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 REGIONE TOSCANA	 INTERMEDITERRANEAN COMMISSION CPMR CRPM	 REGIONE PUGLIA	 REGIONE ABRUZZO	 REGIONE CALABRIA	 Provincia di Crotona
 REGIONE CAMPANIA	 Govern de les Illes Balears	 Generalitat de Catalunya	 המשרד להגנת הסביבה الوزارة لحماية البيئة Israel Ministry of Environmental Protection	 SPLITSKO-DALMATINSKA ŽUPANIJA	 CYPRUS
 REGIONE AUTONOMA FRIULI VENEZIA GIULIA	 ŠIBENSKO-KNINSKA ŽUPANIJA	 REGION OF WESTERN GREECE Full of contrast!	 Región de Murcia	 REGIONE AUTONOMA DI SARDEGNA REGIONE AUTONOMA DELLA SARDEGNA	 HELLENIC REPUBLIC REGION OF ATTICA



*from 2007-2013, through 2014-2020, towards 2021-2027
a lot we did together, a lot is still to do for our coasts,
all around the Mediterranean*



What is the Mediterranean?

A thousand things together. Not a landscape but innumerable landscapes. Not a sea but a succession of seas. Not one civilization, but a series of civilizations stacked one upon the other. All this because the Mediterranean is an ancient crossroads. For thousands of years all converged there, complicating and enriching its history.

In the physical landscape as in the human, the crossroads of the Mediterranean, the Mediterranean composite, presents itself to our memory as a coherent image, where everything comes together and merges in an original unity.

Fernand Braudel (1902- 1985)

JOINT ACTION PLAN on Med Coasts Adaptation to Climate Change *“Developing conditions for the Blue Growth in the Mediterranean”*

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ABSTRACT

The policy paper “**Bologna Charter 2012 - European Regions Charter for the promotion of a common framework for strategic actions aimed at the protection and sustainable development of the Mediterranean coastal areas**” (www.bolognacharter.eu), was subscribed on the 21st of March 2013 by several maritime Regions and Administrations of the Mediterranean, and adopted by the Inter-mediterranean Commission of the CRPM, General Assembly on the 27th of June 2013 in Barcelona.

This document represents the updating of the Bologna Charter Joint Action Plan (BC-JAP) issued in 2015 (MED Capitalization Program, COASTGAP project’ Best Practice n. 5) prepared with the contribution of project’s and BC’s partners within the BC Coordination Board started in 2014 by the Inter-mediterranean Commission of the CPMR, and now “Bologna Charter Task Force” within the working Group on Transport & Integrated Maritime Policy of the IMC-CPMR, and in particular it:

- **updates on the frame of action and the implementation activities of the BC-JAP** after 4 years from its issue and presentation within the Med Capitalisation Final Event by the Committee of the Regions in Brussels, in March 2015;
- **refers on the state-of-art of JAP implementation and its impact on policies** in these years, through cooperation projects for the development and objectives achievements of the action lines of JAP Strategic Themes 1 to 3, on the advancements of Major Coastal Projects implementation (JAP Strategic Theme 4) and on the start and participation in new initiatives matching with topics of Blue Economy development, coastal & maritime Sustainable Tourism and coastal protection;
- **recalls on new adhesions and extension of the BC cooperation space in the Mediterranean**, and outlines **new opportunities emerged**, initiatives created in the Med area, and what still is to be done in the next period **towards the completion of the JAP implementation** and achievements of the Bologna Charter objectives and moreover it introduces **new Major Coastal Projects** proposed by participating coastal Regions (Annexes 3 and 4);
- **introduces a new comprehensive strategy for assisting adaptation to climate change in the Mediterranean coastal region** (new Annex 5) responding thus also to the expectations indicated for the Bologna Charter initiative by the [WestMed Initiative Framework for Action {COM\(2017\) 183 final}](#), while indicating tools also for maintaining updated data/information on erosion phenomena and coastal risks and contributing to harmonise and expand the coastline monitoring systems for basin scale R&I activities.

Further revisions of this document and of its Annexes will occur updating when required by the evolution of EU / international policies for the Mediterranean or the evolution of JAP implementation and of Major Coastal Projects realisation or new proposals.

1. INTRODUCTION

1.1 Vision and development of the Initiative

The Bologna Charter (BC) is the Policy document of a joint regional initiative promoting a **common framework and strategic actions aimed at the protection and sustainable development of the Mediterranean coastal areas.**

The Joint Action Plan (JAP) “**developing conditions for the Blue Growth in the Mediterranean**” represents the translation in practice of the objectives and indications of the Bologna Charter initiative policy document.

The BC is an initiative started by EU Med Regions, but **open to other coastal Administrations of Southern and Eastern Mediterranean**, performing concrete objectives, even structural ones, able to obtain diversified funding resources and with high capacity of mainstreaming.

Vision shared by the partnership is that “Blue Growth” in the Mediterranean finds its fundamental conditions in **safety, wellbeing and sustainability-oriented development models of coastal areas and maritime space.** This including opportunities given by the development of new markets, new companies and job creation, in the field of ecosystem-oriented activities related to coastal and marine environment protection, sustainable C&M tourism and other Blue Economy sector activities, management and adaptation to climate change.

The Bologna Charter promotes an **integrated land-sea approach** which directly feeds into the objectives and principles of the EU **MSP Directive** (2014/89/EU) and **ICZM Protocol** (Barcelona Convention).

Developing condition for the Blue Growth, in the light of BC aims, means:

- Increase **cross-border cooperation between** Med countries and regions, through the strengthening of the role and cooperation between coastal Regions and Administrations;
- Increase **vertical and horizontal coordination** between Administrations in each Country;
- Protect the environment through **early identification of impacts and of opportunities for multiple use of land-sea spaces;**
- Encourage **investment in research and innovation and new jobs creation** in the field of Blue Economy, C&M sustainable tourism, coastal protection, coast-marine monitoring and adaptation to climate change;
- Encourage **investment in interventions for coast-marine environment protection**, conditions for the safety, sustainable development and coevolution of human activities and natural systems in the Med space;

Subjects involved -and whom the initiative is directed to - are territorial governing bodies with competence on coastal defence, management/ adaptation/ governance, bodies at different governance level in different Mediterranean countries: regions, provinces, State ministries.

The implementation of the Vision - Strategy - JAP, depends on the will of the Administrations signatories of the Charter, on the cooperation network and on the availability of funds to realize the actions, mainly throughout EU cooperation projects and national initiatives.

1.2 Why a joint regional initiative

The driver for developing the initiative is the will to strengthen the cooperation between the Mediterranean actors engaged in ensuring coastal territories safety and sustainable development. Ending 2000-2006 ERDF period, between partner Regions involved in ETC projects a discussion developed concerning:

- the opportunity to **rise up the attention on coastal issues** (risks, protection, management, adaptation) that, even it was present in specific EU documents, in general were weakly specifically represented in policies and funding programs;
- the necessity to **act within a joint strategy**, in which to inscribe project lines and joint actions concurring to specific objectives, instead of running single cooperation projects often not well connected and hardly in synergy;
- the **identification of common challenges** and themes on which to cooperate, in order to focus efforts and create conditions for efficacy of projects in the future and capitalisation and mainstreaming of specific outcomes.

Moreover, the **cooperation between the Med Regions and Administrations** in charge for coastal protection and management was seen - and is today - the best way to face common challenges as: in **strengthening the role of Med coastal Regions** in EU, national and international policies formation for the specific sectors, in **enhancing effectiveness of actions/responses** to identified challenges and phenomena (beyond administrative borders) and in **facilitating the access to funding** for projects and investments.

1.3 Brief History of the process

The occasion to start the process was the Interreg IIIC project Regional Framework Operation "BEACHMED-e" (2005-2008). A first version, "**Bologna Charter 2007**", promoted by the Emilia-Romagna Region together with a core partner Regions and Administrations, was prepared and signed within the RFO BEACHMED-e project Steering Committee in Bologna in February 2007.¹

A first updating of the policy document was prepared later on as "**Bologna Charter 2012**" to entail the new international and European policies connected to the sector and was developed within the MAREMED project (2010-2013) with the support of the FACECOAST Med-cluster. The "Bologna Charter 2012" was signed in March 2013 by 14 Regions and Administrations, within the project final event by the European Parliament in Brussels.

¹ "Bologna Charter 2007" - Regione Emilia-Romagna (IT), Regione Lazio (IT), Regione Toscana (IT), Regione Liguria (IT), Conseil Général de l'Hérault (FR), Service Maritime et Navigation du Languedoc-Roussillon (FR), Generalitat de Catalunya (ES), Region of East Macedonia and Thrace (GR), Decentralised Administration of Crete (GR), and adoption by Arco Latino.



Further adhesions occurred up to year 2018, bringing up to 30 at present the number of adherent partners² including the Intermediterranean Commission of the Conference of Peripheral Maritime Regions (IMC-CPMR), representing more than 40 Regions in the North, South, East Mediterranean area, and obtaining the acknowledgment by the Ministries of Environment of Italy, France, Greece, Israel and by the Ministry of Public Works and Communication of Cyprus.

In 2014 it was started the "**Bologna Charter Coordination Board**" within the Working Group on Maritime Integrated Policy and Transport, by the ICM-CPMR, with the aim to prepare a Joint Action Plan. The BC was set by Partners as one of the best practices to capitalise and the JAP was set among the outputs to achieve by the COASTGAP -Med program Capitalisation project- (COASTtal Governance and Adaptation Policies) in which a number of BC Partners participated.

The first version of the Joint Action Plan, prepared in 2014 thanks to COASTGAP within the Coordination Board meetings held in Bologna, Montpellier, Rome, other confrontation moments between BC partners and also with RITMARE project³, was presented in Brussels in March 2015 within the MED Program Capitalisation final event by the Committee of the Regions premises.

1.4 Main areas of cooperation

Main areas of cooperation to which the JAP refers are the ones outlined in the Bologna Charter initiative policy paper:

1. **Network of Coastal Observatories** for the monitoring, management of risks and erosion phenomena, defence interventions & sediment stocks management;
2. **Survey of the erosion status and trends** & flood hazard exposure, suitable for territorial planning and adaptation measures formulation;
3. **Sustainable use of strategic resources** like the coastal territory (to contrast the “littoralization” process) and coastal & submarine stocks of sediments (to contrast erosion and Climate Change impacts, favouring new market potentials development and job creation at Med level);
4. **Integrated territorial planning** and application of the principles of ICZM/MSP for the sustainable development of Med coasts, protection of environment and ecosystems, of landscape and cultural heritage, coastal adaptation to natural risks and climate change impacts;
5. **Structural works** along Med coasts consistent with integrated planning processes, for the implementation of an adaptation policy to the natural & anthropogenic risks;
6. **Project-clustering** for synergies and capitalization of outcomes and good practices

² “Bologna Charter 2012” - [joint signature 2013](#): Emilia-Romagna, PACA, Corsica, Region of Crete, Andalusia, Generalitat Valenciana, Region of Est Macedonia and Thrace, Department of Herault, Dubrovnik-Neretva County, Regions of Lazio, Liguria, Marche, Toscana, Province of Crotone; [adhesions 2013- 2017](#): IMC-CPMR, Regions of Puglia, Abruzzo, Calabria, Campania, Friuli Venezia Giulia, Balearic Islands, Generalitat de Catalunya, Ministry of Environment of Israel, Ministry of Public Works and Communication of Cyprus, Split-Dalmatia County, Sibenik-Knin County, Region of Western Greece, Sardegna, Attika.

³ RITMARE is the Italian Flag project on marine and coastal research financed by the Ministry of University and Research (MIUR).

The Joint Action Plan articulates the indications of the policy paper into several lines of action, defining “in-nuce” project initiatives to be applied in relevant EU Programs calls or to national and international funding sources, grouping them in 4 **Strategic Themes (ST)**:

ST1 - Developing Knowledge, network-based monitoring and Data Management systems;

ST2 - Sustainable use of strategic resources for the Blue Growth in the Mediterranean;

ST3 - Supporting Research & Innovation, Clustering and Implementation;

ST4 - Responding to the Challenge driven by Climate Change;

While the lines of action referred to the **STs from 1 to 3** are envisaged to be implemented through **interregional and transnational cooperation projects**, the lines of action of **ST4** are referred to **structural works**, Major Coastal Projects (**MCP**), and Monitoring & Management Plans (**MMP**), expressed as priorities by the BC partners along the regional coasts and envisaged to be implemented by national and regional investment funds.

1.5 Impacts on policies, initiatives and programs

The overall process of Vision and Strategy making was aimed at increasing the level of attention from the Commission and the National and Regional governments on the need for land-sea policies, including the availability of funding in specific objectives or measures in EU and national programmes.

The Bologna Charter is promoted in the **political declarations of the IMC-CPMR**. It is compliant with the **Mediterranean Strategy for Sustainable Development 2016-2025 (MSSD)** Objective1 “ensuring sustainable development in marine and coastal areas”.

A specific contribution was given by the BC initiative to the **MSP Directive** formulation, focusing on land-sea interaction by human activities and in particular on the importance of sediments for coastal protection and sea bottom aggregates (including off-shore sediment deposits) to be considered within maritime spatial planning processes, for coastal nourishment purposes.

The Interreg **MED Operational Program 2014-2020** acknowledges the Bologna Charter [*1.1.1.4 Assessment of challenges and needs for the Programme; 2.A.4 Investment priority 6.d*] as a reference initiative for regional cooperation on coastal risks and adaptation to climate change.

The **EU WESTMED initiative**, Framework for Action [*SWD(2017) 130 final*], quoted the Bologna Charter for Goal 3 with specific reference to coastal risks, also by harmonising and expanding the coastline knowledge monitoring systems for basin scale R&I activities (in synergy with BLUEMED initiative) and for expected shared strategies and tools for assisting adaptation to climate change in the Western Med region.

The BC Initiative was quoted in the conclusions of the **Union for the Mediterranean (UfM)** Working Group on **Blue Economy** (November 2017, Brussels) and of the Working Group on **Environment and Climate** (March 2017, Barcelona).

The BC was quoted also in the “**Athens Declaration for a Sustainable Tourism**” signed in October 2017 by the **MED Sustainable Tourism Community**, grouping all the thematic projects of the MED program, pledging for a greater engagement of policy makers and stakeholders of the Med region to make a change at policy and managerial level for a future of tourism more sustainable.

The Initiative through its members contributed also to the **EUSAIR** Pillars objectives and actions, for the specific BC’ sector - the strategy to which the EU programs as Interreg Adrion and CBC IT-HR looks for compliance of applied projects – and to the **BLUEMED** Strategic Research and Innovation Agenda (SRIA) formulation, with specific indications according with the BC themes today entailed among the 12 Goals and related actions of the SRIA.

The **BC Italian Regions network** also contributed to the start and smooth running of the **National Board on Coastal Erosion**, first initiative of this relevance in Italy, promoted by the IT Ministry of Environment and by coastal Regions (Protocol MATTM-Regions signed in 6 April 2016). The collaboration, also with ISPRA, the hydrographic District Authorities and the Universities and Research community, led to the production and issue in 2017 of the “*National Guidelines for coastal protection from erosion phenomena and for adaptation to climate change effects*” (www.erosionecostiera.isprambiente.it). Now the second step of the collaboration is looking to the constitution of the **National Observatory** on Coastal Erosion.

At present the aim of the BC initiative is to **strengthen the synergies and interactions with all the relevant initiatives at Mediterranean level**, in particular with **BLUEMED** research and innovation in the field (according with the ST3 of the JAP), the **WESTMED** initiative and the Working Groups of the **Union for the Mediterranean**.

Long term impacts are targeted also via new initiatives, one of these particularly significant is the **CO-EVOLVE project** compliant with ST2 action lines of the JAP, including specific sector-oriented actions on sustainable C&M tourism and coastal environment protection, together with other connected project initiatives downstream.

In fact, working for the transferability of the CO-EVOLVE approach (see chapter 2.3) and of the Bologna Charter Initiative to the Southern / Eastern rims of the Mediterranean (e.g. Tunisia, Lebanon, Montenegro, Albania, Algeria, Morocco), a wider project initiative was prepared “**Med Coasts for Blue Growth (MC4BG)**” *“Common approaches and planning tools to boost sustainable C&M tourism in the Mediterranean”* and advanced for the Union for the Mediterranean labelling process. It has been **officially labelled by the 43 UfM countries** at the Senior Officials Meeting in December 2017 by the UfM Secretariat in Barcelona, and under this umbrella also the ENI-CBC-MED proposal **CO-Evolve4BG**, approved ’19.

1.6 JAP implementation so far

Given the ambitious objectives in terms of financing resources needed for the overall implementation, since the beginning (2014) the JAP was thought to be implemented through diversified funding sources: European, national and international. This means a particular attention to the opportunities given by EU programs, direct funding and national funding programs, but also to other initiatives with high potential in multiplying the efforts to achieve objectives compliant with the BC-JAP. In

these few years a number of projects, funding and initiatives compliant and in line with the BC-JAP Strategic Themes from 1 to 3 have been started, involving several BC partners:



MEDSANDCOAST, ENPI Program funded project on “Coastal-marine resources for the strategic defence of Med littorals”, compliant with JAP Strategic Themes 1 and 2;



COASTALMAPPING, EC DG MARE direct funding project on “Assess availability of the current digital coastal maps in the EU, share coastal mapping through the EMODnet”, compliant with JAP Strategic Theme 1;



CO-EVOLVE, Interreg MED funded modular project on “Co-evolution of human activities and natural systems for the development of a sustainable coastal and maritime tourism”, compliant with JAP Strategic Theme 2;



CO-EVOLVE4BG, ENI CBC MED funded project on ICZM and Blue Growth, “Co-evolution of coastal human activities & Med natural systems for sustainable tourism & Blue Growth in the Mediterranean”, compliant with JAP Strategic Theme 2;



MC4BG – Med Coast for Blue Growth, labelled by the Union for the Mediterranean, common approaches and planning tools to boost sustainable coastal and maritime tourism in the Mediterranean, extending tools and methodology of CO-EVOLVE also in the South and East Mediterranean, compliant with JAP Strategic Theme 2;



MITOMED+, Interreg MED modular project aimed at building an integrated maritime-coastal tourism management model for the Mediterranean, in line with JAP Strategic Theme 2;



COASTING, Interreg MED funded capitalisation project based on the ICZM principles application aiming at enhancing the effectiveness of a multilevel governance tool like Coast Contract, framing coastal management and tourism sustainability issues, in line with JAP Strategic Theme 2;



CHANGE WE CARE, Interreg V A Italy-Croatia funded project, “Climate cHallenges on coAstal and traNsitional chanGing arEas: WEaving a Cross-Adriatic REsponse”, concerted and coordinated climate adaptation actions at transboundary level, tested in specific and representative pilot sites: analysis of state of art and of CC scenarios aimed to a participated design of adaptation strategies and measures for resilience increasing, compliant with JAP Strategic Theme 2;



BLUEMED Initiative, Research and Innovation for Blue Growth and job creation in the Mediterranean, initiative promoted by the EC DG R&I and Ministries of Research in EU Med Countries, **ECOMEDPORT** Start-up Action of CSA BLUEMED, in line with JAP Strategic Themes 1 and 3;



RITMARE, Italian Flag project on marine and coastal Research promoted and financed by the Ministry of University and Research and led by the It National Council For Research - CNR, in line with JAP Strategic Themes 1 and 3;



National Board on Coastal Erosion, established by the Italian Ministry of Environment and the 15 coastal Regions (Protocol undersigned in April 2016): Guidelines on coastal erosion and CC adaptation, and coastal Observatory, compliant with JAP Strategic Themes 1 and 2;

Concerning **Major Coastal Projects (MCP)** and **Monitoring/Management Plans (MMP)** referred to BC-JAP **Strategic Theme 4**, several actions are in development, started or completed.

MCP **Cyprus-01 “Larnaca North Coastal Redevelopment Project”** is **on the way of realization**. The master plan has been approved, the displacement of the energy and oil plants has been decided and some demolition works has started (February 2017), as well as works for coastal protection (November 2016). The Department of Town Planning and Housing started with the preliminary plans for the development of the area (planning zones agreed), including the plans for restoration of the coastal area interested. The total budget foreseen is about **50 M€**, of which an amount of about 2 M€ for the protection works in realization. The schedule foresees works until 2020-2021.

MCP **Herault-01 “Beach nourishment of sandy coasts in Herault Departement”** and MCP **Herault-02 “Protection du Lido de Maguelone à Frontignan”**: are **on the way of realization** - the coastal projects were included in Contrat de Plan Etat-Région 2015 – 2020 and in [PLAN LITTORAL 21](#) carried out by Region Occitanie. The schedule of works foresees the period 2017-2020 for the complete realization and together they represent an amount of about **43 M€**. Funding sources are from FEDER 20%, French State 30%, Region Occitanie 15%, Département de l’Herault 15% and local funds / Communes 20%. The sites of intervention along the 90 km of Department coasts are Lido de Frontignan, Maguelone, Carnon, Sète and Vias.

MCP **RER-02 “Extraordinary nourishment intervention on Emilia-Romagna coast with off-shore sand deposits”** **has been completed** in 2016. The intervention interested 8 coastal stretches in municipalities, for a total extension of about 11 km and a total of 1,4 Million of cubic meters of sand. It was financed with a total amount of **20 M€** (18,5 from State and 1,5 from regional funds) thanks to a Program Agreement between the Ministry of Environment and the Emilia-Romagna Region in the framework of “Programma Italia Sicura”. A monitoring program started in 2017, both on off-shore withdrawal areas and on nourished coastal stretches, to be completed in 2019, to assess the impacts and the efficacy of the intervention.

MCP **Split-Dalmatia-01 “Restoration of Kaštela bay coastline”** master plan has been defined. National **ERDF has been allocated**. The preliminary plan concerns coastal works, road network, town planning zones. The implementation of the project is scheduled by year 2020.

MCP **Lazio-01 “Tiber Major Project - environment restoration of Tiber river course and mouth coastal area”** **executive project completed** and funds (**4,8 M€**) were allocated by Lazio Region.

MMP **Catalunya-01 “The XIOM: regional coastal Observatory for the Catalan coast”** and MMP **Catalunya-02 “Towards a sustainable management and protection of the Tordera Delta coast”** received the allocation of the estimated budget, about **1 M€** for the first phase, and are now under development.

A new MCP is proposed by the **Region of Western Greece WG-01 “Protection and confrontation of erosion on Western Achaia coasts”** foreseeing studies and interventions on 13,6 km of coasts prone to erosion phenomena (Article 3 of the Greek Law 2971/2001) from Monodendri to Niforeika on the Western Achaia coasts, with an estimated budget of **20,5 M€** involving the Region, the Ministry of Infrastructures and Transport and the local Municipalities. The allocation of funds is pending.

A new MMP is proposed by **Region of Tuscany “Creation of a Coastal morpho-sedimentological Monitoring Plan at regional scale” Tuscany-MM01**, for supporting coastal monitoring activities, realizing a regional-scale monitoring of the entire coast that is carried out, every year, through the integration of in-situ observed data (surveys) and satellite data.

More info on the advancement of the MCPs and MMPs are included in **Annexes 3 and 4**.

2.COASTAL PROTECTION AND COASTAL-MARITIME TOURISM: CONDITIONS & DRIVERS FOR A SUSTAINABLE BLUE ECONOMY DEVELOPMENT

2.1 Framework

In the framework of the EU's Blue Growth Strategy, the coastal and maritime tourism is identified as a sector with particular potential to promote an intelligent, sustainable and inclusive Europe. Tourism is one of the fastest-growing industries in the Mediterranean - being the Med region a major world tourist destination - and contributes more than 350 Billion € annually to the regional economy. However, uncontrolled tourism development threatens important ecosystems (i.e. by air, water, waste, pollution, etc) especially in coastal areas, underlining the need for sustainable models that recognize the value of the services of the marine and coastal areas and protect them effectively⁴.

Tourism is expected to grow by around 2,9% per annum over the next decade, and related employment is expected to grow along with it at 2,8% per annum⁵. **This continued rapid growth has come at a high cost.** In all three sustainability dimensions – economy, environment and people – the Mediterranean is under significant stress⁶. Developing the tourism sector sustainability is essential to achieving MSSD⁷ Objective 1 “ensuring sustainable development in the marine and coastal areas”, as well as Objective 5 of a “transition towards a green and blue economy”.

On the other hand, and on the same land-sea ambitus, a highly dynamic and evolving environment, **coastal risks are rising driven by climate change effects.** These risks, including erosion, sea level rise, marine ingression, should be managed in an integrated and sustainable way in order to create and maintain conditions for a dynamic and contemporary evolution of anthropic activities, ecosystems and natural processes, while protecting and valorising environmental and cultural heritage in the coastal areas.

2.2 An integrated project initiative for the Mediterranean

The awareness of the challenge given by this framework, according to the BC aims and to the **JAP Strategic Theme 2**, inspired the preparation of the **CO-EVOLVE project**⁸ “*promoting the co-evolution of human activities and natural systems for the development of sustainable coastal and maritime tourism*”, now running (2016-2019) co-financed by the Interreg MED Program, as modular project, Study and Testing.

According to the aim of the Bologna Charter concerning the cooperation and role of the Med Regions, including the areas of the South and East Mediterranean, the facilitation of access to funding for common projects and investments within the identify strategy and action lines, the Co-Evolve project has been **designed to be replicated and extended from its start** to fulfil these objectives.

