, combining efforts from national programmes for stocktaking	Policy coordination	National, EU	Medium
	Establish a network for collaboration, e.g. between marine and archaeological institutions	Policy coordination	National, EU	Medium
Increase the economic impact of the Mediterranean's cultural heritage	Create a sustainable and integrated range of tourist services, e.g. scuba diving circuits, to make best use of the Mediterranean's cultural heritage while preserving it	Policy coordination	National	Short
	Develop advanced concept of robotic systems for submarine archaeology	R&I activities	EU	Short
	Take advantage of retrieved data and information to create a Virtual Museum of Mediterranean Submarine Archaeology	Policy coordination	National, EU	Medium
	Train a new generation of marine technicians/scientists to conduct research on the protection of the marine cultural heritage	Programmes	National	Long