⁴ WWF Report 2017 - *Reviving the Economy of the Mediterranean Sea: Actions for a Sustainable Future*

⁵ WTTC (2016) - *Travel & Tourism: Economic Impact 2016, Mediterranean*

⁶ WWF Report 2017 – *ibid.*

⁷ *Mediterranea Strategy for Sustainable Development 2016-2025*

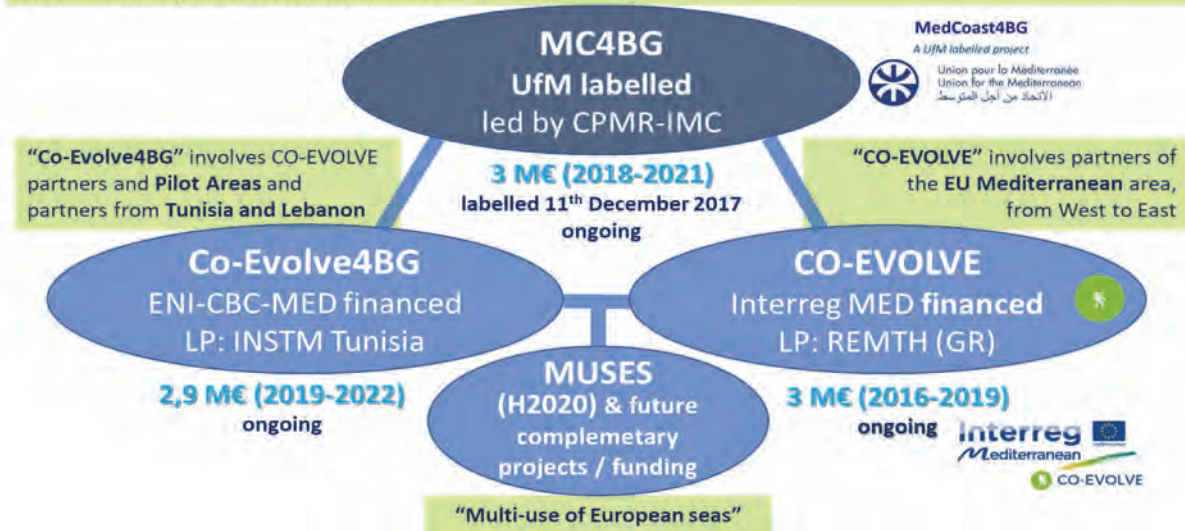
⁸ <https://co-evolve.interreg-med.eu/>

To this aim, on the basis of the **CO-EVOLVE work model**, has been prepared an umbrella project covering also the South and East rims of the Mediterranean **“Med Coast for Blue Growth” (MC4BG)** **“Common approaches and planning tools to boost sustainable coastal and maritime tourism in the Mediterranean”**. This project, given its relevance for the whole Med basin, was welcome by the UfM Secretariat and has been labelled (December 2017) by the Senior Officials of the 43 countries of the Union for the Mediterranean⁹.

The MC4BG project, led by CPMR-IMC, involving all the Co-Evolve Partners and further Partners from South and Est Med, responds to the priorities of the Union for the Mediterranean and more specifically to priorities identified in the **2014 UfM Ministerial declaration on Environment and Climate Change** and in the **2015 UfM Ministerial declaration on Blue Economy**, namely the use of marine spatial planning as a governance tool, mobilizing efforts towards adaptation to the impacts of climate change, and referring to coastal and maritime tourism among the main traditional and emerging economic sectors for the Blue Economy in the Mediterranean Sea.

In addition, to extend the CO-EVOLVE approach and methodology in the Med basin, the core partnership also prepared a **new proposal submitted under ENI CBC MED** call for projects, with the aim to complete the financing of the “MC4BG” UfM labelled project for possibly extending the activity on these topics until year 2022 on further Pilot Areas in the South and East of the Mediterranean.

MC4BG “Common approaches and planning tools to boost sustainable coastal and maritime tourism in the Mediterranean”
It responds to the priorities of the Union for the Mediterranean: UfM Ministerial on Environment and Climate Change (2014) and UfM Ministerial on Blue Economy (2015), namely the use of maritime spatial planning as a governance tool, mobilizing efforts towards adaptation to the impacts of climate change, and referring to coastal and maritime tourism among the main traditional and emerging economic sectors for the Blue Economy in the Mediterranean Sea.



These projects share an approach for Coastal & Maritime Tourism based on three main points:

- ❖ Sustainability
- ❖ Inclusivity
- ❖ Diversification

also making actions compliant with -and contributing to- **the UN Sustainable Development Goals 2030**.

⁹ <http://ufmsecretariat.org/project/medcoast4bg-med-coasts-blue-growth/>

More in particular:

- ❖ **Diversification** and de-seasonality of the C&M touristic offer, should see the Competent Authorities engaged with policies directed to:
 - promote/valorise the coasts, sea, islands, as well as the inland areas,
 - govern and regulate de-seasonality,
 - promote the development of alternative targeted/specific offers (cultural, historical, archaeological, traditional, gastronomic, cycling, trekking, etc.)
 - promote/propose thematic offers or integrated packages, suitable for different periods of the year.

- ❖ **Inclusivity**, an inclusive approach in C&M tourism development, in revising or designing new offers, should entail:
 - the valorisation of local communities, traditions, skills and competences of citizens and local operators,
 - activate Participatory Processes at local level to identify, and co-design options, touristic thematic-offers to be developed,
 - identify people and expertise to be involved, define roles and participation tools,
 - arrange and support local networks and connect local thematic-offers with the main touristic operators (national/international) proposals for the area.

- ❖ **Sustainability**: each C&M tourism activity, event, tour, package, offer, etc., should respond to the principles of social, environmental, economic sustainability, each activity
 - Social: decent jobs, good work conditions, adequate salaries, respect of rights of men and women employees in the sectors and in the linked activities.
 - Environmental: reduce/ limit resources consumption, water/air/soil pollution, ban any single-use plastics, operate a correct waste management, activate/educate tourists for responsible fruition of protected areas and ecosystems, etc.
 - Economic: adequate prize of the services, adequate allocation of the costs, adequate distribution of the incomes, to guarantee the wider benefits for the territory (maintenance, protection, etc.) and the local communities (welfare, education, wellness, etc.)



Contributions to the UN Sustainable Development Goals 2030

Some key messages

- The **development of C&M tourism** is accompanied by significant challenges (Coastal systems over exploitation, Biodiversity loss, Energy consumption and GHG -greenhouse gas- emission, Waste management, Water and other resources consumption, Cultural-historical heritage preservation and management, etc.), so the highest attention to sustainability is a must.
- Demand of **“greening”, sustainable, tourism** is more and more increasing;
- The development of a sustainable and more diversified C&M tourism has the potential to **create new qualified and decent jobs**;
- Investing in sustainable and diversified tourism can bring **new economic opportunities** for local operators and communities and for territorial-cultural valorisation;
- The **private sector, local stakeholders and communities** can and must be mobilized to support the development of integrated, alternative, new tourism proposals and offers;
- The **vision and the lead role of competent Authorities** is fundamental and pre-conditions to make possible the development of a diversified, inclusive and sustainable C&M tourism in local destinations.

2.3 The Co-Evolve approach for a sustainable tourism

CO-EVOLVE recognizes as a key challenge for sustainable coastal and maritime tourism development the **strengthening of cooperation among regions** and the joint development and transferring of approaches, tools, guidelines and best practices.

It couples a presently unavailable analysis at MED scale of **threats and enabling factors for sustainable tourism** with local studies on representative Pilot Areas, to demonstrate through pilot actions the feasibility and effectiveness of an **ICZM/MSP-based planning process**.

The **Threats analysed** are on:

- Climate Change and morphological instability,
- Littoralization and urbanization,
- Touristic fluxes and carrying capacity,
- Pollution and ecosystems,
- Conflicts in land-sea uses and interaction,

while **Enabling Factors** are mostly represented by measures taken to reduce those threats as for:

- Coastal protection and adaptation measures,
- Ecosystems protection,
- Water supply and depuration,
- Transport and accessibility,
- Governance: legal, administrative, financial.

Defining and quantifying tourism sustainability in the Mediterranean, it helps in developing a sustainability analysis method and a conceptual model for assessing the level of sustainable development of tourism setting up also an operational **Tourism Sustainability Toolkit**. This also helps the traditional sectors of the Blue Economy rearranging towards sustainability principles and approach. These approach and tools are used to quali-quantify the sustainability of tourism on the specific

Pilot Areas and address their **strategic planning**, so that going from global to local, and working on site with local communities through codified **participatory processes**, (see just as example, the EU JRC adopted “[Innovation Camp](#)” approach and technique) it is possible to achieve local action plans for sustainable tourism development having good chance to be implemented successfully thanks to the collaboration started-consolidated between local authorities, stakeholders and communities.

A **transferability plan at Mediterranean scale**, including operative guidelines, it is expected to disseminate the approach developing ICZM/MSP based action plans for sustainable tourism development in further Pilot Areas in the Mediterranean. At **Pilot area scale**, on the basis of the analyses conducted in collaboration with local Administrations and Research Institutions, it is important to define preliminary:

- the territorial scope, conditions of the Area and problems to be tackled (state-of-art);
- interaction between sectors and different interests in the Area;
- mapping of stakeholders;
- proposing a vision (for the Area in the future) to be shared;
- indications on strategic planning;
- proposing objectives, ideas to be shared.

All these elements are taken in consideration for preparing a **preliminary document**, building evidence and **setting the vision** – “*the coast we have, the coast we want*” - to share and to build on with stakeholders. An important step is then the **co-design of the participatory process** together with main stakeholders / local Administrations, that could be different by local assets and conditions from site to site. The support of expert facilitators can be determinant in this phase as well as in the conduction of a proper participatory process. Properly run the participatory processes with stakeholders and local communities - through local meetings, participatory workshops, bilateral meetings, on line consultation tools etc. - to share the framework (the preliminary document/vision) and building on for the **formulation of local Plans**: actions and measures **to foster sustainable tourism-driven development** for the specific Area, even with specific agreements between local actors, Institutions, local Administrations, for its implementation in the future.

This approach and work method can be a change of paradigm for many sectors and activities on the coastal and maritime space and fully exploiting the Blue Economy potential at local level, reducing the impacts on the ecosystems, preserving the environment and the cultural heritage, promoting the creation of new markets and jobs, creating a smarter and inclusive development, more wellness and more safe life conditions in the Mediterranean coastal areas, that is the main aim of the Bologna Charter initiative policy paper.

2.4 A MED regional Community to make Tourism more Sustainable

The **MED Sustainable Tourism Community** was created in November 2016 within the Interreg MED Programme and co-funded by the European Regional Development Fund (ERDF). The Community comprises all projects financed within the Med Program’ Strategic Objective on sustainable and responsible tourism (including CO-EVOLVE), and will develop in the future with new financed projects. It involves, at this first stage, more than a hundred partners, **policy makers, private sectors, universities and civil society**, within 14 projects in nine European countries facing the Mediterranean Sea.

Concerned by the economic growth of the whole region, by the preservation of the tangible and intangible cultural and natural heritage and by the socio-economic sustainability of the tourism industry, the MED Sustainable Tourism Community is joining forces to attain four goals:

1. contributing to address tourism pressures,
2. enhancing attractiveness and tourism offer,

3. strengthening planning and management practices towards sustainable tourism,
4. building a strong community of projects and stakeholders.

This also being in line and strictly connected with the Med Coasts development sustainability outlined in the Bologna Charter principles and objectives.

The [MED Sustainable Tourism Community](#) is promoting the “[Athens Declaration for a Sustainable Tourism](#)”, the first joint effort of the Community calling for a greater engagement of all the key actors and stakeholders of the tourism sector at local, national and European level, to make a change at policy and managerial level towards a more sustainable tourism.

Moreover, particular attention and collaboration on the themes of the BC-JAP are developing with [PAMORAMED](#) the MED program project on **governance, maritime surveillance and coastal and maritime tourism** (started in September 2017), also laying the basis and objectives for the programming period post 2020.



THE MED SUSTAINABLE TOURISM COMMUNITY

Tourism sector is amongst the highest income generators in the Mediterranean. Leisure related activities make tourism a leading economic sector in terms of gross value added and employment. Tourism contributes directly to regional economies with sectoral synergies and strong multiplying effects.

Despite its economic and social importance, tourism development is exerting undue pressures on natural and built environment. These pressures may threaten the quality of life of local populations, degrade the tourism assets and, by consequence, affect negatively future tourism developments. Exploiting the full potential of tourism requires an innovative approach and sustainable basis. Therefore, effective strategies and targeted integrated actions should be developed and implemented across the Mediterranean region.

“ Our aim is to study, test and capitalise innovative instruments and actions towards the enhancement of tourism sustainability in the Mediterranean. ”

With this common objective, 17 Modular Projects (MPs) are implemented under the Interreg Med Sustainable Tourism Community.

ALTERECS (Alternative tourist strategy to enhance the local sustainable development of tourism by promoting Mediterranean identity), **BLUEISLANDS** (Seasonal variation of waste as effect of tourism), **BLUEMED** (Plan/test/coordinate Underwater Museums, Diving Parks and Knowledge Awareness Centres in order to support sustainable and responsible tourism development and promote Blue growth in coastal areas and islands of the Mediterranean), **CASTWATER** (Coastal areas sustainable tourism water management in the Mediterranean), **COASTING** (Coastal INtegrated Governance for Sustainable Tourism), **CO-EVOLVE** (Promoting the co-evolution of human activities and natural systems for the development of sustainable coastal and maritime tourism), **CONSUME-LESS** (Consume Less in Mediterranean Touristic Communities), **DestiMED** (Mediterranean Ecotourism Destination: main components (joint planning, monitoring, management and promotion) for a governance system in Mediterranean protected areas), **EMbleMat©** (Emblematic Mediterranean Mountains as Coastal destinations of excellence), **HERIT-DATA** (Sustainable Heritage Management towards Mass Tourism Impact thanks to a holistic use of Big and Open Data), **INHERIT** (Sustainable Tourism Strategies to Conserve and Valorise the Mediterranean Coastal and Maritime Natural Heritage), **MEDCYCLETOUR** (MEDiterranean Cycle route for sustainable coastal TOURism), **MEDIPEST** (MED Culinaty heritage experiences: how to create sustainable tourist destinations), **MIQMED** (Models of Integrated Tourism in the MEDiterranean Plus), **ShapeTourism** (New shape and drives for the tourism sector: supporting decision, integrating plans and ensuring sustainability), **SIROCCO** (Sustainable InterRegional cOastal & Cruise maritime tourism through Cooperation and joint planning), **TOURISMED** (Pêche Tourisme pour un développement durable dans la région méditerranéenne).

3.A STRATEGY FOR DEVELOPING KNOWLEDGE, MONITORING SYSTEMS AND ACTIONS FOR ASSISTING CC ADAPTATION, RESILIENCE AND PROTECTION OF THE MEDITERRANEAN COASTAL AREAS

3.1 Introduction

The protection and adaptation to climate change of the coastal areas is a basic condition for a sustainable development of the blue economy and for the Blue Growth in the Mediterranean.

The **Framework for Action** of the **West Med initiative**¹⁰ indicates the Bologna Charter as one of the reference initiatives, together with the BLUEMED SRIA, for maintaining updated data/information on **erosion phenomena and coastal risks** by harmonising and expanding the coastline monitoring systems for basin scale R&I activities, and to jointly develop robust and **shared strategies and tools for assisting adaptation to climate change and protection of coastal areas in the Med region**.

In 2015-2016 the Italian regional network of the Bologna Charter initiative contributed to the start and smooth running of the **Italian National Board on Coastal Erosion**, promoted by the It Ministry of Environment and Territory and Sea protection, that issued the **National Guidelines for coastal protection from erosion and climate change impacts**, published in 2017 and updated in 2019.¹¹

These Guidelines, produced by the 15 It coastal Regions and the Ministry, supported by ISPRA, with the contribution and experiences of the River Basin Authorities and the Research and Scientific community (CNR-ISMAR, Universities, coastal engineers and geomorphologists, research centres) represent a concrete contribute, to be shared/**proposed to the attention of the Med community, in terms of approach and strategy for assisting adaptation to climate change in the region**. Here is provided an overview and in **ANNEX 5** are provided more details on the main indications of these Guidelines with the aim of sharing and contributing to its diffusion and discussion in the Med area.

3.2 An integrated approach to coastal protection and management

The proposed Guidelines are based upon **experiences and best practices developed in recent decades**, with particular attention to the actions of protection that concern the **control of the coastline**, the **rebalancing of the sediment cycle**, the **adaptation of the coasts** in relation to the physiographic context, the **degree of effectiveness and durability of the different solutions**.

This approach underlines the importance of develop and update the **knowledge system**, the **monitoring** of phenomena and of physical and environmental factors, the assessment of **criticalities** and of the **sustainable solutions** and measures. All these elements are components of the **planning process**, having identified a vision with **stakeholders and local communities** and individuated together a **strategy for protection, adaptation and sustainable development** for the coastal areas and maritime space.

¹⁰ Initiative for the sustainable development of the blue economy in the western Mediterranean [COM\(2017\) 183 final](#), Framework for Action [SWD\(2017\) 130 final](#)

¹¹ National Guidelines published in www.erosionecostiera.isprambiente.it

These elements and indications are detailed in the mentioned Guidelines and valuable for the Med region. Planning, aimed at identifying and implementing actions for the solution or reduction of different critical issues regarded as "not acceptable", is a **crucial process which, through the analysis and assessment of the current situation, allows to shape a shared future vision -agreed upon by public bodies and stakeholders-** (Fig. 3.1) to achieve safety, protection and adaptation objectives taking into account the effects of the expected climate change.

The Guidelines on coastal erosion are also focused on the Integrated Coastal Zone Management - **ICZM processes and principles** - necessary to operate according to a unified and integrated vision of the various anthropogenic and natural factors that interact on the coast, in particular, and with particular emphasis, also by addressing the coasts erosion and CC adaptation issues.

The **land-sea interaction implications** are

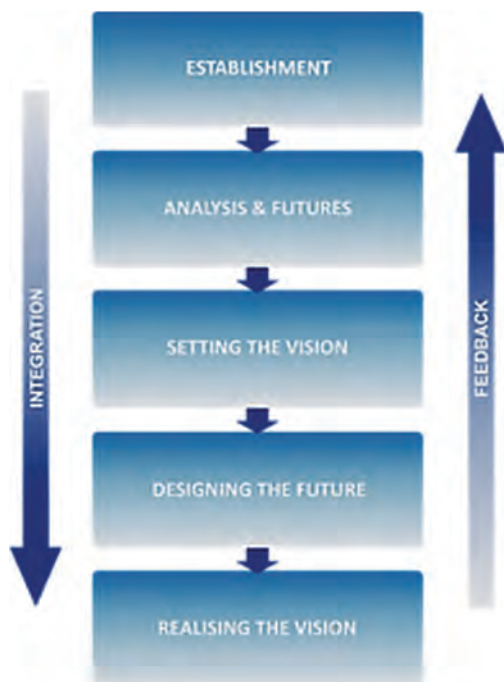


Fig 3.2 ICZM Process diagram
http://www.coastalwiki.org/wiki/ICZM_Process_diagram



Fig. 3.1 Proposed scheme for a correct approach to the assessment and management of coastal areas

also considered to this extent, as well as implications of **human activities** in the sea, **resources available** for coastal protection (beach nourishment) and Maritime Spatial Planning -**MSP principles** application (MSP Directive). The **ICZM Protocol in the Mediterranean** -of the Barcelona Convention- sets out an **ICZM process** as summarized in the diagram (Fig 3.2), a specific approach, behavioural principles and guidance for the public authorities, businesses, enterprises, stakeholders, citizens, in order to achieve a proper degree of sustainable development of coastal zones, through an integrated planning process. The **sustainability of development in a coastal zone** means that the coasts themselves should be:

Resilient - able to adapt to future uncertainties deriving from climate change, including Sea Level Rise, warming and drought; resilient to climate variability, such as extreme events, sea storms, floods, waves, resilient to earthquakes and coastal erosion; resilient to the negative impact of human processes, including the pressure exerted by tourism and urban development along the coast;

Productive - financially productive in traditional, modern and future, economic sectors; able to cope up with the economic aspirations of the coastal communities, to provide a competitive asset to the local economy with a rich content of natural and economic values, to enhance well-being and to reduce poverty;

Diversified - ecologically diversified, a mosaic of land and sea ecosystems, of different urban and rural, old and new landscapes; a diversified economy, able to guarantee an open society and a variety of social groups, with a distinct Mediterranean characterization;

Distinctive - maintaining the cultural specificity of coastal areas, including architecture, traditions and landscapes;

Attractive - maintaining the attractiveness of the coast, not only for visitors but also for local residents and investors, to promote a self-sustaining cycle of sustainable growth;

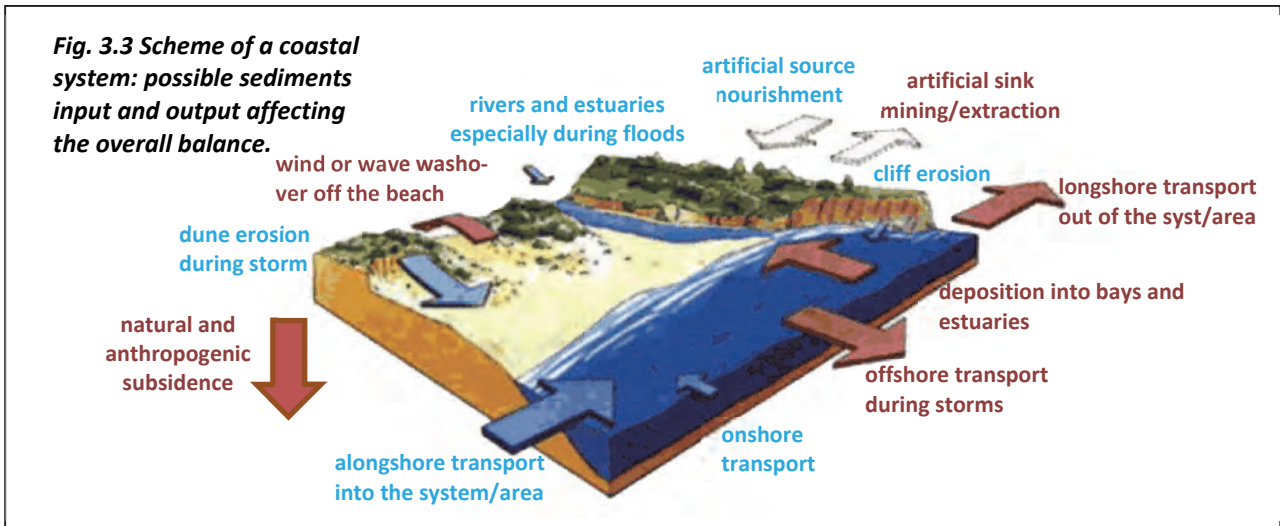
Healthy - free from land and marine based pollution sources, providing clean air, fresh and salty sea water, a healthy environment for people, for natural resources, such as fishing, and for wildlife.

3.3 Guidelines on coastal protection from erosion and climate change impacts (overview)

The “*Guidelines on coastal protection from erosion and climate change impacts*” keeps this integrated approach as reference in defining the strategy against coastal erosion, for balancing the coastal systems (Fig. 3.3) and for assisting adaptation to climate change. They represent a heritage of **indications based on experiences, good practices, technical and scientific knowledge**, ripened by public administrations, research bodies and institutions, shared for the benefit of all coastal Administrations in the Mediterranean. Along with this concept and aim, while defining the land-sea scope, the necessary knowledge development, the monitoring systems (please see ANNEX 5 for more details), the Guidelines identify, describe and arrange a wide number of **good practices for an integrated approach to coastal protection and adaptation** that are summarised in the following points and scheme, better described in Annex 5. They contain indications and good practices on:

- development of the **knowledge framework**, evaluation of erosion phenomena and sediment needs;
- evaluation of **environmental and economic aspects** related to coastal protection and adaptation works;
- legal framework and **regulatory gaps** to be filled to favour an effective integrated management;
- good practices for the **management and adaptation of the coasts**, prevention of risks related to coastal erosion

Both rocky and sedimentary coasts are considered, but with a focus on low quota sedimentary coasts, the most exposed to sea level rise, erosion, and climate change impacts. Management and adaptation of the coasts are proposed through an **integrated approach** (Fig. 3.4) considering measures for **reducing losses of sediments from the littoral systems**, on one hand, and measures for **feeding them artificially or allowing natural processes**, on the other hand.



REDUCTION OF LOSSES

	AMBITS OF ACTION	POSSIBLE ACTIONS / MEASURES
RP - REDUCTION OF COASTAL SEDIMENT LOSSES FROM THE SYSTEM	RP-1 Managing beach sediments	RP-1.1 Beach cleaning operation
		RP-1.2 Construction of wind traps
		RP-1.3 Construction of winter embankment defense works
	RP-2 Reduction of subsidence	RP-2.1 Reduction in groundwater withdrawals, water supply infrastructures
		RP-2.2 Hydrocarbon Extraction Control, regulation
		RP-2.3 Mitigation measures, regulation
	RP-3 works to reduce losses and re-treating of the coastline	RP-3.1 Interventions and works to reduce the energy of incident waves
		RP-3.2 Interventions and works for the reduction of coastal sediment transport

FEEDING THE SYSTEM

	AMBITS OF ACTION	POSSIBLE SOURCES / MEASURES
AS - COASTAL SYSTEM NOURISHMENT	AS-1 Contributions from sediments stocks external to the coastal system	AS-1.1 Offshore Deposits management and cultivation for beach nourishment
		AS-1.2 River sediment transport enhancement (actions aimed at restoring) for natural beach nourishment
		AS-1.3 Excavations in the coastal hinterland, using sediments for nourishment
AS-2 Contributions from sediments stocks internal to the coastal system <i>(Management of coastal sediment and littoral accumulations)</i>	AS-2.1 Surface Coastal Deposits along the littorals of the coastal system	
	AS-2.2 Submerged coastal Deposits, submerged fans, accumulation nearby coastal protection works or harbor works	
	AS-2.3 Hydraulic management, dredging for and navigation safety	

Fig. 3.4 - Measures for balancing and managing of the coastal systems are summarised in the following scheme for more details please see Annex 5

A negative sediment balance in a coastal area is likely to lead to erosion and to an increased threat from flooding. The Guidelines (summarised in Annex 5) recommend and give indications on how to operate in order to counteract the negative trends, where occur, identifying and managing all the possible sources of sediments as “strategic sediment reservoirs”, that could be:

- offshore (on the seabed);
- within the coastal system (cliffs, banks, dunes, beaches, etc.);
- on the hinterland (rivers solid transport, dams, excavations, etc.), especially when the other sediment reserves are considered insufficient.

The Guidelines are also supported by specific technical annexes on:

- development of monitoring and knowledge systems,
- coastal works classification and efficiency evaluation elements,
- location, overall characteristics and dimension of offshore sediment deposits,

and are also subjected to a continuous updating of information and good practices by interaction between the different stakeholders and main actors, Ministry, coastal Regions, ISPRA, Basin Authorities, Research and Scientific Community.

4. ECOSYSTEMIC APPROACH: A CONSISTENT APPROACH FOR THE BC-JOINT ACTION PLAN

4.1 Introduction

Ecosystemic approach (EcAp) is a form of environmental policy making that promotes cooperation between territories and Administrations. It is widely recognised that marine and terrestrial ecosystems’ processes are not subjected to administrative borders. Beside the fact that adopting the EcAp is a correct way to operate for environmental governance, in accordance with EU Directives and Barcelona Convention, the Bologna Charter Joint Action Plan (BC-JAP) with the ecosystemic approach also gets a geographical consistency.

The EcAp allows a multi-scale approach in which local, regional and multiregional projects make sense because the ecosystem and the effects of human being activities link them. The way to achieve it implies the establishment of a **cooperation network between coastal Administrations**, as the Bologna Charter aims, and also a **network of observatories** not only to improve knowledge but also to monitor the ecosystems status with appropriate indicators.

The definition of the spatial scope of a “**Macro-Project**” (considering the BC-JAP as a Marco-project for the Mediterranean) is to be done in accordance with the regions and sub-regions which have been defined by MSFD. It could also cover unions of a subdivision of these regions or sub-regions as long as they are consistent with ecosystems: the **West Med** (Western Mediterranean Sea), the **Adriatic** Sea, the **Ionian** Sea and the **Central Mediterranean** Sea, the **Aegean-Levantine** Sea. As it is in accordance with ICZM, the BC-JAP Macro-Project takes in account for its “land” part the shoreline of the abovementioned sub-regions.

4.2 Matching of BC-JAP with EcAp principles

The following tab presents in which way Bologna Charter is in accordance with EcAp and what can be improved in the scope of the BC-JAP Macro-Project regarding the existing projects and initiatives.

Principles of the ecosystem approach	First elements of compliance with EcAp in existing projects and initiatives	Further improvements within the BC-JAP scope
1 - The objectives of management of land, water and living resources are a matter of societal choice .	<i>“Coastal zones are strategic fields for the harmonic and sustainable development of territories and people of the entire Mediterranean area”</i> , Bologna Charter springs from MED coastal administrations directly concerned in societal matter	If regional and local coastal administrations are directly involved, national level is also concerned in accordance with its administrative competencies. The JAP’s scope has also to be in accordance with the share of competencies for the sea .
2 - Management should be decentralized to the lowest appropriate level.	Bologna Charter typical bottom-up initiative promoting decentralization and cooperation between territorial governance levels.	Decentralization of competences and cooperation means consistency in project conduction, and, in accordance with national guidelines. That means also a top down guidance.
3 - Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems	ICZM-MSP principles and approach is one of the central point of the Bologna Charter and its JAP	It must also take in account human being in the ecosystem in order to appreciate the effects. Stakeholders have to be involved . In order to implement ICZM or MSP, dedicated governance mechanism has to be established. It should be done in accordance with MSFD scheme.
4 - Recognizing potential gains from management , there is usually a need to understand and manage the ecosystem in an economic context. Any such ecosystem-management programme should:		An economical definition of the services, which can be provided by ecosystems, could make sense to politics to appreciate the level of benefits from environment balancing the cost of the human activities impacts .
<ul style="list-style-type: none"> • Reduce those market distortions that adversely affect biological diversity 	e.g. avoiding coastal hard defences affecting natural sediment transport / balance and e.g. designing new strategies for CC coastal adaptation	The environmental status has to be established in order to pre-evaluate and appreciate the effects on biological diversity by solutions adopted .
<ul style="list-style-type: none"> • Align incentives to promote biodiversity conservation and sustainable use 	e.g. promoting the sustainable use of sediment sources and e.g. promoting the sustainable use of the coastal territory	Disseminating actions in benefit for biodiversity with measurements of the effects
<ul style="list-style-type: none"> • Internalize costs and benefits in the given ecosystem to the extent feasible 		Definition and economical valorisation of ecosystem services which can be provided by biodiversity
5 - Conservation of ecosystem structure and functioning , in order to maintain ecosystem services, should be a priority target of the ecosystem approach	e.g. the analysis and management of the coastal sediment balance in order to maintain the natural equilibrium and coastal natural protection.	A global approach has to be promoted then with a cross-cutting analysis with coastal sediment issues .
6 - Ecosystems must be managed within the limits of their functioning	careful management of the coastal zones and the concerned sediment balance in terms of quantity and quality	Modelling of the global impacts on the environment. It is important to balance the actions with the global consequences .

<p>7 - The ecosystem approach should be undertaken at the appropriate spatial and temporal scales.</p>	<p>need of a MED scale and a long-term initiative like the BC - Joint Action Plan, focused of Med coastal areas, the impact on ecosystem is dependant of the scale</p>	<p>A multi-scale approach must be implemented. MSFD identified 4 sub-regions:</p> <ul style="list-style-type: none"> - the Western Mediterranean Sea; - the Adriatic Sea; - the Ionian and the Central Med Sea; - the Aegean-Levantine Sea (East Med).
<p>8 - Recognizing the varying temporal scales and lag-effects that characterize ecosystem processes, objectives for ecosystem management should be set for the long term.</p>		<p>It is a multi-scale approach, which has to be implemented. The level of response on the ecosystem is dependant of the scale because of interactions. That means that ecosystem's monitoring must be adapted to track both local and global effects as those of the short and long term.</p>
<p>9 - Management must recognize that change is inevitable</p>		<p>Monitoring ecosystem status means that change is inevitable. As a consequence, administrations and society have to adapt.</p>
<p>10 - The ecosystem approach should seek the appropriate balance between, and integration of, conservation and use of biological diversity</p>	<p>e.g. The strategic use of the MED marine sand deposits to face the CC effects by an adaptation policy based on beach nourishment or strategic retreat</p>	<p>It can be also considered a strategic retreat regarding not only the efforts which have to be done to adapt but also the impacts on ecosystems by retreating</p>
<p>11 - The ecosystem approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices</p>	<p>BC network activities, PEGASO platform, MSP Platform, UfM Virtual Knowledge Centre (VKC) help as infrastructures to collect and deliver information</p>	<p>Assessment of the environmental status: overall state of the environment in marine waters, taking into account the structure, function and processes of the constituent marine ecosystems together with natural physiographic, geographic, biological, geological and climatic factors, as well as physical, acoustic and chemical conditions, including those resulting from human activities inside or outside the area concerned. Provide and consolidate information in order to monitor the environmental status and evaluate the way to reach the good environmental status.</p>
<p>12 - The ecosystem approach should involve all relevant sectors of society and scientific disciplines.</p>	<p>PEGASO platform, European projects, BLUEMED Initiative, projects clustering etc.</p>	<p>It can be achieved by the implementation of ICZM-MSP principles, with involvement of stakeholders, associations, policy makers, scientific community.</p>

Adaptation to climate change effects implies not only territory and environment but mostly the society. The EcAp provides a way to get geographical consistency. In the “Macro-Project”, and related Joint Action Plan project lines, it is also important to take in account the impact of - and on- the human being activities. Project lines are focused not only on environmental issues but also on social ones, in an integrated way.

5. EUROPEAN STRATEGIC PROJECTS: COASTAL ADMINISTRATIONS AS PROMOTERS OF MACRO-REGIONAL INITIATIVES AND PROJECTS

The difficulties to effectively intervene in integrated “framework” macro-areas like the Mediterranean basin, are evident in the effort to redesign the European programs geography for the period 2014-2020 and beyond. This maybe **facing also a feared, possible and not-welcome, reduction of EDRF budget and announced grouping of financial Programs**. The hypothesis to include Macro-Projects in macro-regional contexts is a clear attempt to find new and more favourable settings for long-lasting and efficient outcomes, beyond the single European financing Program and related borders.

The widespread adoption of the term “strategic” in several European programs (ENI-CBC, INTERREG, ADRION, ITALY-CROATIA, IT-FR Maritime, H2020, etc.) stands for an **action aimed to increase the effectiveness of the EU funded projects**. Nevertheless, we still lack the elements required to achieve real progress; and the elements suggested basically reproduce those adopted by traditional projects, often only emphasising them in terms of budget and allowed number of partners.

Moreover, the strategies currently adopted for many of the programmes and initiatives (e.g. INTERREG, H2020, Copernicus, EMODNET) are **oriented for a stronger connection between the outputs and their real capacity to be put in practice** (mainstreaming) and be clearly useful for the users and really fostering the blue and green growth. In fact, many important European initiatives suffered from a lack of practical impact on the investigated territories.

Thus, if the Mediterranean Administrations intend to play a key role in the Mediterranean policy, they are first of all required to **promote projects whose strategic nature stems directly from real needs and their self-capacity in sharing visions, solutions and methods to overcome territorial challenges** in consistent geographical approaches.

The Mediterranean Administrations, on the grounds of their experience in cooperation, capacity to link with scientific Community, and territorial competence, can **promote strategic initiatives** (as a macro-project) mainly featured as follows:

- **Coherent ensemble of studies, researches, projects and works** aimed to face strategic operations by an integrated approach and to be developed at macro-regional level and in accordance with strategies of upper level.
- **Clear coherence with the most relevant European policies on coastal zones** (like Adaptation to CC, Integrated Maritime Policy, Maritime Spatial Planning, ICZM, Marine Strategy and Water Framework Directives, etc.) in order to be consistent with the current European operational programmes and be eligible to be funded by them (*a strategic macro-project is indeed designed to be funded by more funding channels, also European/International programs, according to a suitable articulation, budget and time extension adequate to its objectives*).
- **Clear coherence also with Barcelona convention and its protocols** (ICZM and its Article 8) in order also to link actions in accordance with Ecosystemic Approach (EcAp) and to be consistent with UNEP organisations’ actions (i.e. PAP/RAC, Plan Bleu, SCP/RAC) and by this way enhancing relations with EU Non Members States.
- **Deep connection with the South and East shores of the Mediterranean** and consistency with the six priority project lines outlined by the Union for the Mediterranean and in particular with Civil Protection project for the effects of climate change and with Blue Economy (to be enhanced also through working groups linked to ARLEM-UfM)



- **Innovative content thanks to a strongly territorial and participated path**, explicitly endorsed by public and private operating bodies (protocols between States, Regions, Departments, Municipalities, local Communities, Entrepreneurs, Associations, etc.) and their active involvement according to the principles of policy-innovation, open-communication, etc. (Living Lab)
- **Possibility of mutual integration with other macro-projects in order to encourage and facilitate macro-regional policies** with multi-sector approach (networking between States and/or Regions) able to enhance the strategic contents in terms of thematic integration and geo-political diffusion with the necessary flexibility.
- **Designed to be stable** through the potential Implementation of specific clustering structures (like PEGASO platform, MSP platform, VKC, etc.) or the creation of one (like EGTC -European Grouping for Territorial Cooperation) able to manage long-term initiatives (coastal network observatories, specific programs, etc.)

5.1 Looking to macro-regional and sea basin strategies in the Mediterranean

Looking forward to the **EU macro-regional strategies**, the BC initiative responds to the need to foster and to activate advanced cooperation tools (as the Macro-Projects, strategic) to make the actions taken by the coastal Administrations more efficient in dealing with the adaptation to climate change through a coastal and maritime space integrated management and protection of the marine environment, in order to contribute in developing the conditions for the Blue Growth in the Med basin.

Regarding the discussion on the **macro-regional strategy for the Mediterranean**, it is considered positively the political message adopted by the InterMediterranean Commission on Macro-Regions in the Mediterranean as follows:

- the **variable geometry** characteristic for the proposed strategy: a global Integrated Mediterranean Strategy in the long-term perspective that should include three short/medium term oriented strategies (the Adriatic-Ionian Strategy, the West Med, the East Med);
- the **balanced multilevel approach** top-down and bottom-up and the need to set up public/private synergies;
- the **gradual "step by step" voluntary approach** to be applied to the MRS strategy concerning cooperation with the southern countries and territories;
- the **synergies** to be set up **with Territorial Cooperation programmes** in the area, the mainstreaming and the importance of capitalisation of previous projects/initiatives;
- the need for **thematic concentration** and some of the possible major priorities for the macro-regions: decontamination, transport, energy efficiency, the adaptation to and fight against the climate change, amongst others that could be defined in the future.

In this frame, the JAP of the Bologna Charter aims to contribute in defining the common challenges to be addressed and the actions to be implemented, especially in **mitigating risks related to climate change effects** and urban pressure along the Mediterranean coasts, and in indicating the way how to deal with, through the **promotion and strengthening of the cooperation between Med Coastal Administrations**.

In the medium-short term, and as a second step towards emerging Macro-Regional Strategies in the Mediterranean (following the ongoing implementation of the EUSAIR strategy), a **Sea Basin Strategy for the Western Mediterranean** should also be considered as wind of opportunity for strengthening the cooperation starting from maritime affairs. In this sense, the JAP could contribute consistently to its definition and future implementation.



5.2 A way to promote integration in the macro regional strategies

Integration in policy definition means an integration of scales, an integration of sectors either of transverse axes in order to take in account their interactions and to get consistency in their own definition or declination. Common tools covering **knowledge, surveillance, evaluation** and **funding** support this policy and its declinations as it is presented on the following scheme.

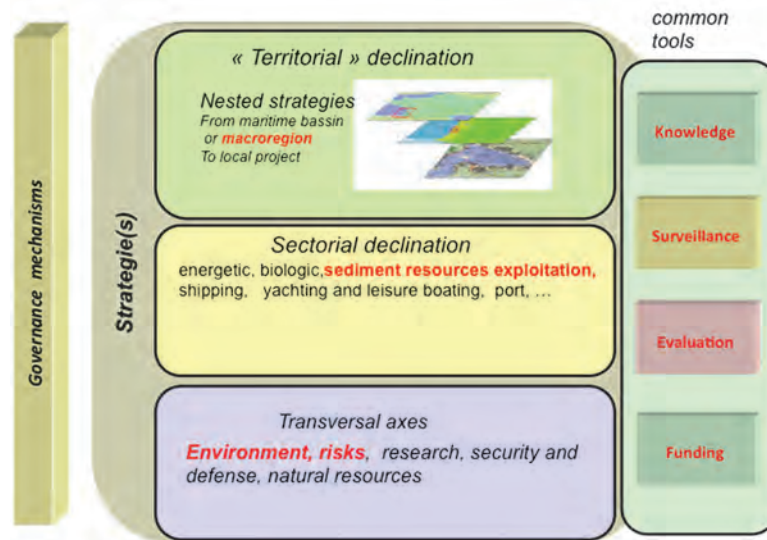


Fig. 5.2.1: global view of Integrated Maritime (and Coastal) Policy

The items, which are taken in the project lines of the BC-JAP “Macro-Project” (highlighted in red in Fig 5.2.1), interact each other: the environment and risks protection purposes (cross-cutting issues), the mineral resources exploitation (sectorial) within a territorial approach (macro-region) and its nested declinations.

The next scheme (Fig. 5.2) shows the **global scope of the BC-JAP** with its potential partners, the shared tools and area of interest, highlighting the nested relationship between levels. The extension of the Bologna Charter intends to enlarge the cooperation space in the Med, sharing vision, strategy, objectives and actions.

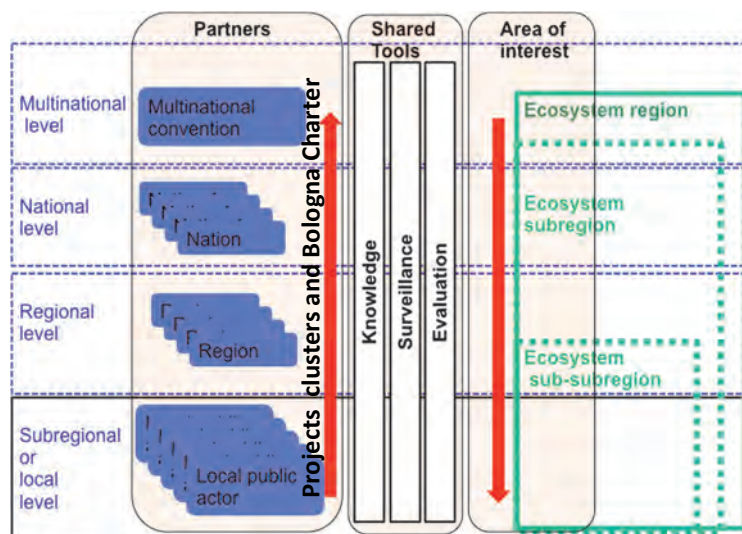


Fig. 5.2.2: BC-JAP Macro Project scope

6. JOINT ACTION PLAN FRAMEWORK AND APPROACH

6.1 Joint Actions support regional cooperation and clustering initiatives

The Administrations involved in the Joint Action Plan represent the **diverse geographical conditions, coastal assets and resources** in the European Mediterranean. The objective of the Bologna Charter to extend the cooperation space also towards the North Africa and Mid East Mediterranean regions, translated in the invitation to those Administrations in participating in the work of the Bologna Charter Task Force working group (by the Intermediterranean Commission of the CPMR) even not being yet signatories of the Charter but participant in the IMC. This pushes subjects already involved in considering also other specific conditions and coastal assets in the Med area. This enhancement of partnerships is done in accordance and consistency with other existing cooperation framework (Barcelona Convention for instance).

Even though there are significant differences between the States or Regions, that come from different competences and coastal territory features (tourism development, urbanisation of the coastal belt, contribution to the regional economies, development of maritime industry and transports, coastal vulnerability, etc.), all of them are sharing the same ecosystem on which activities and climate change have impacts on.

Moreover, for low-land sedimentary coasts, **sediment stocks represent a strategic resource** and its availability is crucial for all Administrations dealing with coastal erosion, coastal environment and ecosystems preservation, adaptation to climate change and protection of their littorals, together with other type actions in the long term, different from coastal nourishment, and dealing with territorial policy re-arrangement. For cliff and rocky coasts, the availability of sediments is less significant (except for cases of pocket beaches) and the coastal Administrations necessarily focus on type of actions mainly dealing with **territorial policy re-arrangement for facing climate change impacts**.

The challenge of coastal adaptation to climate change, for both coastal configurations, it is obviously played in the long term, through an overall reorganization of policies for the management of the territory, from the waterfront to a river basin scale approach. In this perspective, the practice of coastal nourishment, **for low-land sedimentary coasts** (management of coastal sediments and new sediment inflow in the coastal system from off-shore reservoirs) allows the coastal Administrations giving answers in the short and medium term (in a more suitable and environmental friendly way, compared to traditional interventions) to those territorial safety needs that our shores and our citizens manifest, and **giving the time to the territorial policies re-arrangement to exert their effects in the long term**.

Anyway, even given the different situations and policies to be applied, the following common needs are individuated by coastal managers in the Administrations:

- Reliable and updated surveys and data;
- Researches applied to management issues;
- Innovation in dealing with coastal issues such as safety of population and settlement, loss of territory by erosion, marine ingression and inundations.

Taking into account the scale of the phenomena and the ecosystem approach, the availability of resources and the need of an integrated approach (both for efficacy and economy of actions) the

maritime Administrations are called to **join efforts, widen their vision/approach** to a basin or marine region or its subdivision scale, **create synergies**, in order to better face the challenges brought by climate change and good marine status reach. And this is even more pressing in this period in which, at the European level, they are outlining and launching the **macro-regional strategies** in the Mediterranean (Adriatic-Ionian, already consolidated, West and East Mediterranean, in development) that will contribute to the definition of the development strategies of the macro-region¹² and to the destination of resources, actions and projects in accordance with EU Directives.

Elaboration of themes and topics should start in parallel with the design of the consistent **National, Regional Agendas** for Policies, Research and Actions in the specific fields. A particular effort in this sense has been done by BC partners towards the [BLUEMED Initiative](#), and in collaboration with the initiative promoters, for including in the Strategic Research and Innovation Agenda (SRIA) particular topics on Med coast risks and costal management and adaptation, topics and financing hints that are now considered by the H2020 program.

6.2 Widening the approach and unlocking Research & Innovation and market potentials in the Mediterranean

The JAP and the Macro-Project, to which the JAP is referring to, aim to contribute in **creating the basis for a wider approach**, among maritime Administrations, to face and manage together the coastal and maritime issues in the Mediterranean, considering their interactions and their interdependencies, with an integrated vision and, thus, with the formulation of adequate integrated policies in coastal and maritime management and planning.

The **JAP outlines a program with Joint Actions** (action lines) to be translated into projects inscribed in the overall strategy introduced by the Bologna Charter (Marco-Project) and to be implemented (start 2014 till 2023) by submitting them in EU and international funding programs calls or by direct financing procedures, depending on the nature of the specific initiatives.

Among the scientific and economic expected impacts of the JAP in the Mediterranean area, can be mentioned the following ones:

1. **unlock potentials in Research & Innovation**, towards environmental friendly and **ecosystem-based solutions in the field of coastal adaptation** and climate change effects mitigation, protection and integrated management in coordination with maritime spatial planning;
2. **unlock potentials of coastal nourishment market** through the fostering of interregional coordinated programs at a larger scale than the one of a single Administration, in order to optimise interventions, to reduce operational costs thus **optimising the use of financial resources**, laying the **opportunities for new jobs creation**.

The JAP plays a major role in the knowledge/technology-based maritime and Mediterranean coastal economies. The demand arising of these innovative interventions by maritime public Administrations, today diffuse also in the Mediterranean but born in the North Sea and developed in other areas of the world, determined an arise of knowledge and innovation needs in technologies, specific

¹² including States and Regions



for the Mediterranean basin and adequate for its characteristics in terms of operational techniques and capabilities.

The **research and development of adequate/new technologies and techniques** in survey, monitoring and modelling of littorals and sea bottoms (erosion phenomena, sediments stocks individuation and characterisation, coastal and marine dynamics, environmental and ecosystems conditions, etc.) and in designing and realising devices and interventions suitable for the diverse ecological and morphologic conditions in the different sea basins, according to the ecosystem approach, could give a strong **impulse to the economy and job creation** in the Mediterranean community.

This without taking into account the benefits, in the economic development, in the enhancement of the environment, in wellness for the local communities and attractiveness of the territories, that should derive by ensuring an adequate level of safety of the coastal zones through a careful and continual intervention and management policy.

An important factor for achieving this goal is the involvement of the **Scientific community and the entrepreneurs** in the R&D activities, through a research-driven cluster. This requires new innovative thinking across sectors and across disciplines. Furthermore, a strong commitment in the regions is needed for implementation of the Joint Actions. The project activities are based on close consultation with the key national and regional stakeholders and connecting the joint activities to the national and regional priorities defined in the National, Regional Agendas. This way the JAP and the whole Macro-Project can **strengthen the role of Mediterranean regions in contributing to the Blue Growth**, to innovation and to the overall competitiveness and vitality of the Med area and its maritime sub-regions.

Through the implementation of the Joint Action Plan and the whole Macro-Project the partners network can represent a reference group to be taken in consideration in the macro-regional strategies definition as well as for other European platforms and policy deliberations.

7. Joint Action Plan Strategic Themes

7.1 Strategic Theme n. 1 - Developing knowledge, network-based monitoring and data management systems

The JAP aims to set-up a permanent coastal and maritime knowledge network, based on existing local “observatories” and fostering the creation of other specific structures where missing / needed, at national, regional or local level. A **network of Observing structures**, sharing common/comparable standards in coastal and maritime monitoring and surveys, common/comparable indicators for supporting coastal and maritime management and preservation actions and for evaluating coastal and marine dynamics and erosion phenomena.

Particular actions of the network will be focused on the evaluation of **Mediterranean coasts status in order to provide information on D7** (Descriptor 7 of the MSFD), in terms of **erosion phenomena and coastal risks**, and to the survey of littorals and sedimentary balance and sea bottom to individualize and **evaluate sediment deposits suitable for coasts nourishment**.

Moreover, it is promoted the development of an **integrated Mediterranean Interoperable Spatial Data Infrastructure** for the Mediterranean on coastal data also as a condition for the reliability of coastal indicators and the environmental assessment procedures and as a common and reference platform to support networking on needs, policy implementation, best practices, stakeholder involvement, etc. This data infrastructure could get the benefit of PEGASO¹³ or MEDINA¹⁴ project which has been developed within FP7 framework.

Thus, several project-lines focusing on this strategic topic will be proposed and launched at the Mediterranean level involving maritime Administrations, Universities, Research Centres, international Organisations.

- ST1A. **Identification of common standards in coastal survey activities**, data harmonisation with the INSPIRE Directive, the MSFD descriptors and indicators, looking to and fostering the creation of an **Interregional Observatory on Med coasts protection and adaptation** [EURIOMCODE].
- ST1B. **Morphological stability characterization** (exposition to erosion, floods, etc.) of the Mediterranean coasts to allow an aware planning of the coastal zones through an integrated management approach [EUROSION-MED].
- ST1C. **Research and characterization of the coastal and marine sediment resources** in the Mediterranean region to allow a sustainable recovery of the coastal sediment balance [RESAM], this project line can have the following sub-projects: offshore Marine sediments / Coastal stocks / River basin, dikes, deltas, sediments / Methodologies for exploitation and management of the different sources.
- ST1D. **Mediterranean Interoperable Spatial Data Infrastructure** [MISDI]: Select, organise, standardize and make accessible interoperable spatial data for coastal management and marine spatial planning in the Mediterranean according to the INSPIRE Directive 2007/2/CE, EMODNET and to other relevant data policies.

¹³ <http://www.pegasoproject.eu>

¹⁴ <http://www.medinaproject.eu>

7.2 Strategic Theme n. 2 - Sustainable use of strategic resources for the Blue Growth of the Med coasts

A systemic and strategic approach (in space and time) and new solutions are needed to respond to climate change in coastal areas and to reduce the increasing anthropic pressure and “littoralization” phenomena, which aggravates general phenomena as land take, soil sealing, loss of biodiversity. It must be fostered the concept of the **coastal territory as “strategic resource”**, for the wellness and socio-economic development, for the ecosystems and environment preservation and for the safety of inland territories.

In the same way more efforts are needed to change the seasonal trend of the coastal tourism, with the well-known problems that specially affects the small islands and more efforts should be done towards the achievement of Sustainable Development Goals related to tourism and coastal and maritime assets by 2030: **Goal 8, target 8.9** (policies to promote sustainable tourism that create jobs and promotes local culture and products), **Goal 12, target 12.b** (monitor development impacts for sustainable tourism), **Goal 14, target 14.7** (increase economic benefits from marine resources, including sustainable management of fisheries, aquaculture and tourism).

Particular attention is to be put on the **environmental vulnerability assessment** of plans and programs, in accordance with Directive 2001/42/EC, and on measures for coasts protection and adaptation, in order to check and optimise their compliance and harmonization with an ecosystem-based approach, complementing the primary physical nature of the plan with other existing policies, legislation and instruments.

The JAP proposes actions and projects to foster these concepts along with ICZM principles, with specific aims to enhance the implementation of the ICZM Protocol (Barcelona Convention) in the Mediterranean, and with MSP Directive (2014/89/EC).

The focus has to be put also on the **policy options** more suitable, case by case, **for the environmental and strategic recovery of the coastal zones**, which should be considered, even in combination, in the coastal plans formulation (e.g. EUROSION policy options: no intervention; limited intervention; hold the line; managed realignment; move seaward). The decision on policy options to be adopted is site-specific, depending on coastal asset, settlements and infrastructures, geomorphological setting, sediment availability and erosion phenomena, as well as on a series of social, economic and political factors.

Being aware of the overall complexity of the coastal assets in the Med area, of the need for a proper management of coastal sediments and of the frequent recourse to nourishment interventions, even combined with other policy options in a comprehensive coastal plan, the JAP is to put a particular focus on littoral and offshore sediments management taking into account the effects not only on marine ecosystem but also on territory and society (communities) in order to appreciate the way they face with adaptation to vulnerability.

Thus, the JAP promote actions/projects able to boost the coasts sustainable development and protection and the sustainable use of **sediments deposits as “strategic resource for Public purposes in coastal defence”**, preserving them from other uses. Thus, actions, plans and projects will be dedicated to foster best practices in sustainable management of sediments and to evaluate (also by the means of traditional and novel modelling approaches) socio-environmental impacts induced by activities dealing with sediments exploitation and coastal protection, looking forward in the future considering the use of those not renewable resources.

From a legal standpoint, all these actions need to go through new public-private forms of cooperation for coastal management and development in which society has to be involved for definition

and monitoring. European professionals of the coastal and maritime tourism point out that the conditions for a Blue growth strongly relate to new contractual models of long term coastal monitoring and maintenance.

The main project lines can be envisaged as follows:

- ST2A. **Regional and local Plans for the Integrated Management** of coastal adaptation, sustainable development, contrast to erosion [COASTGROWTH]: Master Plans following ICZM principles, in connection with local and basin-scale marine and maritime uses / Project financing for coastal management;
- ST2B. **Legal tools and agreements needed for the coastal and maritime zones governance**, including the integrated management of coastal and offshore sediments resources [COASTGOVERNANCE]: Environmental monitoring Protocols for off-shore and littoral sediment sustainable management / Structuration of the governance in accordance with marine region or sub-region and ICZM principles of the Barcelona Convention.
- ST2C. **Environmental strategic assessment of policies, plans and programs for coastal adaptation and for sediments sustainable management** [ENVICOAST]: EIA procedure for coastal works / EIA procedure for Continental shelf borrow sediment site exploitation / Coastal natural assets protection or recovery as strategic issue to face natural risks / Mapping and quantification of ecosystem services of coastal areas, in DPSIR framework, including MSFD and EcAp indicators.

7.3 Strategic Theme n. 3 - Supporting research, innovation cluster, implementation

Research and innovation is a cross-cutting issue along the whole JAP and should provide real added value as better performance, longer durability, higher socio-economic benefits, of the solutions proposed. The implementation of the JAP and its specific Joint Actions and projects will be supported by research activities in the field of innovative and customized technologies and solutions for coastal protection [COAST R&I].

These project lines include several topics to focus on, e.g.:

- ST3A. **Improvement of remote sensing techniques and supports**, as drones and submarine devices, e.g. advanced use of remote sensing data from Copernicus satellite system (Sentinels) matched with marine LIDAR survey for a broad systematic monitoring;
- ST3B. **Integrated modelling tools, monitoring systems, data management** and decision support systems e.g. coastal hazard assessment through broad and territorial modelling;
- ST3C. **Analysis and forecast of local climate change and sea level rise scenarios** and their effect on the coastline, sediment budgets, ecosystems and habitats (Big Data);
- ST3D. **Improvement of sediment moving and handling systems**, management techniques and equipment, aimed to design vessels systems suitable for the Med basin characteristics;
- ST3E. **Technical improvement in characterization** and sustainable management and exploitation of sediment deposits;
- ST3F. **Evaluation in the short and medium-long term of the connections and impacts of intervention** on habitats and ecosystems, including the design and study experimental solutions (e.g. “building with nature” approaches)
- ST3G. **Design and testing of innovative solutions**, technologies, materials for coastal protection;

Such activities are potentially financed/co-financed in synergy by different frameworks, i.e. Horizon 2020 and the Cohesion Policy Framework, as recommended in the EC strategic documents.

Moreover, this Strategic Theme includes two cross cutting actions aimed at:

- **fostering projects-clustering initiatives**, for a closer connection among research institutions and research activities and among research institutions and decision-makers;
- **assuring a close connection with the new EU Research Programme (Horizon 2020)** and other national and international research programme sand initiative (i.e. the BLUEMED), in order to promote science-to-policy transfer, lobbying in favour of JAP themes and priorities and promoting the preparation of proposals, with the joint participation of Administrations, Research Institutions, Companies and SMEs.

7.4 Strategic Theme n. 4 - Response to challenges driven by climate change

Following policy options choices aimed at the environmental and strategic recovery of the coastal zones, strategic or major interventions (Major Projects) should be designed in order to upgrade the resilience level and to ensure conditions for a sustainable growth, related to specificity and vocation of the diverse coastal areas.

The JAP aims also at fostering the design of these kind of interventions, structural works along Mediterranean coasts consistently with the above-mentioned integrated planning processes, for the concrete implementation of adaptation policies to the natural and anthropogenic risks driven by climate change.

To this extent, a specific joint action is foreseen to **support the designing of structural works and management solutions**, with the above-mentioned aims, and the individuation and activation of adequate financing channels, favouring the collaboration between public, private and scientific community sectors.

These integrated projects are expected to be characterized by a definite socio-ecosystem approach and in particular:

- **High adaptation/adaptive capacity** towards evident natural and social risks and vulnerability (cost/benefit analysis), and reversibility;
- **Integrated approach** combining social, environmental and economic issues.

These projects then won't include only coastal defences but as well the infrastructures closely related to, like waterfronts, port arrangements, touristic assets, natural protected areas, etc. These infrastructures will be defined as the best response to reach the goal of a sustainable adaptation.

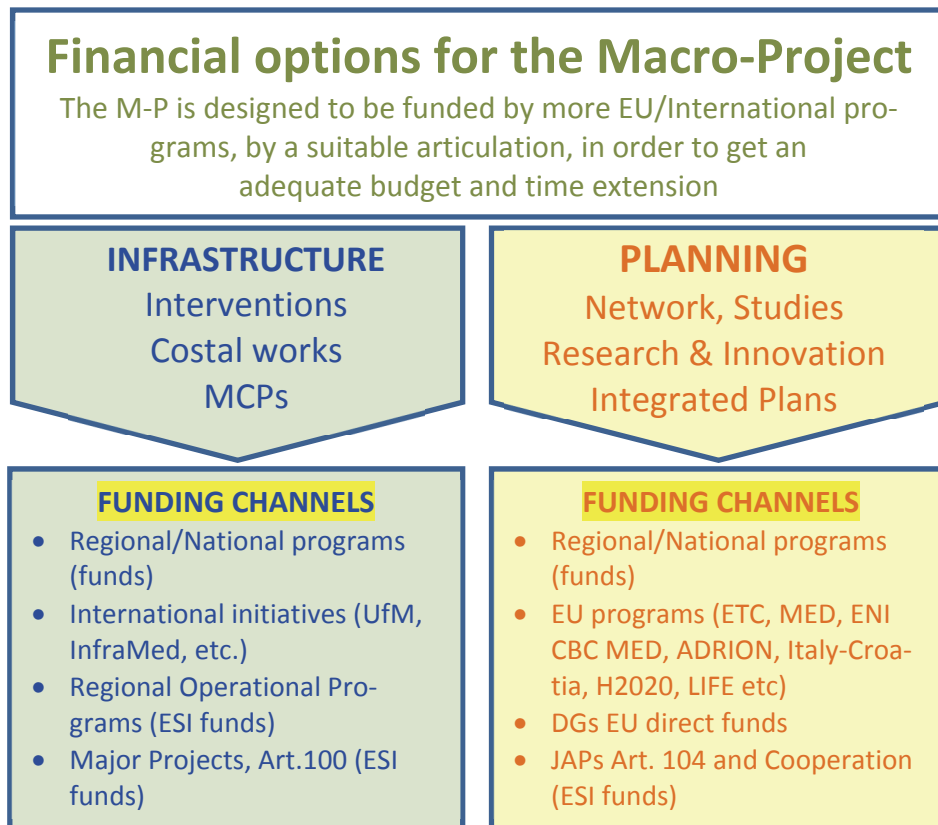
Major Coastal Projects proposed to be included in the JAP **should be compliant with ICZM and MSP principles** and should be described as in the following scheme:

- Project title, Map with location and general features of the area
- Brief description of the typology and main features of the project
- Possible limitations (environment, social, regulatory, etc.)
- Level of design of the project (scheme, preliminary, definitive, etc.)
- Budget amount estimation and possible schedule
- Actors involved and participatory process envisaged

During the development of the JAP design (2014) several proposals on pilot sites along the Mediterranean coasts were selected in order to propose relevant integrated projects, some news on these and new Major coastal projects are now included in this updating (2019) of the JAP.

8. Budget, schedule and financial resources

One of the most peculiar characteristics of the Macro-Project stands on its flexibility on financial organisation, in order to get a budget and time extension adequate to its objectives. Being an initiative born from a grouping of coastal Administrations, the **Macro-Project implementation through the JAP can count on ERDF** by different European programs but, for the completion of the different phases, in particular for its infrastructural part, needs as well other funds and on **their own national and regional resources**.

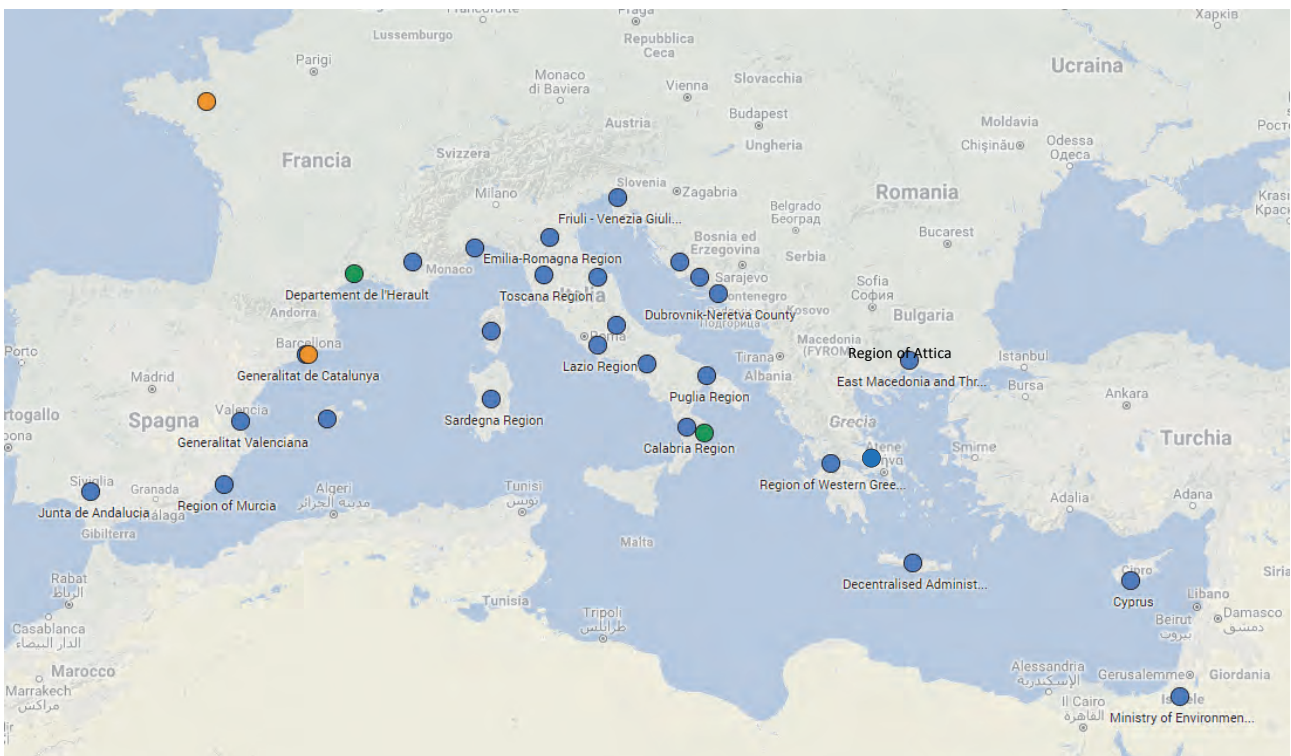


In the first version of the JAP three phases were indicated for its implementation: **1st phase (2014-2015)** JAP consolidation within the COASTGAP Med capitalization project and projects proposal preparation for application; **2nd phase (2016-2018)** Launching the first actions and approved cooperation projects (5-7 MEuro envisaged), start implementing the Major Coastal Projects (40-50 MEuro); **3rd phase (2019-2023)** Completion of the JAP starting the second generation of cooperation projects (10-15 MEuro), applied in 2017-2018, complete implementing of the remaining Major Coastal Projects (450 MEuro).

The **1st Phase** was completed in 2015 by the Bologna Charter Coordination Board within the IMC-CPMR working group on Integrated Maritime Policy (today BC Task Force in IMP&Transport working group). The **2st Phase** is in implementation though specific projects as MEDSANDCOAST (completed), CO-EVOLVE and MEDCOAST4BG (ongoing) quoting overall **about 6 MEuro**, and in interaction and collaboration with specific initiatives as the BLUEMED, the WestMed, the RITMARE IT flag project on marine and coastal Research, the IT National Board on Coastal Erosion, etc. The **3rd phase** started its implementation with projects as CHANGE-WE-CARE (IT-HR) and the CO-EVOLVE4BG (ENI-CBC-MED) quoting together **about 5,8 MEuro**. Moreover, the Major Coastal Projects up today financed, completed or in completion, quote overall **about 115 MEuro**, in line with the previsions.

Annex 1

Adhesions to the Bologna Charter





Regione Emilia-Romagna (I) - 21st of March 2013

Région Provence-Alpes-Côte d’Azur (F) - 21st of March 2013

Collectivité Territoriale de Corse (F) - 21st of March 2013

Decentralized Administration of Crete (GR) - 21st March 2013

Département de l’Hérault (F) - 21st of March 2013

Dubrovnik-Neretva County (HR) - 21st of March 2013

Junta de Andalucia (E) - 21st of March 2013

Generalitat Valenciana (E) - 21st of March 2013

Region of East Macedonia and Thrace (GR) - 21st of March 2013

Provincia di Crotona (I) - 21st of March 2013

Regione Lazio (I) - 21st of March 2013

Regione Liguria (I) - 21st of March 2013

Regione Marche (I) - 21st of March 2013

Regione Toscana (I) - 21st of March 2013

Intermediterranean Commission of the CPMR - 27th of June 2013



Regione Puglia (I) - 5th of December 2013

Regione Abruzzo (I) - 5th of December 2013

Regione Calabria (I) - 5th of December 2013

Regione Campania (I) - 19th of December 2013

Govern de les Illes Balears (E) - 20th of December 2013

Generalitat de Catalunya (E) - 12th of February 2014

Ministry of Environmental Protection of Israel (IL) - 12th of February 2014

Split-Dalmatia County (HR) - 16th of June 2014

Regione Autonoma Friuli Venezia Giulia (I) - 18th of September 2014

Ministry of Communication and Works of Cyprus (CY) - 5th of December 2014

Šibenik-Knin County (HR) - 25th of January 2016

Region of Western Greece (GR) - 1st of July 2016

Region of Murcia (E) - 15th of February 2018

Regione Autonoma della Sardegna (I) - 17th of May 2018

Region of Attica (GR) - 28th of June 2018



Annex 2

Implementation of the Action Plan



ST1 - DEVELOPING KNOWLEDGE, NETWORK-BASED MONITORING AND DATA MANAGEMENT SYSTEMS

Joint Action 1.1 - Build a network of coastal Observatories in the Mediterranean -

Challenge: creation of a network of existing coastal observatories in the Mediterranean, also promoting the establishment of new structures, if needed, at national, regional and local level, in order to evaluate and monitor erosion phenomena and other dynamics connected to climate change, exchange of good practices, support the design of surveys and studies in the related fields.

Activities 2015-2018: start of the Italian National Board on Coastal Erosion (NBCE), in collaboration between the Ministry of Environment and Land and Sea Protection, the 15 coastal Regions, ISPRA, Basin Authorities, Research and Scientific Community (start in 2015, MoU signed in April 2016), evolution towards the institution of a National Observatory on coastal Erosion (in 2018), composed by existing regional coastal observatories. COASTALMAPPING, DG Mare funded project (2015-2018) on “Assess availability of the current digital coastal maps in the EU, share coastal mapping through the EMODnet” creates a portal for accessing physical data as coastline, intertidal area, HR underwater DTM, on EU coastal areas.

Activities 2019-2023: promoting of the IT experience and achievements for its possible transferring as concept in other Med areas and countries / links with existing observing systems at national, regional and sub-regional scales, and with ESFRI Research Infrastructures / ecosystems observation and with EU databases, portals and information systems (e.g. SeaDatanet, Atlas of the Sea, EMODnet, etc.) / support the start of the IT National Observatory on Coastal Erosion / for integrated coastal and long-term / Link with Copernicus initiative / Define protocols for data exchange and management, identify a common structure consistent with the principles of cost-effectiveness and efficiency.

Outcomes: protocols, common standards, Med coastal Observatories network functioning (EURIOMCODE).

Joint Action 1.2 - Survey erosion status and flood hazard along the Med coasts -

Challenge: Characterisation of morphological stability of the Mediterranean coasts at a territorial/regional scale (exposition to erosion, vulnerability by floods and marine ingression, etc.) to allow an aware planning of the coastal zones taking into account climate change scenarios through an integrated management approach.

Activities in 2015-2018: flood hazard along EU Med coasts has been evaluated and mapped thanks also to the Directive EU 2007/60 within the Flood Risk Management Plans elaborated in the EU Countries, but a similar evaluation hasn't been done systematically on erosion phenomena status and trends on the Med coasts, nevertheless they are often strictly connected with flood risks. The IT National Board on Coastal Erosion started in 2015 had the objective, among others, of harmonising methods and data gathering frequency coastal erosion phenomena. This operation was proposed and facilitated by the IT coastal Regions being part of the BC initiative.

Activities 2019-2023: promoting and disseminate the experiences in identify common standards and guidelines for erosion phenomena assessment / support the updating processes of the Flood Risk Management Plans in the EU countries (2nd generation Plans) / promote the launching of a coordinated initiative of survey on erosion and vulnerability status and trends on the Mediterranean coasts, evaluating also the evolution and sedimentary balance of rivers mouth and deltas in combination with rivers watersheds analysis on “sediment traps”. Define and start a monitoring program for a continuous alimentation of the EUROSION-Med geo database.



Outcomes: updated framework of the coastal erosion phenomena, in the Mediterranean, including rivers mouth and deltas balance / EUROSION-Med geo database / Recommendations/guidelines for coastal erosion assessment, sediments correct management, enhancing of river solid transport.

Joint Action 1.3 - Individuate and characterise coastal and submarine stocks of sediments suitable for beach nourishment - RESAM

Challenge: Research, characterise and assess the coastal and marine sediment resources in the Mediterranean region, suitable for a sustainable recovery of the coastal sediment balance.

Activities in 2015-2018: MEDSANDCOAST project (2013-2016) ENPI Program funded project on *“Coastal-marine resources for the strategic defence of Med littorals”* (1,3 MEuro), with BC partners participating, identified tools and characterised sediment resources in the coastal and marine space in the parts of the Med, in synergy with and contributing to the activities of the IT Board on coastal Erosion concerning the systematization of knowledge on off-shore deposits and littoral accumulation of sediments.

Activities 2019-2023: promote the launching of a coordinated research campaign in the Mediterranean for the individuation and characterisation of sediment resources, coastal and sea bed surveys, physical and chemical characteristics, assessment of available volumes. /Define protocols for pre-assessment and monitoring of impacts on ecosystems by sediments stocks exploitation.

Outcomes: geo data base on sediments stocks suitable for recovery of coastal balance.

Joint Action 1.4 - Build a Mediterranean Interoperable Spatial Data Infrastructure -

Challenge: organize, standardize, and make accessible and interoperable spatial data for sharing (online geoportal), through a network of partners’ geonodes, that allow working together, exchanging data, science and practitioners, in a multidisciplinary way, from different spatial scales (local, national and regional). The aim is to support the overall “network-based monitoring and data management systems” (ST1).

Activities in 2015-2020: further developing the existing coastal and marine SDI. Further integration of geonodes (from new partners, Mediterranean Networks, etc) to improve SDI performance for implementation of various relevant policies as well as EMODnet. The visibility of participating institutions or networks will be enhanced by sharing in a common platform their spatial data and tools for implementation of related policy or other instruments at various scales.

Outcomes: A Spatial Data Hub and service to support knowledge development and management and to support actions and projects implementing the JAP, via interoperable spatial data infrastructures in the Mediterranean.



ST2 - SUSTAINABLE USE OF STRATEGIC RESOURCES FOR THE BLUE GROWTH OF THE MED COASTS

Joint Action 2.1 - Promote the sustainable use of the coastal territory -

Challenge: foster the integrated territorial planning and ICZM Protocol implementation, ensuring coordination with principles and provisions of the Directive 2014/89/EC on Maritime Spatial Planning; foster the sustainable development of coastal zones, the landscape and marine environment protection, the coastal adaptation to climate change and the risk prevention, the development of sustainable tourism and the Blue Growth in the Mediterranean, the participatory approach with local community and stakeholders within policy making processes on the coastal areas.

Activities in 2015-2018: CO-EVOLVE Interreg MED funded (3 M€) modular project (2016-2019), methodology and concrete experiences on the field on how to act and to support local sustainable development together with local stakeholders and communities. An extension of this project, “Med Coasts for Blue Growth” (MEDCOAST4BG) has been proposed to -and labelled by- the Union for the Mediterranean, to transfer methodology and on field experiences on the south and east shores of the Med area. An ENI-CBC Med project proposal also has been prepared on the same concept of the Co-Evolve.

Sustainable use and management of sediments is also a specific topic of the Guidelines on coastal protection from erosion and climate change developed by the IT National Board on Coastal Erosion.

Activities 2019-2023: further development downstream of the CO-EVOLVE approach by project extensions (MedCoast4BG + CO-EVOLVE4BG, 2.9 M€) transferring its methodology in the Med area, including south and east shores / support the formulation of ICZM plans in coordination with MSP / support the development of the Med project PANORAMED on Governance, marine surveillance, coastal and maritime sustainable tourism. Starting CHANGE-WE-CARE, IT-HR project (2,7 M€), on adaptation plans for coastal and transitional areas to climate change, looking also to the call for strategic projects of the Interreg V A Italy-Croatia program.

Outcomes: implementation of projects with concrete actions in Pilot areas, ICZM plans coordinated with MSP, aimed at the development of sustainable tourism and for coastal adaptation to CC, contrasting erosion and enhancing resilience of coastal territories and communities, promoting better “vertical” and “horizontal” integration processes and coordination mechanisms between the different level of territorial governance on the land-sea belt.

Joint Action 2.2 - Promote the sustainable use of coastal and off-shore stocks of sediments -

Challenge: foster the sustainable and ecosystem-oriented management and use of the coastal and submarine stocks of sediments, also favouring relationship between Mediterranean countries and regions, creating conditions for a regulated exploitation of sediments stocks;

Activities in 2015-2018: MEDSANDCOAST project (2013-2016) ENPI Program funded project on “Coastal-marine resources for the strategic defence of Med littorals” (1,3 MEuro), with BC partners participating, identified modalities for sustainable use of coastal and marine sediments stocks. The IT NBCE, with BC Italian partners participating, also identified in the Guidelines best practices for a correct management and sustainable exploitation of sediment stocks.

Activities 2019-2023: capitalize MEDSANDCOAST achievements and promoting of the IT NBCE experience achievements, and transferring of Guidelines concepts and best practices, concerning the sustainable management of littoral and off-shore sediments stocks / Promote demonstrative projects on methods and technologies for better management and exploitation of sediments stocks / promote ecosystem-oriented management plans of sediments stocks (ENVICOAST)

Outcomes: Sediment management plans, environmental monitoring Protocols, for offshore and littoral sediments stocks sustainable management and exploitation.



ST3 – SUPPORTING RESEARCH, INNOVATION CLUSTERS, IMPLEMENTATION

Joint Action 3.1 - Foster projects-clustering initiatives -

Challenge: strengthen the cooperation between Coastal Administrations, Scientific Community, National Authorities, international organisations, SMEs, private actors and stakeholders, maximizing results and favouring synergies in research and innovation

Activities in 2015-2018: cooperation started with BLUEMED (initiative for Research and Innovation for Blue Growth and job creation in the Mediterranean) including specific topics in the Strategic Research and Innovation Agenda (hazards and protection of Med coastal areas, ICZM and MSP coordinated implementation, sustainable tourism development, Observing systems in the Mediterranean); cooperation with RITMARE project IT flag initiative on coastal and marine research.

Activities 2019-2023: supporting the BLUEMED initiative and cooperating with CSA BLUEMED project / foster clustering of projects and further develop existing clustering initiatives / link with the Blue Italian Growth cluster / Explore the possible constitution of an EGCT of coastal Administrations.

Outcomes: consolidation of networks, projects and initiatives with research and innovation purposes in coastal monitoring, protection, and adaptation; possibly start of an EGTC of Med coastal administrations.

Joint Action 3.2 - Foster innovation in the field of coastal protection and climate change adaptation in the Mediterranean -

Challenge: find innovative solutions and technologies for coastal protection and adaptation, for sustainable and ecosystem-oriented management of littoral and off-shore sediments resources, for data management, modelling and monitoring systems.

Activities in 2015-2018: testing new technologies for seabed sediment management in the CO-EVOLVE project, pilot areas (ejector systems for desilting and maintenance of harbour seabed).

Activities 2019-2023: foster research and development of solutions for coastal protection (also “building with nature” approaches) and for the improvement of sediment moving and handling systems / promoting design of dredge-ship systems suitable for the Med basin characteristics. ECOMEDPORT, Start-up Action financed by the CSA BLUEMED on the feasibility application of ejector technology (tested in CO-EVOLVE) for the sediment sustainable management in little and medium harbours in the Mediterranean.

Outcomes: tested solutions and technologies ready to be developed and applied

Joint Action 3.3 - Interaction with the new EU Research Programme (H2020) -

Challenge: contribute in the definition of the priorities, to make themes and actions of JAP suitable to access the Programme financing; promote initiatives involving public and private sector, enterprises, research bodies, in R&D projects.

Activities in 2015-2020: individuate areas of the Programme (Societal challenges, Infrastructures, Support to SMEs, etc.) more suitable for supporting the JAP specific lines of action and projects. Preparation of project proposals favouring joint participation of research bodies, Administrations, stakeholders, and enterprises supporting adaptive management of coastal systems.

Outcomes: proposals submitted for financing of actions and projects in the field of research and development in coastal protection and adaptation / Science and Innovation from research projects supporting and addressing JAP actions.



ST4 - RESPONDING TO CHALLENGE DRIVEN BY CLIMATE CHANGE -

Joint Action 4.1 - Supporting the design of structural works for coastal protection and adaptation to climate change -

Challenge: collect and promote priority coastal works proposed by BC members (nourishment, infrastructures, waterfront rearrangement, etc.) designed following ICZM principles and to be implemented in a coordinated way.

Activities in 2015-2020: survey on needs and framework conditions by different Administrations for coastal adaptation and protection interventions. Share competences and best practices in definition (including civil society position) to support the design of structural works, soft and hard options, following ICZM approach and principles.

Outcomes: package of structural works and Major Projects ready to be implemented.

Joint Action 4.2 - Foster adaptive management solutions and structural works for enhance the resilience of coastal systems -

Challenge: create the conditions for the realisation of structural works and management solutions (Major coastal Projects), favouring the collaboration between public, private, the scientific community and involved civil society sectors.

Activities in 2015-2020: design of common projects (even combining Major Projects), according with the individuated suitable financing channels, also by diverse sources, for their implementation / Prepare project proposal favouring joint participation of public, private and research bodies for definition, implementation, and monitoring.

Outcomes: common design, shared by Administrations, of Major Projects for adaptive structural works and management solutions for implementation and monitoring.

Joint Action 4.3 - Individuation, access to and efficient use of funding frameworks -

Challenge: ensure adequate financing resources to the JAP and Macro-Project and to the structural works implementation (Major Projects).

Activities in 2015-2020: monitoring EU programs and other funding opportunities consistent with the themes and actions encompassed by the JAP and the Macro-Project, individuation of funding opportunities most suitable for the different actions and projects.

Outcomes: proposals submitted for financing of actions and projects, other funding channels activated for the implementation of strategic actions (Major coastal Projects) or large-scale initiatives as -but not exhaustive- EUROSION-Med, RESAM, EURIOMCODE, etc.



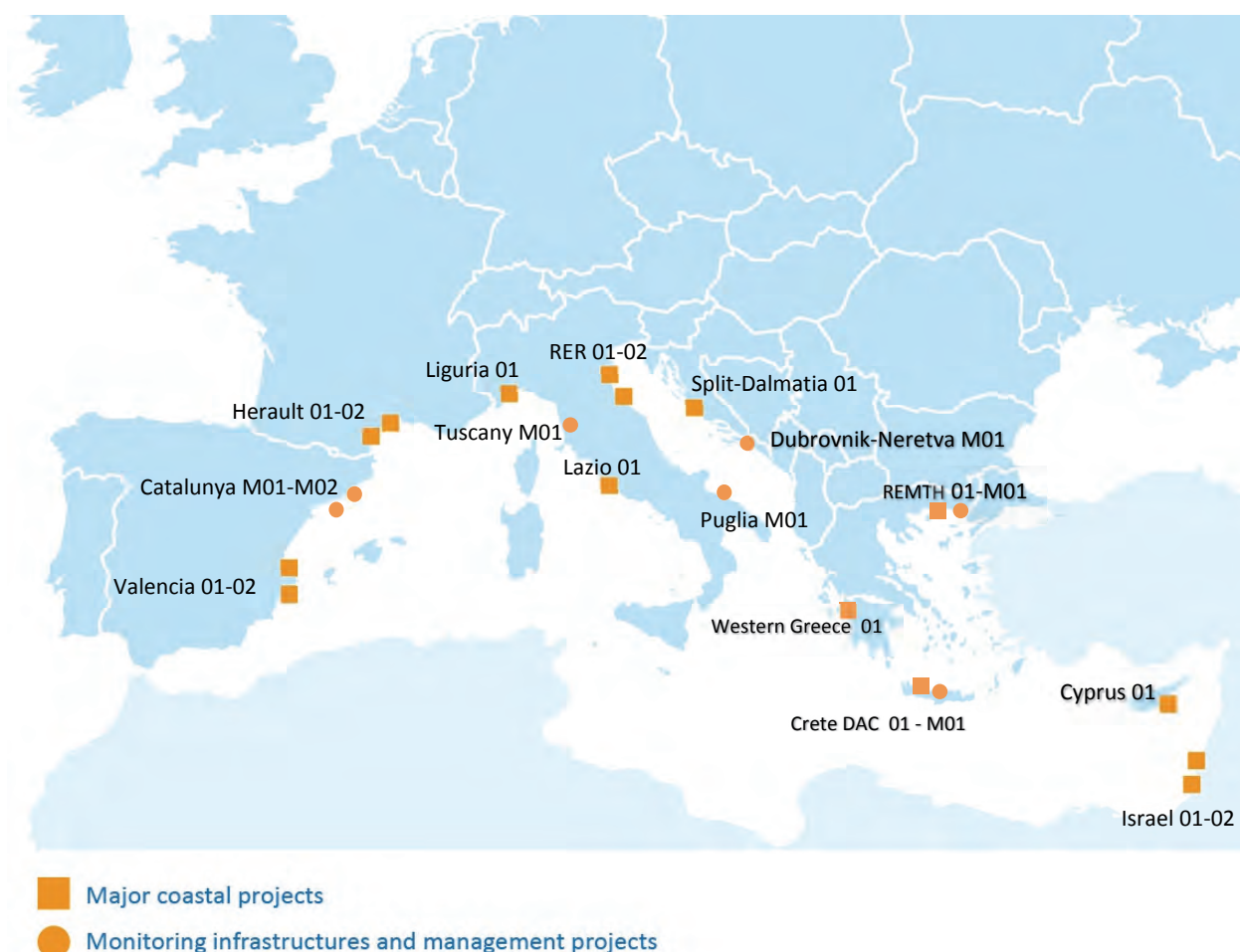
Scheme resuming initiatives, projects on going or to be developed consistent with the implementation of actions lines and funding channels possibly accessible to further implement the BC-JAP.

Strategic Themes	JOINT ACTIONS	Implementation with Projects, Initiatives / Funding opportunities
ST1 - DEVELOPING KNOWLEDGE, NETWORK-BASED MONITORING AND DATA MANAGEMENT SYSTEMS	1.1 Build a network of coastal Observatories – EURIOMCODE	MEDSANDCOAST, COASTALMAPPING, H2020 projects, RITMARE, IT-NBCE, BLUEMED initiative WestMed Initiative EMODnet,
	1.2 Survey erosion status and flood hazard along the Mediterranean coasts – EUROSION-MED	/
	1.3 Individuate and characterize coastal and submarine stocks of sediments suitable for beach nourishment – RESAM	Interreg MED, ENI-CBC-MED H2020
	1.4 Build a Mediterranean Interoperable Spatial Data Infrastructure for Coastal Data and Indicators - MISDI	ADRION, IT-HR, IT-FR Maritime
ST2 - SUSTAINABLE USE OF STRATEGIC RESOURCES FOR THE BLUE GROWTH OF THE MED COASTS	2.1 Promote the sustainable use of the coastal territory – COASTGROWTH / COASTGOVERNANCE	CO-EVOLVE, MEDCOAST4BG, MITOMEDplus COASTING PANORAMED, CHANGE WE CARE IT-NBCE
	2.2 Promote the sustainable use of coastal and off-shore stocks of sediments - ENVICOAST	/ Interreg MED ENI-CBC-MED ADRION, IT-HR, IT-FR Maritime
ST3 - SUPPORTING RESEARCH, INNOVATION CLUSTERS, and IMPLEMENTATION	3.1 Foster projects clustering initiatives	BLUEMED initiative CSA BLUEMED
	3.2 Foster innovation in the field of coastal protection and climate change adaptation in the Mediterranean - COAST R&I	RITMARE project ECOMEDPORT SuA
	3.3 Interaction with the EU Research Programs and initiatives	/ H2020 UIA
ST4 - RESPONDING TO THE CHALLENGE DRIVEN BY CLIMATE CHANGE (Major Coastal Projects)	4.1 Supporting the design of structural works for coastal protection and adaptation to climate change	National & Regional funds (PON, POR)
	4.2 Foster adaptive management solutions and structural works to enhance the resilience of coastal systems	/ ERDF for structural works
	4.3 Individuation, access to and efficient use of funding frameworks	

JOINT ACTION PLAN

Annex 3

MAJOR COASTAL PROJECTS



CYPRUS

1. TITLE OF THE PROJECT: Larnaca North Coastal Redevelopment Project (CYPRUS- 01)

2. BRIEF DESCRIPTION OF THE TYPOLOGY OF THE PROJECT

in realization

- Hard Coastal defenses – revetments/ sea wall, groins;
- Requalification of a coastal stretch – conversion from industrial (fuel depot) to residential/ commercial/ tourist area;
- Rearrangement of the waterfront – pipelines, storage tanks removed. Tourist developments (hotels, shops, restaurants, parks, etc.);
- Transformation, re-destination of a coastal area – Beach nourishment/ import of sand, coastal protection works to protect the new beaches;
- Realignment of infrastructures along the coast – new pedestrian/ cyclist road, public amenities.

Larnaca city and the hinterland will enjoy social-economic benefits due to the removal of the fuel storage facilities. The image of the city will improve, the value of the properties next to the oil companies will increase, the risk of a major accident will be eliminated, barrier blocking the city from expanding to the north is removed.

General aspects and Limitations

- Oil distribution companies were operating in the area. The relocation of these installations was associated with a significant capital cost. It is also associated with administrative problems since businesses and people needed to be relocated.
- There are environmental problems associated with the cleaning of the area from the fuel storage facilities. The ground is expected to be contaminated, bearing in mind that the age of these installations is too old.
- Main uncertainties and knowledge gaps addressed in the design phase include:
 - The actual condition of the sub-soil.
 - The reaction of all those employed in the oil companies who will be forced to relocate.
 - The demand and value of all this land which will be converted from industrial to tourist/ residential/ commercial use.



7. LOCATION AND GENERAL FEATURES. The project area is located north of Larnaca City. Larnaca is bounded by the airport and the salt-lake on the south side and the port and oil companies on the north side. All fuel storage facilities will be relocated. The area is to be redeveloped into a tourist, residential, commercial area. The existing coastal works (revetments and groins) will be removed. Detached breakwaters and beach nourishment will create and protect sandy beaches.

3. LEVEL OF DESIGN OF THE PROJECT (in 2014):

The project has been a Government policy for more than a decade, the master plan for the coastal works was at its final stage. The master plan for the road network was complete and implemented, the town planning zones are agreed.

4. BUDGET AMOUNT ESTIMATION & SCHEDULE of INTERVENTION: the budget of the project is of the order of € 50 Million, the implementation is scheduled towards the next 5-10 years.

5. UDATING 2017 – **in realization**

Based on the Government decision the transport of petroleum and liquid storage facilities from Larnaca (fig.1) to the energy and industrial area of Vasiliko (fig.2) will take place within 2019 (provided that all the required facilities will be finished in Vasilikos area). After the completion of all environmental studies and the approval by the Environmental Authority the KETAP company started the demolition of company's'

Major Coastal Projects

storage tanks (the works started in February 2017, Fig.3). Other companies have already submitted their studies and soon they will start also demolition. The cost for the demolition is not known since the companies will undertake it.



Fig.1 Larnaca Facilities



Fig.2 Vasilikos energy and industrial area

At the same time the Department of Town Planning and Housing started the preliminary plans for the development of the area. The town planning zones are agreed. The development plan includes also the plans for restoration. The Public Works Department started the **construction of 5 new detached breakwaters** in combination with nourishment in the area next to storage facilities (eastwards) to protect the coast from erosion. The project **started in November 2016** and it is expected to **finish in summer 2019**. For this first part the **total cost is about € 2.149.000** (VAT excluded).

Finally, the Ministry of Communication and Works using BDFO method selected the private investor for the development of the Larnaca harbour and marina -it will be a joined project- (Fig.4). The agreement is expected to be signed in 2017.



Fig.3 Demolition of storage tanks



Fig.4 Main areas and elements of intervention

6. ACTORS INVOLVED

- Department of Town Planning and Housing (development on land side)
- Department of Public Works (coastal works, road works)
- Ministry of Energy, Commerce, Industry and Tourism (relocation of oil companies)
- Larnaca Municipality (Local Authority)
- Private sector (oil companies)

Emilia-Romagna Region

1. TITLE OF THE PROJECT:

protection and restoration of the area Foce Reno – Bellocchio - Lido Spina (RER-01)

2. BRIEF DESCRIPTION OF THE TYPOLOGY OF THE PROJECT **partially funded**

- Coastal defenses – nourishment, groins, dune reconstruction, sand motor, lagoon channels restoration
- Restoration of a coastal stretch in a high value naturalistic area (SIC, ZPS, Ramsar), defense of the urban settlements of Lido di Spina, touristic resorts and activities, adaptation to climate change and defense of high value habitat of protected species.
- Waterfront of about 5 km and relative internal area, with implications on sustainable management of a coastal stretch of about 10 km

General aspects and limitations

The area has been subject to severe storms in the last 6-7 years, recording a retreat of about 30 m/year of the coastline. The threatening involves:

- the marinisation of the coastal lagoon (Vene di Bellocchio) and the total loss of specific habitats of protected species;
- the exposure to sea floods of the State road 309 “Romea”
- the exposure to sea floods of the urban settlement of Lido di Spina South, involving also the Lake of Spina.

Limitations to the interventions are given by the conditions of a natural protected area in which particular low impact techniques and materials should be employed, scheduling subject to breeding and nesting periods.

3. LEVEL OF DESIGN OF THE PROJECT (in 2014): The project has been designed also for a LIFE program application, the master plan for the coastal works was discussed and agreed to be developed by steps.

4. BUDGET AMOUNT ESTIMATION & SCHEDULE of INTERVENTION: The budget of the project is about € 25 Million; the implementation is scheduled by 2015-2017

5. UPDATING 2017 – **partially funded, in starting**

Part of the complex intervention was proposed also in a **H2020 project OPERANDUM recently approved**. It will provide about **250 k€ for the dune reconstruction**, only part of the one foreseen in this MCP, for testing on site “Nature Based Solutions” contrasting floods / marine ingression phenomena. The realization of the intervention is **foreseen in year 2019**.

6. ACTORS INVOLVED

- Emilia-Romagna Region (Directorate General of Territorial and Environment Care)
- ARPAE (Regional Agency for Environment Protection and Energy, of Emilia-Romagna)
- State Forestry Service (Biodiversity Protection Office of Punta Marina)
- Delta Po Park Authority
- Ravenna, Comacchio and Goro Municipalities (Local Authorities)
- Military Polygon
- Private sector: Orsi Mangelli (farm company), Spina Camping Village (resort company)

7. LOCATION MAP AND GENERAL FEATURES



Location Map. The project area is located north of Reno River mouth. The coastal stretch subject to the direct interventions is about 5 km of waterfront and involves about 213 hectares of the Vene di Bellocchio wet area. The total coastal stretch involved in the future management linked to the area of intervention is about 10 km length. Scheme of interventions



Emilia-Romagna Region

1. TITLE OF THE PROJECT: extraordinary nourishment intervention on Emilia-Romagna coast with off-shore sand deposits (RER-02)

2. BRIEF DESCRIPTION OF THE TYPOLOGY OF THE PROJECT **realization completed**

The extraordinary nourishment intervention with sand from submarine deposits has the scope to restore the safety conditions of the 8 coastal stretches along the regional coast, in very critical condition, after different sea storms impacts in the last 6 years. It is foreseen the provision of sand taken from two submarine accumulations located from 40 to 50 km off the regional coastline.

The coastal stretches subject to the intervention are located within eight municipal territories (Misano Adriatico, Riccione, Rimini, Bellaria, Cesenatico, Cervia, Ravenna, Comacchio) and concern all the 4 coastal provinces of Emilia-Romagna.

The experience gained from similar interventions, performed in 2002 and 2007, has shown that with a proper enlargement of the beach are avoided damages to infrastructures/settlements and is strongly limited marine ingression risk in the inland. Taking care to follow the intervention with yearly maintenance operations, the benefit of such alimentation with “new” sand resources will affect the whole coastal system (coastal stretches directly interested and nearby stretches, in the 8 most critical zones of the regional coast). The purpose of this project is therefore to implement a significant enhancement of the beach system, considered as the first defense line against marine ingression, based on a rise in altitude and an enlargement towards the sea of the sandy shore, in order to ensure the safety of inland features (settlements, infrastructures, plants, natural protected areas, etc.) for a period of almost 5 years. One of the location of the intervention, destination of part of the sand nourishment, is the area of Foce Reno-Bellocchio, concerning further interventions for restoration and protection described in RER-01.

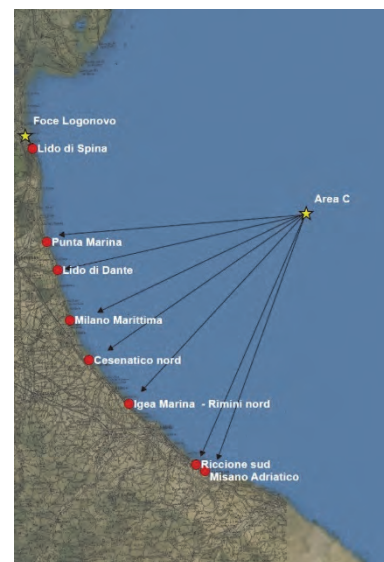
General aspects and limitations

The use of submarine sand accumulations is particularly indicated by:

- the input into the coastal system of “new” sand to compensate losses due to erosion and subsidence, practice included in the regional strategy for coastal protection and adaptation to CC effects;
- the low environmental impact during implementation on the coast, on the ground and on the road network (being the transport exclusively via sea) and the low impact, as demonstrated in the previous post intervention monitoring, on the ichthyic and benthonic population of the off-shore borrow sand deposit;
- the benefit for the tourist economy and for the attractiveness of the different areas, adopting a “soft option” instead of a hard defense works solution.

Limitations to the interventions are given mainly by:

- the impossibility to operate during the bathing season (May-September period) and the conditions of natural protected areas in which the schedule should concern also the breeding and nesting periods;
- to contain visual impacts due to the different colors of the submarine sands providing a certain opportune accumulation of site specific “original” sand to be subsequently stringing on submarine sands once put in place;
- the depth of excavation, dredging, in the submarine accumulations must not reach the boundary level between the sands and underlying deposits in order to not alter the composition of the bottom with consequent modification of the benthic fauna associated.



Scheme of the intervention realized in 2016: borrow sandpit (Area C + Foce Logonovo) and location of sand nourishment on coastal sites.

3. LEVEL OF DESIGN OF THE PROJECT (in 2014): The project has been designed in its Preliminary version and approved by a deliberation of the regional government, and it's included in the Rendis database, national platform, for evaluation of funding to soil protection interventions.

4. BUDGET AMOUNT ESTIMATION & SCHEDULE of INTERVENTION: The budget of the preliminary project approved is about € 16,5 Million. The implementation is scheduled by 2015-2016. An extra charging of the “sand motor” by Foce Reno-Bellocchio area, with sand coming from submarine deposits, is quoted to add about € 13 Million to the abovementioned budget.

5. UPDATING 2017 – realization completed

The intervention was realized in **2016** with an overall **funding of 20 M€** (18,5 from State, 1,5 from Emilia-Romagna) within the Program “Italia Sicura” with a specific contract State-Region. It interested 8 critical coastal stretches (Misano Adriatico, Riccione Sud, Rimini Nord e Igea Marina, Cesenatico Ponente, Milano Marittima Nord, Lido di Dante Sud, Punta Marina, Lido di Spina Sud) for an overall **littoral extension of 11 km**, with a nourishment overall amount of **about 1,4 Million of cubic meters of sand** (of which 1,25 from off-shore sandpit and 0,15 from littoral accumulation). A **monitoring activity started in 2016, now ongoing till 2019**, both on off-shore sandpit and coastal site of intervention. This is the 3rd big intervention with off-shore sand realized in Emilia-Romagna. It is a periodical extraordinary maintenance that Emilia-Romagna setup, together with other specific measures, in its strategy for the protection and adaptation of the regional coastal area. The next intervention, depending on national and regional financial resources, is fore-

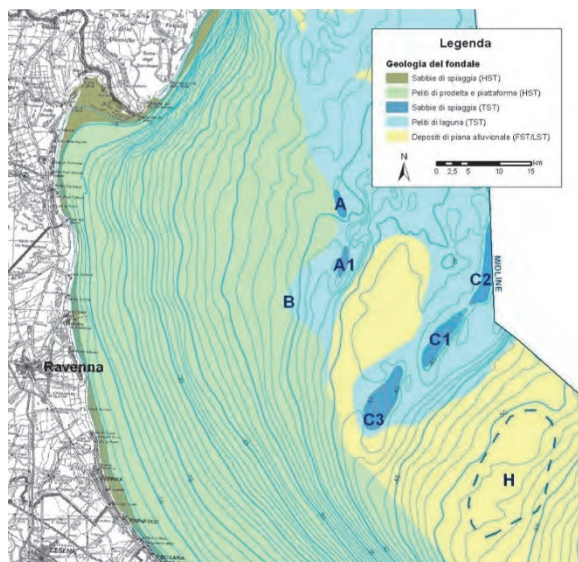


Moments of the intervention: the dredging vessel approaching the pipeline graft | a backflow yard work on the coast seen by year 2021.

6. ACTORS INVOLVED

- Emilia-Romagna Region (Directorate General for Territory and Environment Care)
- ARPAE (Regional Agency for Environment Protection and Energy)
- Municipalities (Local Authorities) interested by the intervention

7. LOCATION MAP AND GENERAL FEATURES



General plan with the ER's regional coastal area, and off-shore sites of sand withdrawal (areas A, B, C) and thickness of sedimentary deposits.

Departement de l’Herault

1. TITLE OF THE PROJECT beachnourishment of sandy coasts in Herault Departement / South of France (Herault-01)

2. BRIEF DESCRIPTION OF THE TYPOLOGY OF THE PROJECT

in realization

Mediterranean Sea is considering as a hot spot for climate change. A lot of damages are previous on our sandy coasts: a study from 2010 for the French Ministry estimates these damages of 30 billion € in year 2100. During the last period 2007 /2014, public administrations realized more than 100 M€ to protect beaches on Herault coasts (90 km) – see herewith document.

For the medium term, we project to restore the sand balance along many beaches, considering we will need enough time to sensibilize the coastal population to move behind.

We studied a beach nourishment project including 10 million m³ of sand, associated with some groins to stabilize. We found these offshore sand deposits during **Beachmed studies 2002/2008**. Moreover, the environmental aspects were studied on ESPEXS project 2011/2013.

3. LEVEL OF DESIGN OF THE PROJECT (in 2014): The project has been designed in its Preliminary version in the works of the Interreg IIC project **BEACHMED-e**.

4. BUDGET AMOUNT ESTIMATION & SCHEDULE of INTERVENTION: the overall budget is estimated in 100 M€, and the interventions are foreseen to be realized in a 10 years period.

5. UPADTING 2017 – in realization

These coastal projects were included in “Contrat de Plan Etat-Région 2015-2020” and in [PLAN LITTORAL 21](#), which is a coastal plan carried by Region Occitanie, to protect the most weak coastal zones, to manage and develop the economic activities. The projects **started at the end of 2017** and will be realized by steps during next 2 or 3 years, **until 2019-2020**. The overall amount of budget they represent is **about 43 M€**. The funds come from FEDER 20%, Fr State 30%, Region Occitanie 15%, Département Herault 15% and local funds / Municipalities 20%.

Lido de SETE – 4,3 M€

Thau agglomération continues the work of protection and sustainable development of the Sète lido until Marseillan. During the 4th phases of work in 2013, a geotextile swell attenuator filled with sand was immersed at 350 m of the beach by 4,5 m depth.

The monitoring carried out by Thau agglomération reveals that this device of 800 m linear is effective on its site of implantation. A new 5th phases of this operation provides for the extension of the wave attenuator over 1400 m in the period 2017 / 2018. A complement sand may take place but is already not confirmed.

Beach of VIAS – 25 M€

The Communauté d'Agglomération Hérault Méditerranée (CAHM) manages a program to protect the west coast of Vias in two phases:

- Phase 1: restore the natural functioning of these beaches (removal of groins, reconstruction of the dune in place of the stakes of the seaside and sand beach nourishment);
- Phase 2: massive beach nourishment of sand and / or decline of stakes to more than 100 m (long-term development).

The work begun in recent years is continuing with the completion of the work Phase 1, zones 2 and 3, but also with the Phase 2 study on long-term adaptation of these beaches. Beach nourishments are planned to reconstitute the dune of zones 2 and 3: they will take place in 2018.

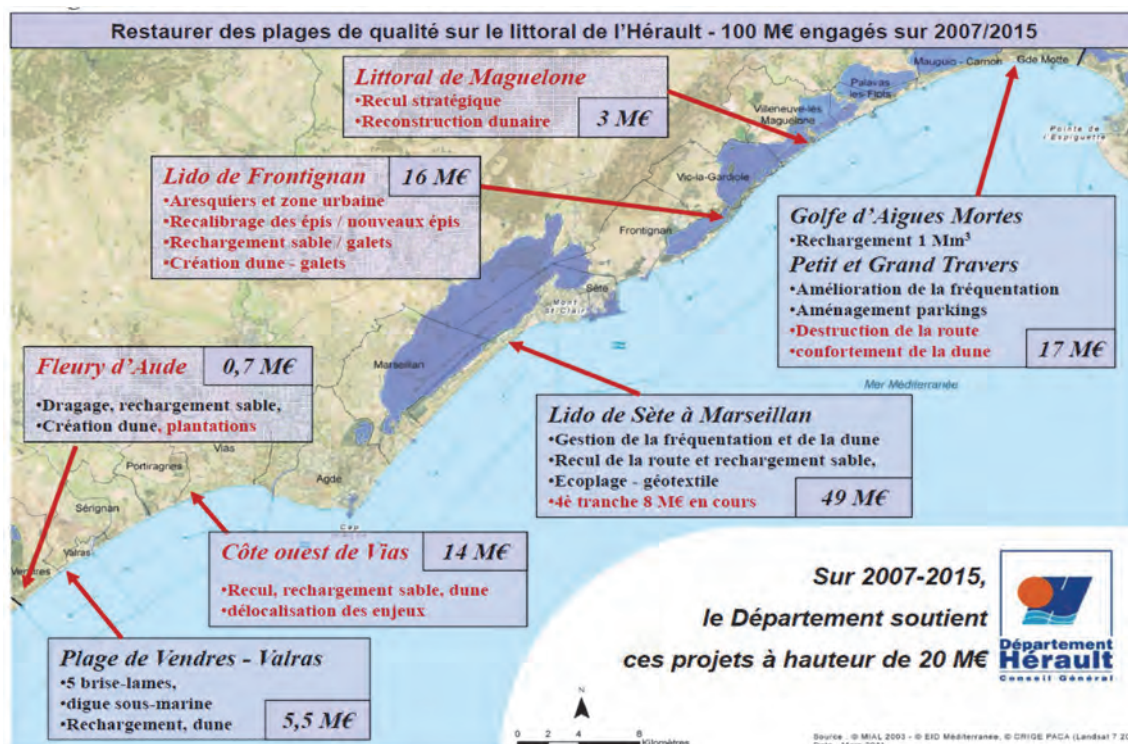
Lido de CARNON & Lido de Maguelone – 5 M€

A study is underway and must validate a development plan for 2018. Some scenarios foresee for 2018 the use of beach nourishment and groins.

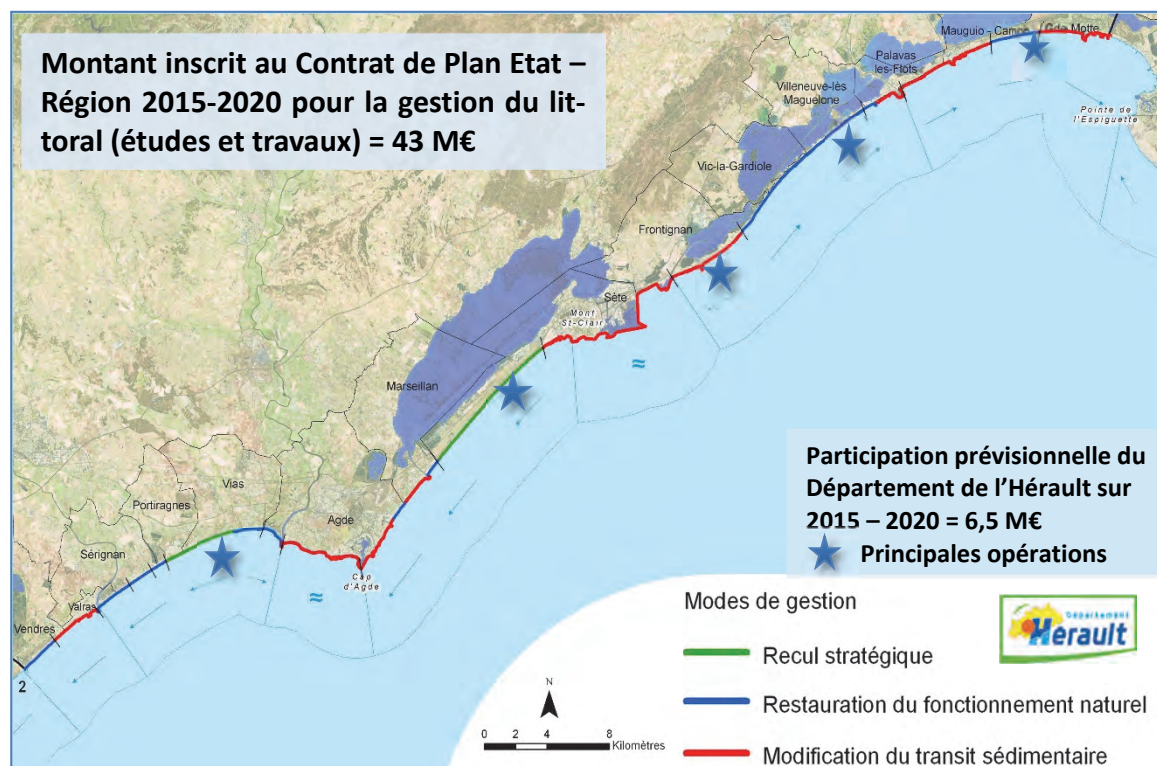
6. ACTORS INVOLVED

- French Central & local Administration
- Region Languedoc-Roussillon
- Department of Hérault - Municipalities
- Private sector (owners, economic actors) - Research centers

7. LOCATION MAP AND GENERAL FEATURES



Overall view of the programmed interventions, to be realized until 2019-2020



Departement de l’Herault

1. TITLE OF THE PROJECT: protection du Lido de Maguelone à Frontignan – 5 km (Herault-02)

2. BRIEF DESCRIPTION OF THE TYPOLOGY OF THE PROJECT **in realization**

The project consists to protect this coastal stretch, restoring the beach and to reorganizing the fruition by citizen and tourists. Typologies of works considered are Sandy beach nourishment, realization of groins and breakwaters and reconstruction of littoral dunes.

3. LEVEL OF DESIGN OF THE PROJECT (in 2014): the design is at it Definitive stage, looking to be prepared the executive project.

4. BUDGET AMOUNT ESTIMATION & SCHEDULE of INTERVENTION: the estimated budget is about 16 M€, and the intervention is foreseen to be realized in 2-3 years period, in 2015 a first step is foreseen with about 8 M€ of works.

5. UPDATING 2017 – in realization

Thau Agglomération is continuing work on the protection and sustainable development of the Lido de Frontignan La Peyrade (a first phase of work was carried out in 2015, about 8 M€).

The main issues concern the protection of residents and activities against sea submersion. The whole area is in the red zone of the PPRI (Flood Risk Prevention Plan).

The project on Lido de FRONTIGNAN consists in strengthening beach protection in line with the national strategy for coastal management, using soft and reversible techniques, without adding rocky constructions and without complicating the strategic long-term retreat of the economic activities.

Beach nourishments planned in **autumn 2017**, with an **amount of 8,74 M€**, are the followings a **beach nourishment** of the urban lido beaches with **192.000 cubic meters of sand**, and the **creation of a sandy dune** of 4.775 m long, 2,5 m wide and 2,75 m high with **32.300 cubic meters of sand**.

6. ACTORS INVOLVED

- French Central & local Administration
- Region Occitanie (former Region Languedoc-Roussillon)
- Department of Herault - Municipalities
- Private sector (owners, economic actors) - Research centers

7. LOCATION MAP AND GENERAL FEATURES



Objectifs de l'intervention :

- Préserver le plus possible le caractère naturel des espaces du secteur Est des Aresquiers.
- Maintien de la vocation balnéaire des espaces littoraux situés à l'Ouest des Aresquiers.

Etude générale pour la protection et la mise en valeur du littoral de Frontignan et de Villeneuve-lès-Maguelone

Mas d'Angoulême - Mas d'Ingril Aménagement retenu

Figure 6

MAR2025C - schéma CDRI JLF 31/08/2014

BCEOM



Solution retenue : Rechargement et entretien des épis

- Maintien suivi et entretien du cordon de protection et des épis existants.
- Apport de 60 000m³ de galets associés ou non aux "pierres" (20000m³ disponibles) pour recharger la plage aux Aresquiers (solution de base)
- Apport de 104 000m³ de sable en provenance de la pointe de l'Espiguette pour recharger la plage au niveau de la dent creuse.

Variante 1

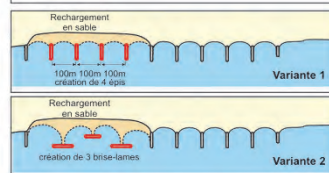
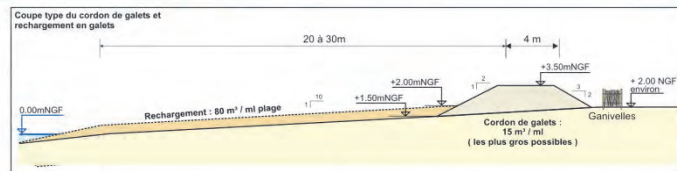
- Secteur de la dent creuse : -création de 4 épis espacés de 100m, de 80m de long et rechargement par 25 000m³ de sable.

Variante 2

- Secteur de la dent creuse : -création de trois brise-lames avec rechargement (20000m³).

Variante 3

- Secteur de la dent creuse : -création de 4 épis espacés de 100m, de 80m de long et rechargement par 25 000m³ de sable et suppression des quatre épis situés le plus à l'Est



Lazio Region

1. TITLE OF THE PROJECT: “TIBER MAJOR PROJECT” (Lazio-01)

2. BRIEF DESCRIPTION OF THE TYPOLOGY OF THE PROJECT

updating

- Increasing sediment transport of Tiber river
- Requalification of Tiber river banks and
- Environmental monitoring system
- Maintenance
- Requalification of Tiber River mouth (Passo della sentinella – Idroscalo)
- Waters quality
- Flood risk mitigation
- Tiber at zero emissions
- Touristic promotion
- Eco-compatible agriculture development
- Tiber Start-up (Old buildings re-establishment and co-working initiatives)
- Nourishment of Tiber River mouth system beaches (Fiumicino, Roma, Pomezia)
- New and existent Marinas and Ports adaptation to sustainable coastal management

3. LEVEL OF DESIGN OF THE PROJECT (in 2014): Feasibility Study in the Regional Operational Programme ERDF 2014-2020.

Updating: Part of the realization of the Tiber Major Project was applied as a proposal in a call of the Program LIFE+, the Region in the occasion allocated 4,5 M€ for co-financing.

4. BUDGET AMOUNT ESTIMATION & SCHEDULE of INTERVENTION

- Natural sediment transport improvement	➔	7,2 Million €
- Environmental enhancement	➔	12,0 Million €
- Nourishment of beaches and dunes restoration	➔	16,0 Million €
- Tiber Urban stretch and mouth requalification	➔	11,5 Million €
- Marinas and Ports adaptation	➔	8,4 Million €
Total Tiber major project	➔	55,1 Million €

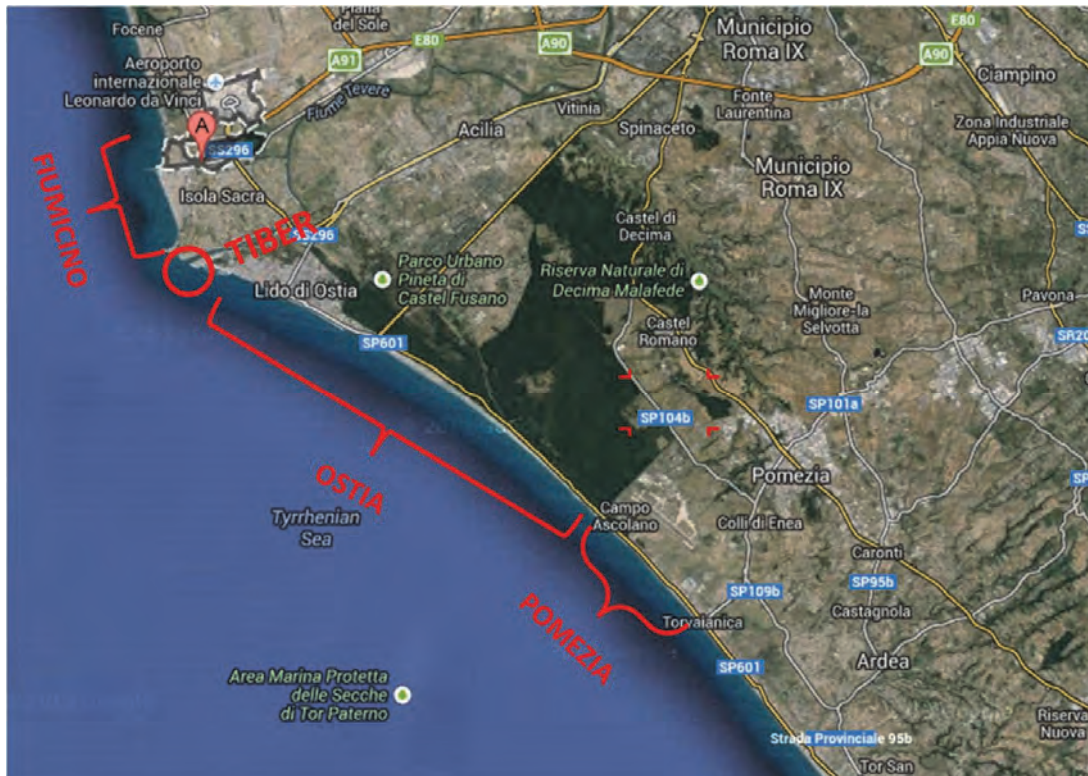
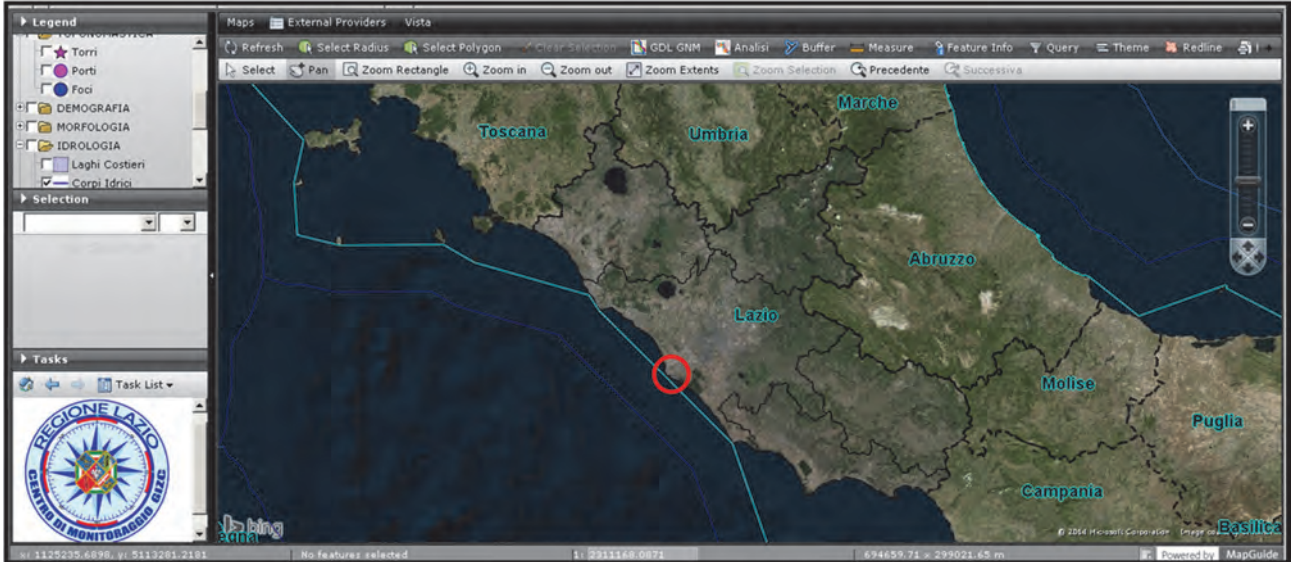
Intervention schedule ➔ 48-60 months

5. ACTORS INVOLVED

- Regional Administration (Regional Coastal Defence Agency ARDIS, Regional Environment Agency ARPA);
- Municipalities (Fiumicino, Roma, Pomezia); planning, tender
- Tiber Regional Basin Authority; planning
- Port Authority of Civitavecchia; planning, tender
- Private Sector; planning, work



6. LOCATION MAP AND GENERAL FEATURES



Liguria Region

1. TITLE OF THE PROJECT: Recupero litorale tra Albenga e Ceriale /Regione Liguria – Provincia Savona (Liguira-01)

2. DESCRIPTION

- Restoration of a coastal stretch of 6 km completely modified by a sea wall built during the last century to protect the railway
- Improvement of the defence against sea floods for a coastal plain through the use of a off shore borrow site for sand nourishment
- Integrated planning of the near shore area in order to improve public uses and pedestrian and cycling mobility

3. LEVEL OF DESIGN OF THE PROJECT

- The project is already approved at the preliminary level; it was developed by a multidisciplinary team that designed the interventions both for the shore restauration and for a new land use plan in the nearshore area.
- The Liguria Region included the intervention in the “Piano Tutela Ambiente marino e costiero (PTAMC)”, now (2014) under EIA procedure.
- The borrow site in the sea bottom was firstly studied thanks to the **BEACHMED-e** project; additional surveys were carried on by the Region in the 2012 for the PTAMC.
- The 7 municipalities of the sedimentary cell signed an agreement for the use of the borrow pit site.

4. BUDGET AMOUNT ESTIMATION & SCHEDULE OF INTERVENTION

The budget of the project is € 10 Million.

The implementation is not scheduled because of the lack of financement

5. ACTORS INVOLVED

- Regione Liguria
- Provincia di Savona
- Albenga and Ceriale Municipalities
- All the other municipalities of the sedimentary cell
- RFI (Italian Railways Company)
- Ministero Beni Culturali



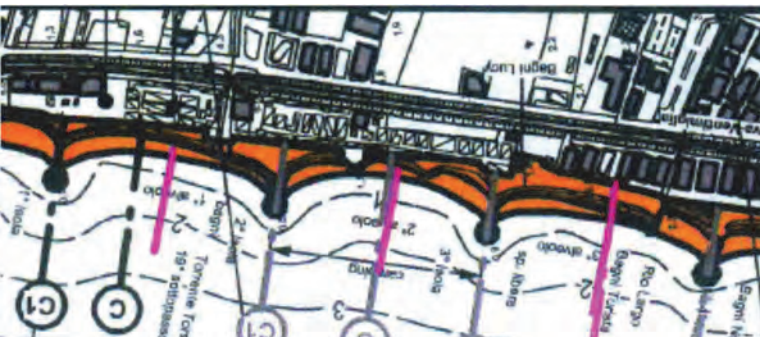
6. LOCATION MAP AND GENERAL FEATURES



The area of intervention



The railway runs directly by the sea.



An example from the project.

Split-Dalmatia County

1. TITLE OF THE PROJECT: Restoration of Kaštela Bay Coastline (Split-Dalmatia-01)

2. BRIEF DESCRIPTION OF THE TYPOLOGY OF THE PROJECT

Coastline of the Town of Kaštela has a very specific history and has been part of mayor one of the biggest infrastructural projects in the Mediterranean - Eco Kaštela Bay financed by the WB and EBRD. The value of the project will be 300 M€ by its end.

It covers construction and reconstruction of sewage systems of for the city of Split, the towns of Solin, Kaštela and Trogir, the municipalities of Seget, Okrug, Dugopolje and Klis and a part of the Čiovo Island.

The project has been implemented due to high pollution caused extensive growth of the population which was not followed by simultaneous development of municipal infrastructure (i.e. construction of water supply and sewage networks). Moreover, several plants (chemical, iron, cement), situated in Kaštela, resulted very high pollution of the area. By now, a 2 levels waste water purification plant was constructed.

The project has resulted with the rise of the sea quality level along Town of Kaštela coastline, transforming it to beach area for local population.

Unstable gravel beaches present 44% of Town's coastline. At the moment the area requires high nourishment costs on the yearly bases, due to lack of planning and technical documentation.

Beach erosion presents a big problem for settlements, particularly for historical castles and road infrastructure, located very close to the coastline. A systematic approach to restoration of the coastal stretch would present significant contribution to the defense of urban settlements.

The scope of the project is 3,5 km of coastal stretch with very narrow internal area, from Kaštilac castle in Kaštel Gomilica to Villa Rušinac in Kaštel Lukšić. The aim of the project is sustainable management of a coastal stretch with aim to restore the coastal promenade and to integrate it with beach and park areas, protection of Kaštilac castle and construction of 2 marinas.

General aspects and limitations

The area has been subjected to series of sea flooding in recent years which has affected the inner coastal area, i.e. road infrastructure and urban settlements that are closely connected with promenade. With inevitable coastal area sinking and water level rise due to the climate change the threats are listed:

- loss of high value beach area
- exposure to sea floods; where boardwalk and road being mostly affected
- exposure to sea floods; where urban settlements being endangered in extreme events
- saltwater intrusion into the groundwater aquifer, causing loss of specific habitats

Limitations to interventions are given by the fact that the area has a distinctive number of cultural heritage sites, which could potentially turn out to be a hurdle of a kind.

The city will enjoy social-economic benefits once coastal area will undergo through restoration process. It will surely alleviate if not totally remove the negative consequences of regular sea flooding and on top restore in full the attractive promenade along with beach and park areas

3. LEVEL OF DESIGN OF THE PROJECT

- The project has been a Government policy for more than a decade
- The master plan for the coastal works is in preparation
- The master plan for the road network is in preparation
- The town planning zones are agreed

4. BUDGET AMOUNT ESTIMATION & SCHEDULE of INTERVENTION

- - The budget of the project is about € 25 Million
- - The implementation is scheduled by 2020

5. ACTORS INVOLVED

- Department of Town Planning and Housing (development on land side)
- Department of Public Works (coastal works, road works)
- Kaštela Municipality (Local Authority)
- Private sector (tourism companies)

6. MAP WITH LOCATION AND GENERAL FEATURES



The project area comprises Kaštilac castle in Kaštel Gomilica and stretches to Villa Rušinac in Kaštel Lukšić. The coastal stretch subject to the direct interventions is about 4.0 km long and involves as well very narrow zone of inner land, on average 50m wide.

Valencia Region

1. TITLE OF THE PROJECT Development and implementation of the shoreline management plan for the northern coast of Valencia /Spain (Valencia-01)

2. BRIEF DESCRIPTION OF THE TYPOLOGY OF THE PROJECT

The project plans a set of actions aimed at overcoming the problems caused by the action of the sea over the territory in which it is probably the most erosive coastal stretch within the Spanish Mediterranean. The project area is the coast between the ports of Burriana and Sagunto, in the north of Valencia. It is a 30 km long stretch of low-lying coast which is subject to strong sedimentary dynamics affecting directly 8 municipalities¹.

Human activities during the twentieth century², generated imbalances that have resulted in severe erosion problems and risks impinging on coastal populations, environment³ and economic activity⁴. Coastal retreat reaches values exceeding 100 m in some areas, with rates greater than 5 m / year. After half a century taking more or less successful measures with a local approach, in 2011 the Ministry of Environment drafted a study of alternatives in the area under a broad geographical perspective, integrating the long term and therefore considering adaptation to climate change. The feasibility study combines hard engineering measures of coastal protection with soft actions addressed to the management of the sedimentary cycle.

Descriptors: beach nourishment, realignment of coastal infrastructures, adaptation to climate change, reduction of coastal risks.

3. LEVEL OF DESIGN OF THE PROJECT

The strategy is drafted, and the feasibility of the different alternatives (including option 0) is studied and assessed through the quantification of key variables.

Actions that integrate the strategy are currently at different stages: there are projects at preliminary drafting stage, others at drafting stage, and others which would be ready to be tendered having passed the environmental processing.

4. BUDGET AMOUNT ESTIMATION & SCHEDULE of INTERVENTION

The estimated budget for the completion of works is about 50 M € and the deadline for its completion five years (60 months), after which only management and maintenance works are foreseen. The estimated useful life of the works projected is 35 years.

5. ACTORS INVOLVED

- Directorate General for the Sustainability of the Coast and the Sea, Ministry of Agriculture, Food and Environment, responsible for coastal defence projects and works.
- Directorate-General for Transport and Logistics and Directorate General for Environmental and territorial assessment, Valencian Regional Ministry of Infrastructure, Territory and Environment, in charge of coastal planning.
- Municipalities of Burriana, Nules, Moncofa, Xilxes, La Llosa, Sagunto y Canet d'En Berenguer, in charge of coastal maintenance and as final beneficiaries.

¹ These 8 municipalities have near 140.000 inhabitants. The proximity of the metropolitan areas of Valencia (near 1 million inhab.) and Castellón (more than 180.000 inhab.) should be also considered.

² Hydraulic regulation and construction of coastal infrastructures (eg the port of Burriana) which have resulted in a dramatic reduction of sediment supply to the coastal system.

³ Within the coastal zone there are three Nature 200 (SCIs and SPAs) sites covering 20 km of the coastal stretch, including wetlands (1150, 1410, 1420, 2110, 2120, 2210, 3140, 3150, 3420, 6430 and 7210) and seabeds (*1120) and other interesting habitats such as dunes.

⁴ Flood hazard maps and the flood risk maps, Ministry of Agriculture, Food and Environment, 2014

6. MAP WITH LOCATION AND GENERAL FEATURES

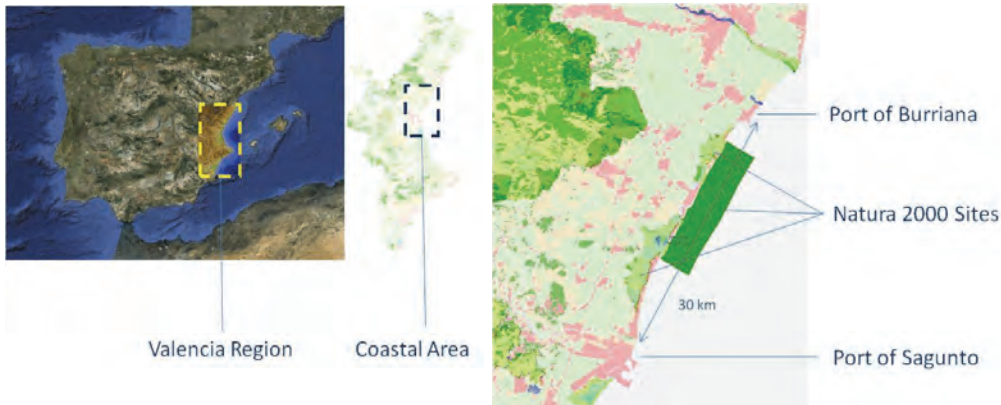


Fig. 1 Location.
Sources: Google Maps and Terrasit (Valencian Regional Government)



Fig.2 Port and southern coast of Burriana: seashore evolution.
Source: Coastal Information System (Valencian Regional Government).



Fig. 3 Project coastal stretches from north (Port of Burriana) to south (Port of Sagunto). Source: Google Earth.

Valencia Region

1. TITLE OF THE PROJECT: Exploitation of deep-waters sand deposits for beach nourishments along the Valencian coast /Spain (Valencia-02)

2. BRIEF DESCRIPTION OF THE TYPOLOGY OF THE PROJECT

The project is framed within the recommendations of the EU projects EuroSION and Conscience, which suggest that Member States investigate the so-called strategic resources to identify potential sources of sand usable for beach nourishment projects at a regional scale and with long-term vision.

As consequence, within the context of the EU project **BEACHMED** the Spanish Ministry of Environment launched the works to locate deep-water sand deposits in the Gulf of Valencia. These works resulted in the location of a potentially exploitable site whose resources would be able to mitigate regional problems of coastal erosion, promote coastal environmental regeneration measures and adaptation to climate change, by minimizing the environmental impact of the works.

The sand deposit has about 90 million m³ of sedimentary resources usable for future beach nourishment in Valencia. The dredging project already has a positive environmental impact declaration⁵ and must be supplemented with the approval of specific projects of beach nourishment and coastal restoration.

Given the position and characteristics of the sand deposit it is required by 2020 to have ready a battery of beach nourishment projects which allows economies of scale making viable the exploitation of the deposit. Thus, the project would allow to address major erosion problems in the Mediterranean Spanish coast under a coordinated action. On the other hand, the implementation of the project would have clear synergies with other Regional initiatives on coastal planning such as the Regional Network of Coastal Parks⁶ and the initiatives on rearrangement and requalification of urban waterfronts⁷.

Descriptors: beach nourishment, adaptation to climate change, reduction of coastal risks, coastal restoration, requalification of urban waterfronts, environmental regeneration.

3. LEVEL OF DESIGN OF THE PROJECT

As pointed out the dredging project is drafted and already has a positive environmental impact declaration. Studies assessing strategic options under integrated approaches were previously completed⁸.

For its implementation, the action needs to be supplemented by a set of coastal projects. The design of such projects is currently in different phases.

Approval and implementation of other synergic actions such as projects of the Regional Network of Coastal Parks are also in different phases.

⁵ See Spanish Official Gazette (BOE) Num. 237 of 3 October 2013.

⁶ See specially articles 21 “Green Infrastructure” and 147 “Coastal Parks” of the Valencian Territorial Strategy (adopted by Regional decree 1/2011 of 13 January).

⁷ As an example see General Protocol on Integrated Actions in the North Bay of the Municipality of Alicante (BOE Num. 268 of 5 November 2010). Should be taken into account that almost 60% of the Valencian coastline is urban.

⁸ See:

“Estrategia para la Sostenibilidad de la Costa”, Ministry of Environment, 2008

“Comprehensive study on coastal defense options for the northern coast of Valencian Region (Port of Burriana - Port of Sagunto)”, Ministry of Environment, 2011

Works within the “General Protocol between the Ministry of Environment, the Association of Municipalities of La Safor and Generalitat Valenciana for the conservation and restoration of the coast”, Polytechnic University of Valencia, 2008

4. BUDGET AMOUNT ESTIMATION & SCHEDULE of INTERVENTION

The estimated budget for the completion of works is about 75 M € and the deadline for its completion five years (60 months). The estimated useful life of the works projected is 50 years.

5. ACTORS INVOLVED

- Directorate General for the Sustainability of the Coast and the Sea, Ministry of Agriculture, Food and Environment, responsible for coastal defence projects and works.
- Directorate-General for Transport and Logistics and Directorate General for Environmental and territorial assessment, Valencian Regional Ministry of Infrastructure, Territory and Environment, in charge of coastal planning.
- Coastal Municipalities, in charge of coastal maintenance and as final beneficiaries.

6. MAP WITH LOCATION AND GENERAL FEATURES

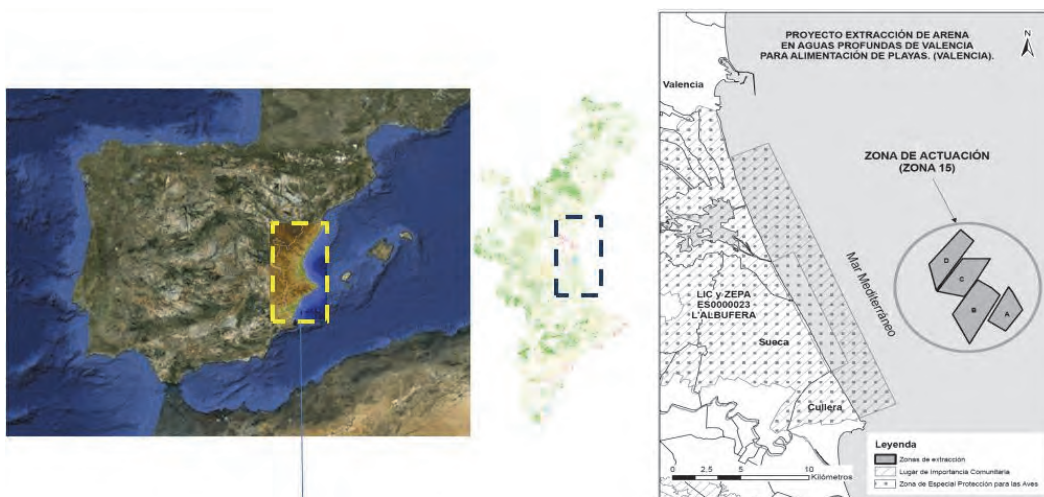


Fig. 1 Location. Sources: Google Maps, Terrasit (Valencian Regional Government) and Project’s Environmental Impact Decla-

Valencia Region

Area and location of sand deposits



Fig. 2 Assessed needs and estimated allocation of sedimentary volumes for coastal defense. Source: Project’s Environmental Impact Declaration.

Ubicación	V aporte arena estimado (x10 ⁶ m ³)
Tramo 1 Puerto de San Carlos de Rápita. Puerto de Burriana.	6
Tramo 2 Puerto de Burriana. Puerto de Valencia.	10,5
Tramo 3 Puerto de Valencia. Cabo de San Antonio.	12,5
Tramo 4 Cabo de San Antonio. Límite Alicante-Murcia.	5
Tramo 5 Límite Alicante-Murcia- Cabo Palos.	5
Total	39

Region of East Macedonia Thrace

1. TITLE OF THE PROJECT Fanari beach rehabilitation (REMTH-01)

2. BRIEF DESCRIPTION OF THE TYPOLOGY OF THE PROJECT

Fanari beach is a linear dune beach between the Aegean Sea and the Ksirolimni Lagoon. A road crosses the beach and makes it accessible to the public. Along the beach there are beach bars, some non-permanent structures and parking lots.

Because of the natural beauty of the beach and the easy access (less than half an hour from Komotini and the Egnatia highway) the beach attracts a great number of tourists and beach activities. However, the fragile dune system has been disturbed and rehabilitation works are necessary in order to obtain a sustainable development of the beach front. Furthermore, few small coastal works perpendiculars to the coastline have disrupted the alongshore sediment transport.

The rehabilitation project can include:

- Dune rehabilitation and planting
- Dune access management
- Rehabilitation of the road and parking lots so as to limit the access of vehicles on the sand and application of ecofriendly materials
- Rehabilitation of the perpendicular existing coastal works and sand rearrangement

3. LEVEL OF DESIGN OF THE PROJECT

- Preliminary study: REMTH wishes to use Fanari as a demonstration site putting in practice the Bologna Charter Best Practices

4. BUDGET AMOUNT ESTIMATION & SCHEDULE of INTERVENTION

- Budget estimation for Preliminary design ~100K€ Necessary time 1 year (mainly for data collection and stakeholders involvement)
- Budget estimation for Final Design ~500K€ Necessary time 2-3 years
- Budget estimation for works 2M€ to 10M€ Necessary time 2-3 years

5. ACTORS INVOLVED

- Central Administration, Cadastral Service, Ministry of Infrastructure and Ministry of Environment
- Regional Directorate of Technical Works, Regional Service of Environmental and Spatial Planning, Regional Service of Water Bodies – Municipality of Komotini (Φορέας Διαχείρισης)
- Private sector – Owners of coastal land, owner of a coastal camping, individuals that rent the coastal infrastructure from the municipality (beach bars, umbrellas etc.)

6. MAP WITH LOCATION AND GENERAL FEATURES

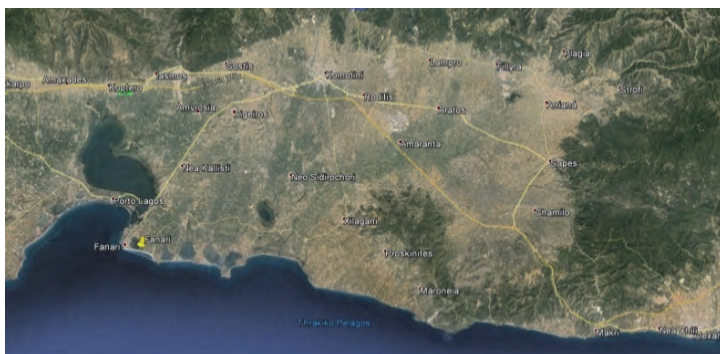


Figure 1: Picture of Fanari beach, relative positioning of Fanari beach from the city of Komotini and Egnatia highway.



Figure 2: Picture of Fanari beach, approximately 4 Km between the cape of Fanari and the cape of Arogi.



Figure 3: Picture of Fanari beach, many activities concentrated on a narrow (approximately 80 -100 m width) and fragile coast.



Figure 4: Picture of Fanari beach, beach and dune condition in 2014.

Region of Western Greece

1. TITLE OF THE PROJECT Protection and confrontation of erosion on Western Achaia coasts (WG-01)

2. BRIEF DESCRIPTION OF THE TYPOLOGY OF THE PROJECT

NEW

The project area is the coastline of Region of Western Greece in the western part of Achaia Regional Unit (Map 1). Here, in after, called Western Achaia coasts.

During the last decades severe problems have been emerged because of the erosion along the coasts of Western Achaia, affecting not only the coastal and maritime environment, but also the local communities, as well as regional economy and development. The erosion of the Western Achaia coasts, from Monodendri to Niforeika settlements, has been certified by the competent Committee of Coast and Seashore Determination, as provided for in Article 3 of the Greek Law 2971/2001.

One of the most important objectives of regional policy is the sustainability of the ecosystems and environment and the development of local economy, ensuring at the same time better quality life. Thus, Region of Western Greece, as the second level administration body (NUTS3: EL632, ACHAIA), is attempting to confront the erosion at these vulnerable areas initially through technical studies, in order to proceed concrete projects in situ for the mitigation of the problem.

Specifically, the project aims at the confrontation of the erosion along the 13,6 km of coastline extending to 2 Municipalities in our Region, the one of Patras (Monodendri, Vrachneika and Tsoukaleika settlements) and the other of Western Achaia (Niforeika, Kalamaki and Alissos settlements), in order to protect the maritime-coastal zone, residential areas and tourist and commercial businesses alongside the coastline, promoting the construction of the appropriate protection works (Maps 2, 3, 4) such as:

- Coastal protection works (revetments), of max 950 meters length, at Roitika-Monodendri, Chatzina and Vrachneika-Monodendri, as well as at the area of Kalamaki-Niforeika (480m length).
- Detached breakwaters at Monodendri site, at the western and eastern area of Tsoukaleika's fishing shelter and at the areas of Kalamaki-Niforeika.
- Small transverse projections in the central part of the coast, at the site of Vrachneika, between the coastal works (revetment) and the breakwaters, for its stabilization.
- Stereotransfer settlement project at the Alykes fishing shelter.
- Detached low coronation breakwaters in the area of Alissos, reconstruction of the two existing cantilevers near the outfall of Peiros river, extending from the area between the two cantilevers and a shielding project extending in length of about 100 m.

3. LEVEL OF DESIGN OF THE PROJECT (in 2017):

The project is designed in its final version

4. BUDGET AMOUNT ESTIMATION & SCHEDULE of INTERVENTION

The total estimated budget of the project is **about 20,5 Million €**, which analysed for each intervention area as follows:

- Tsoukaleika – Vrachneika: 12,2 Million €
- Kalamaki-Niforeika: 6,1 Million €
- Alissos: 2,2 Million €

The implementation of the project is not scheduled, pending the individuation of funding.

5. ACTORS INVOLVED

- Region of Western Greece (Directorate of Technical Services)
- Ministry of Infrastructures and Transport
- Municipalities (Local Authorities)

6. LOCATION MAP AND GENERAL FEATURES



Fig.1 Map of Region of Western Greece

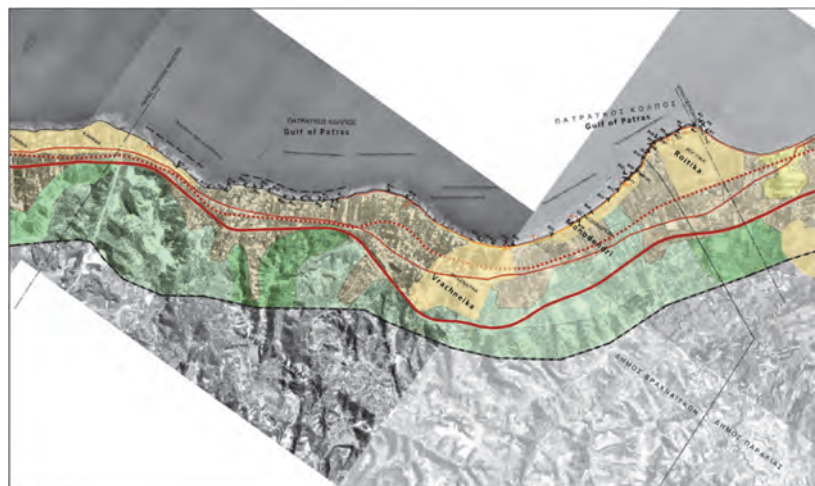


Fig.2 Intervention Area “Tsoukaleika – Vrachneika

Decentralized Administration of Crete

1. TITLE OF THE PROJECT Limenas Hersonisou coastal defence and renovation project (DAC-01)

2. BRIEF DESCRIPTION OF THE TYPOLOGY OF THE PROJECT

The area of Limenas Hersonisou (port of Hersonisos) has been identified by prior studies (Hellenic Center of Marine Research, Anagnostou 2014) as an area of high erosional vulnerability. The coast faces erosion problems because of natural mechanisms and human interventions. Prior projects have studied the geomorphology of the area, the mechanisms of erosion, the local wave climate and the sediment transport mechanisms. Limenas Hersonisou is a developed touristic area which has been identified from the National Special Framework of Spatial Planning and of Sustainable Development for Tourism (2013) as an area that needs renovation in order to improve the touristic product. According to 2013 data, the municipal department of Hersonisos disposes of approximately 25.000 hotel beds. Many hotels, bars and restaurants are built on the coastline and this is the major attraction of the area. Limenas Hersonisou combines easy access from the airport of Iraklion, organized hotels, a picturesque fishermen's port, many local taverns and interesting night life by the sea and easy access to close by archeological sites.

Because of the acute erosion problems and the high pressure for touristic development and further urbanization of the coastal zone, Limenas Hersonisou has already been chosen from DAC as a critical area where coastal works are necessary. This project includes the preliminary design, final design and construction of coastal protection and coastal zone rehabilitation works. The study will take in consideration both technical and socio-economic aspects and propose works friendly to the natural environment and a new urban planning that will limit the erosion phenomena and improve the urban coastal zone.

DAC wishes to use Limenas Hersonisou as a pilot area where the Bologna Charter best practices will be applied and then propose the same methodology for other critical areas in Crete. Limenas Hersonisou presents the typical problems of many Cretan and Greek coastal areas where tourism infrastructure has been developed on the coastline in detriment of the natural coast and a coastal defense and urban renovation project will be a good example for other areas facing similar problems showing that environmental friendly technical solutions and urban planning can help to improve the tourism product and to develop the local economy.

3. LEVEL OF DESIGN OF THE PROJECT

The area of Limenas Hersonisou has already been identified on National and Regional level as a critical coastal area in need for coastal defense and urban renovation works. Many data on coastal dynamics, coastal erosion and socio-economic characteristics are available from prior projects: Preliminary and final design of works / Construction of works.

4. BUDGET AMOUNT ESTIMATION & SCHEDULE of INTERVENTION

Budget estimation: 500.000 € for project technical studies and 4.500.000 € for the construction of project. Necessary time 1-2 years for the technical studies and 2-3 years for the construction

5. ACTORS INVOLVED

- Central Administration, Cadastral Service, Ministry of Infrastructure and Ministry of Environment as managing bodies.
- Regional Directorate of Technical Works, Regional Service of Environmental and Spatial Planning, Regional Service of Water Bodies.
- Municipality of Hersonisos.
- Hellenic Centre for Marine Research.
- Private sector – Owners of coastal land, professional of tourism (hotels, bars, restaurants, cafes) as end users.

6. LOCATION MAP AND GENERAL FEATURES

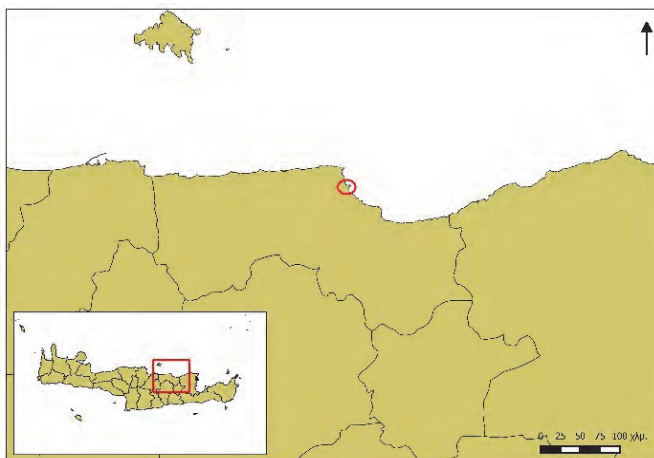


Fig.1: Location of Limenas Hersonissou



Fig.2: Location of the municipality Hersonissou

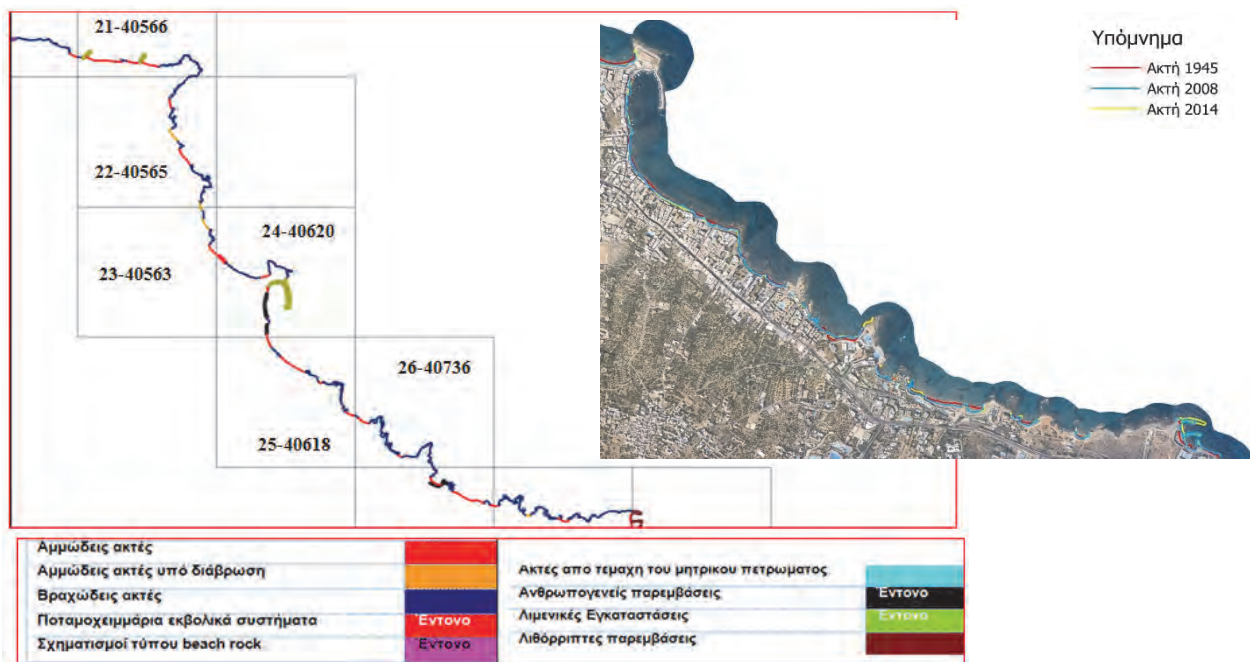


Fig.3: Natural and human characteristics of the coastal zone of Limenas Hersonissou

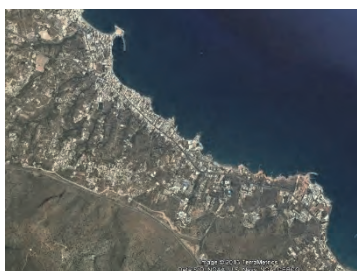


Fig.4: View of the project area from satellite



Fig.5: Coastline with tourism facilities and erosion evidence



Fig.6: detail of the erosion phenomena on the coastline

Israel (MoEP)

1. TITLE OF THE PROJECT:

ICZM for the northern Tel-aviv to Hertzeliya coastal zone (Israel-01)

2. BRIEF DESCRIPTION OF THE TYPOLOGY OF THE PROJECT

The project area runs about 10 km on Israel's central Mediterranean coast, from the Yarkon River outlet in the northern part of the city of Tel Aviv northward to Apollonia National Park at the northern end of the city of Hertzeliya. This area's rich endowment of man-made features (e.g. power plant, detached breakwaters, sea walls, marina, sewage outlets), combined with its mix of ecological, economic, social, political and cultural interests (e.g. touristic resorts, intensive urban areas, archeological site) exemplify the need for integrated coastal zone management.

The coastal area's primary feature is approximately 9 km of narrow, sandy beaches backed by eroding aeolianite sandstone ("kurkar") cliffs, up to a height of 30 meters. Today, these beaches are probably Israel's most valued leisure area.

Project objectives:

- Establishment of an integrated GIS database for the coastal zone.
- Establish a model for an integrated coastal zone management scheme (bathing, maritime sports activities, marinas, infrastructures etc.)
- Restoration and expansion of eroded beaches, by sand nourishment and up-to-date ecological marine constructions (e.g. submerged detached breakwaters based on "Geotube" solutions, reef balls, etc).
- Stabilization and minimization of coastal cliffs erosion.

General aspects and Limitations

During the last 50 years, large sections of the sandy coast and coastal cliff have been eroded and retreated due to the construction of marine and coastal structures, together with an extreme sea condition.

An expansion is planned for the coastal power plant, doubling its production capability. This poses a conflict, as the plant is surrounded by a promenade, an urban park and an airport, and stresses the need for the project.

There is a large knowledge gap concerning bathymetry, wind, waves, currents, and sea-level data, static information, sedimentology processes, morphology and topography. The cities of Tel Aviv and Hertzeliya will enjoy the social-economic benefits of increased touristic activity in the restored beaches. The general public will enjoy an improved leisure area.

The river outlet area should be of special interest, because of its unique ecological system.

Up to date, there is no integrated approach to the developments on the one hand and the fragile and sensitive ecological assets on the other, so the risk of quick unsustainable, development is clear and present.

3. LEVEL OF DESIGN OF THE PROJECT

- The power plant expansion project is at a preliminary planning stage.
- An EIA for the Hertzeliya beaches restoration plan is in preparation.
- A submerged Geotube pilot plan is in preparation, on one of the beaches.
- A national master plan for the protection of the coastal cliff is in the process.

4. BUDGET AMOUNT ESTIMATION & SCHEDULE of INTERVENTION

- The project budget is estimated by €30 million.
- The implementation will take place during the next 10 years.

Therefore, the forecast of this current project is to take place for about 3 years with an estimation of 1.5 million EU.

5. ACTORS INVOLVED

- National: Israel Ministry of Environmental Protection (regarding environmental aspects), Israel Port Authority (regarding marinas), Israel Ministry of Interior (regarding spatial planning), Israel Nature and Parks Authority (regarding Apollonia National park and ecological systems), Israel Archeological Authority, Israel Ministry of Tourism (regarding resorts).
- Regional: Tel Aviv and Herzliya Municipalities, Yarkon River Authority
- Companies: Israel Electric Corporation

6. MAP WITH LOCATION AND GENERAL FEATURES



Israel (MoEP)

1. TITLE OF THE PROJECT: Eco-Friendly Marine Structures for Coastal Protection Solutions (Israel-02)

2. BRIEF DESCRIPTION OF THE TYPOLOGY OF THE PROJECT

The coastline of Israel as a model to many other coastal stretches in the Med region is a vulnerable inter-phase, subject to heavy degradation processes, partly human induced and partly nature induced. The latter is a process which is gaining attention as the CC is a powerful engine that is threatening the coastal areas.

The coastal sandstone cliff in Israel (KURKAR) is a unique feature, occupying about 20% of the total length of the Med Israeli coast. A government decision was taken to protect around 14km of these cliffs, with the building of marine based structures that would reduce wave and current energy and lessen the impact on the shoreline cliffs.

Since there are no natural bays or protecting structures in the Israeli territorial Med basin, and on the other hand, these coastal areas are heavily populated including on some cases, on top of the very coastal cliff itself, the only solution seems to be a series of structural works, both marine based and coastal based to reduce the impact of the degradation and erosion of the coastal area.

Sand nourishment has been identified around the world and, in this case, also, as the most environmentally friendly soft and sustainable solution. However, the scarcity of sand reservoirs is of a crucial nature in the Israeli case, so we are bound to look for more innovative solutions. The conservative ways include building breakwaters and waterfronts out of rocks, concrete structures of many configurations and textures.

Attempting to support the design of structural works for coastal protection and while adapting to climate change results, this project which is based on eco-friendly marine structures will try to introduce alternatives for the old conservative structures, which may also enhance the endemic species and thus, strengthen the resilience of the local coastal ecosystem.

The regional challenge is therefore to collect a number of coastal works around participating regions in the Mediterranean that would be willing to implement the envisaged structures in a coordinated way. That way, we will be able to create the conditions for the realisation of structural works and management solutions, favouring the collaboration between public (regional as well as national), private and scientific community sectors.

The project: We will construct a pilot, real scale, breakwater made out of eco-friendly concrete blocks that will substitute the building blocks such as tetrapod's or natural land-originated boulders that by definition are strangers to the natural marine habitats of the eastern Med.

In this project we will strive also to save on the sand resource, and instead, use more efficient, economic, ecological, alternative for the physical protection of the coastline.

One of the important issues which this project is aiming to enhance, is the understanding of a feasible marine structures that would serve their main purpose of protecting the coastline features, but at the same time, may lower significantly the uncertainties of invasive species introduction and perhaps, induce the presence of endemic species, thus creating more meaning to ecological management of the coastal regions of the Mediterranean. Private companies such as SeaArc and Ocean Bricks will take part at this initiative and thus incorporating already experimented building blocks which should serve the purpose of the project.

The project will therefore consist of the following steps:

1. Construction of a 1:1 scale of a "soft" breakwater as a part of an already marked project in a water depth of 15-20m in front of the city of Netanya or Ashqelon

Major Coastal Projects

2. Continuous measurements of hydrodynamic characteristics of waves, currents, and other physical parameters which will be set a priori.
3. Continuous measurements of biological assets on the breakwater's building blocks as well as on nearby control areas.
4. A choice of at least two the three alternatives will be tested in situ for the construction blocks, possibly all.
5. An ecological, economic, engineering analysis and assessment will be made out of which we could recommend the feasibility of the project for further uses such as to other marine infrastructures.

3. LEVEL OF DESIGN OF THE PROJECT

Currently, we are able to introduce experimental results as well as laboratory test results for both physical and ecological aspects of the proposed building blocks. The challenge is to see how it will hold within harsh eastern Med sea conditions and see the interaction with its surroundings both in terms of marine ecosystems, protection of the coastal erosion, and the added forecasted value of improvement of a degraded marine ecosystem, while keeping the promise of an economic value which is competitive to any other solution. The pictures attached below, show clearly that the potential of enhancing marine life with the use of the Eco-Concrete blocks (by Sea Arc), and are present. The main obstacles of this proposal are financial resources and the lengthy processes in such a project.

4. BUDGET AMOUNT ESTIMATION & SCHEDULE of INTERVENTION

A rough estimation of building 100m of a breakwater, including the surveys needed, monitoring of all parameters is around 10-15 million EU. Schedule of intervention would be around 3-5 years, depending on the willingness of all stakeholders

5. ACTORS INVOLVED

- Ministry of Environmental Protection, Israel
- Municipality of Netanya/Herzlia
- Private companies - Sea Arc, DZ, OBS
- Academia – University of Bologna
- Research center – CAMERI, Haifa

6. GENERAL FEATURES



Eco-concrete pilot project, Haifa harbor

JOINT ACTION PLAN

Annex 4

REGIONAL PROJECTS FOR MONITORING INFRASTRUCTURES AND MANAGEMENT PLANS OF COASTAL AND MARINE AREAS



Catalunya Region

1. TITLE OF THE PROJECT: The XIOM: a regional coastal observatory for the Catalan coast (**Catalunya-MM01**)

2. BRIEF DESCRIPTION OF THE TYPOLOGY OF THE PROJECT

The Catalan coast is located in the north-western Mediterranean at the latitude 40° 45' N to 42° 25' N and long 0° 45' E to 3° 15' E. Some environmental properties of the NW Mediterranean are highly conditioned by the fact that it is a semi-enclosed sea. The coastal wind field is highly heterogeneous with main components from E, NW and S. This will have some implication for the coastal wind waves. Even with the relatively short fetch in the NW Mediterranean, the Catalan coast can be impacted by damaging waves during storms. At the Ebro delta the complex winds develop bimodal spectral wave features. In the central and north coast typical unimodal spectra are found. The most important variations in sea level in the Catalan coast are due to meteorological conditions and in some areas the resonant effect of bays and harbours. Storm surges may be of the order of 1 m, a magnitude much larger than tidal range. This sea level variation has a very important effect on storm risk and coastal flooding and it is a very important factor when modelling coastal dynamics in extreme events. The continental shelf slope dynamics are dominated by a quasi-permanent slope current. The mean current intensity is not very strong (~10 cm/s at 100 m depth) but it presents a seasonal intensification in winter where velocities can reach higher values. The mean current intensity is not very strong (~10 cm/s at 100 m depth) but it presents a seasonal intensification in winter where velocities can reach higher values. Over the shelf, little work has been previously done over long time series. The measurements obtained allowed the identification of the relative influence of winds, Ebro river outflow and open sea dynamics on the shelf dynamics.

The importance of coasts and the need for improving knowledge of their environment through the observation and modelling of processes is evident from human activities and ecosystems that they support. The capability of monitoring and predicting the marine environment leads to a more sustainable development of coastal and offshore regions. In recent years operational oceanography has been considered a necessity given its essential role in solving economic, environmental and social problems

For this reason, our project objective will be to continue with the coastal observatory activities in the Catalan coast and its contribution to a better understanding of processes that take place in this area. The XIOM network for oceanographic and coastal meteorological measurements (Xarxa d'Instrumentació Oceanogràfica i Meteorològica) will be owned by the Catalan government. wave buoys will collect wave height, periode and direction data at local receiving stations, which will be then validated statistically, and the subsequent results will be displayed on website (www.xiom.cat) . Water level recordings will be based on radar measurements and atmospheric variables recorded with typical meteorological stations. Finally, meteorological buoys with current meters will be deployed, at the same locations as wave buoys to record atmospheric variables and ocean currents at 5 and 15 m depth.

3. LEVEL OF DESIGN OF THE PROJECT

The XIOM first instruments were deployed by the regional harbour authorities and the coastal management department to provide observations to support local studies of beach evolution. In 1984 two scalar wave buoys were deployed at about 50 m depth in front of the most vulnerable regions close to Barcelona: Llobregat delta and Blanes. In 1990 the constant retreat of the coast line at the Ebro Delta (the main deltaic formation in the Mediterranean Spanish coast) stimulated the deployment of two directional wave buoys at 60 m and 8 m depth in the area, and two tide gauge and meteorological stations in neighbouring harbours. Finally, in 1992 a third scalar wave buoy was deployed in the Roses bay. In 1997, some instruments were temporarily retired. They were reinstalled in 1999, and were then regarded as a single network providing homogeneous and real-time data, which was able to give support to wave-climate

Monitoring / Managing Projects

studies and forecast systems in addition to its former goals. In 2003 the Llobregat buoy was replaced by a directional one. Correspondingly, governmental involvement was reinforced by the addition of the Catalan Meteorological Service (METEOCAT) to the involved institutions, and regular instrument maintenance was guaranteed. Finally, in the frame of a regional plan for pollution accidents at sea expanded its measurements by adding current and meteorological sampling in the same locations. Its instrument composition has had no relevant changes since then. However, since 2012 all instruments have been temporarily retired.

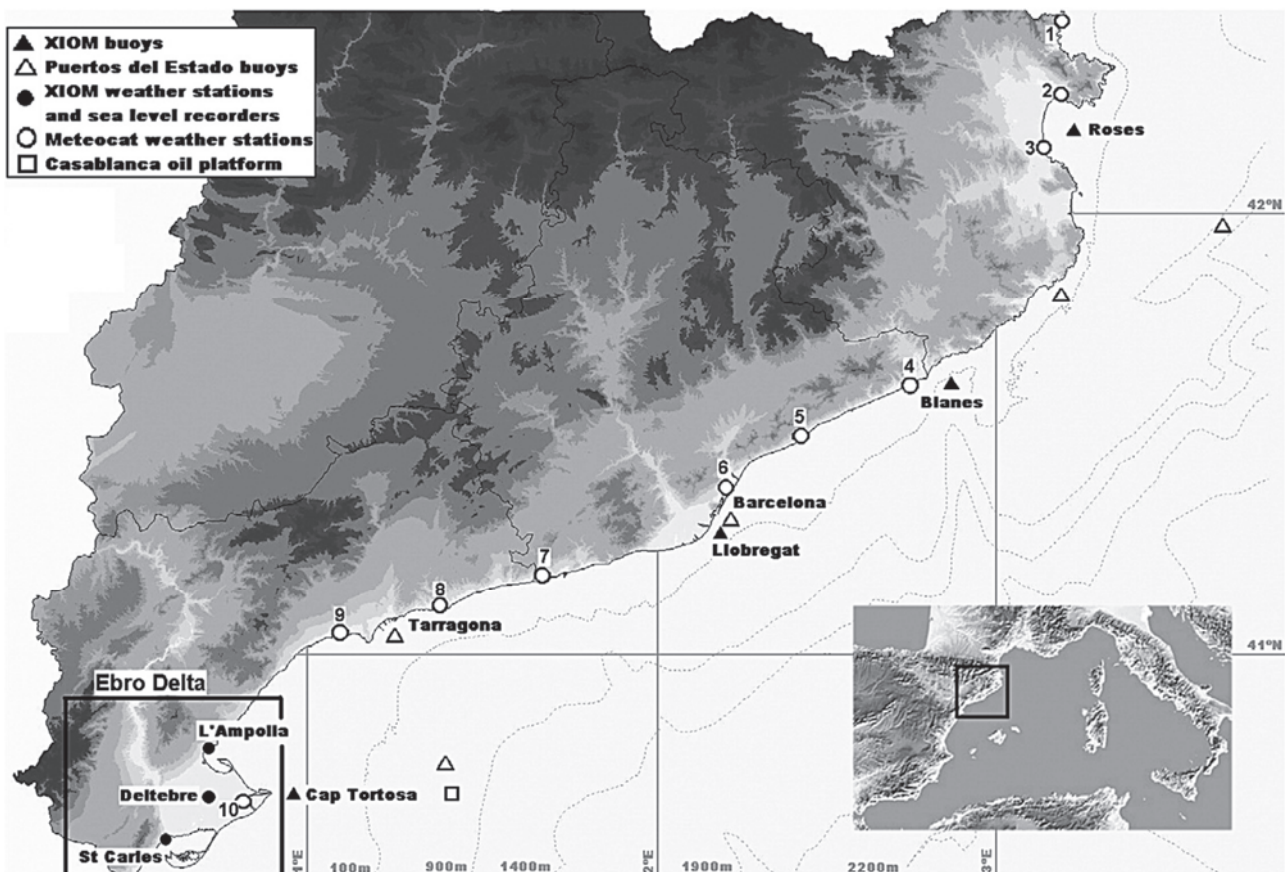
4. BUDGET AMOUNT ESTIMATION & SCHEDULE of INTERVENTION

The project budget is estimated by €2,5 million (deployment and maintenance of the network) during the next 10 years. Therefore the forecast of this current project is to take place for about 4 years with an estimation of €1 million.

5. ACTORS INVOLVED

- Central Administration: Barcelona and Tarragona Harbour Administration (APB and APT) regarding big regional harbour
- Regional Administration: Coastal Management Department (Servei de Costes) regarding spatial planning and environmental aspects, Regional Harbour Authorities (Ports de la Generalitat) regarding marinas, Catalan Meteorological Service (Servei Meteorologic de Catalunya) regarding meteorological forecasting.
- Research centers Maritime Engineering Laboratory (LIM/UPC) regarding network management and coastal research.

6. MAP WITH LOCATION AND GENERAL FEATURES



Catalunya Region

1. TITLE OF THE PROJECT: Towards a sustainable management and protection of the Tordera delta coast (Catalunya-MM02)

2. BRIEF DESCRIPTION OF THE TYPOLOGY OF THE PROJECT

The Tordera delta is a small cusped delta located about 50 km northwards of Barcelona (NW Mediterranean). Its about 6 km sandy coastline extends from s'Abanell beach at the north (Blanes) to Malgrat de Mar beach at the south (Malgrat de Mar), with the Tordera river acting as a border between them.

This is a highly dynamic zone currently in retreat due to a combination of natural and human-made factors. Among them, the most important factor has been the decrease of Tordera river sediment supplies due to massive sediment extraction from the river course (in the 60's-70's). This has resulted in a progressive and significant narrowing of beaches in the areas closest to the river mouth (southernmost part of s'Abanell and northernmost part of Malgrat beaches). This is an important coastal tourism area, with the activity being essentially supported by camp sites located in the coastal/fluvial plain just back of existing beaches. The combination of existing infrastructures (e.g. those associated to camp sites, beach promenade) and progressive narrowing beaches has resulted in (i) a significantly increase in coastal damage during the last 2 decades and, (ii) in a depletion of the main resource supporting the economic development of the area (beach surface).

The current situation of the Tordera delta coast can be considered as the integrated result of the action of natural processes, human interventions in the territory and, lack of governance to tackle existing problems. In fact, until now, commitment to pursue a solution that considers the participation of all the social agents involved was low from all administrations involved. The favoured approach has been to solve problems as they appear, i.e. reactive management, which in many cases has (unintentionally) produced an increase in their magnitude and, even worse, make the system to approach to a tipping point.

Within this context, the main goal of the project is to design a sustainable management and protection plan for the Tordera delta coast based on three main cornerstones: (i) restoring the integrated sediment dynamics, (ii) maintaining/enhancing natural values and (iii) promoting a sustainable economic development.

To this end, three phases have been identified:

- 1) Build-up of deltaic coast evolution model during the last decades, assessing actual evolution rates and identifying results of past interventions along the coast;
- 2) identifying conflicts and problems related to interactions and feedbacks between actual coastal dynamics and land-use;
- 3) proposal of solutions and pre-design of required actuations.

3. LEVEL OF DESIGN OF THE PROJECT

A first assessment on coastal problems in the area has been already done using existing information. In addition to this, a study to propose short-term solutions to remediate/mitigate the present degradation of the system has been launched. This study has been designed to propose measurements compatible with the natural dynamics of the area in such a way that their implementation will not affect/condition any long-term management plan. In addition to this, other parallel studies affecting spatial planning in the area has also been done. Within them, the Water Agency of Catalonia has delimited flood prone areas to implement the EC Directive on Floods. The IGCC has acquired new data (aerial photographs and Lidar) in the area and, additional campaigns are also planned. All these studies and new data will be used to develop the project here proposed.

4. BUDGET AMOUNT ESTIMATION & SCHEDULE of INTERVENTION

The project budget is estimated by 70,000 € and a total duration of 1 year. The first phase will have a duration of 4 months and a budget of 15,000 € whereas the remaining phases 2 and 3 will have a total duration of 8 months and a corresponding budget of 55,000 €.

This budget does not include the acquisition of large scale topographic (Lidar) data and ortophotos which will be responsibility of the IGCC (Generalitat de Catalunya).

5. ACTORS INVOLVED

- *Catalan Government*: Department of Territory and Sustainability. Spatial planning, environmental aspects and competences on management of the coastal zone.
- *Spanish Government*: Ministry of Agriculture, Food and Environment (General Directorate of Marine and Coastal Sustainability). Competences on management and protection of the public coastal domain.
- *Regional Administration*: Water Agency of Catalonia. River basin management.
- *Local Administrations*: Municipalities of Blanes and Malgrat de Mar. Partial responsibilities on beach management issues, urban plans and liason with local stakeholders.
- *Local (economic) stakeholders*: Camp sites representatives. Main local economic actors. Providing data, requirements and constraints for economic activity development.
- *Technology Center (Regional Administration)*: Institut Cartogràfic i Geològic de Catalunya (ICGC). Competences on geodesy, cartography and spatial data infrastructure in Catalonia. Provider of digital cartography (orthophotos) and Lidar data of the study area.
- *Research Center*: Laboratori d'Enginyeria Marítima, Universitat Politècnica de Catalunya-BarcelonaTech (LIM/UPC). Coastal research. Analysis of conflicts and problems in the study area and proposal of solutions.

6. MAP WITH LOCATION AND GENERAL FEATURES



Puglia Region

1. TITLE OF THE PROJECT: Common Implementation of tools for the enhancement of integration among Integrated Coastal Zone Management, Marine Spatial Planning and Marine Strategy Framework Directive in the Puglia Region (**Puglia-MM01**)

2. BRIEF DESCRIPTION OF THE TYPOLOGY OF THE PROJECT

A coherent application of Maritime Spatial Planning (MSP; 2014/89/UE) and Integrated Coastal Zone Management (ICZM) will improve interaction between land and sea based activities supporting an integrated approach. This is not only integration of sectorial interests, but also integration at different governance levels and integration at EU policy level, such as Marine Strategy Framework Directive (MSFD), relevant for marine and coastal areas. Because many of these policy instruments are relatively stand-alone, they miss an overall consistency at a time when social issues and development are becoming more coherent. For a fully integrated management process to work it is vital that EU policies and other instruments (e.g. economic mechanisms) which also drive coastal change are addressed coherently.

In order to address these issues this project aims to support, for the Puglia Region, the capacity building for Integrated Coastal (Zone) Management (ICZM) and Marine Spatial Planning (MSP) in relation to the Marine Strategy Framework Directive and specifically the development of new ICZM measures focused on achieving Good Environmental Status (GES).

The projects are based on different and coordinated actions in the Puglia Region and foresee the contribution of different local actors (Public administration, Environmental Protection Agency, Universities and Research Centers). The proposed actions are:

- collection of all relevant data and information on many topics, as the geo-morphological features of the marine coastal area, the coastal and marine climate features, the oceanographic features, the marine-coastal biological communities, the terrestrial habitats, flora and fauna species, the environmental protection system, the land and sea use and the restriction system (landscape, urban, hydrological, etc.)
- application of DPSIR model linking quality element of WFD, qualitative descriptors of MSFD to the natural/human pressure at local level (national or cross-border contest) in order to give a global picture of the effect of pressures on marine ecosystems. Analysis of multiple stressors operating in the entire Puglia Region coastal area characterized by different pressures and management regimes (protected zones, touristic, urbanized and industrial ones) in order to identify the best strategy for risk prevention.
- implementation of the Article 8 of the ICZM Protocol in the Puglia Region: individuation of the set-back zone;
- Creation of an integrated GIS database for the Apulian Coastal and Marine Area based on the INSPIRE Directive. The database will support European initiative such as EDMODNET (EU Marine Observation and Data Network);
- Implementation of a model for the ICZM and MSP for the Puglia Region.
- 3D hydrodynamic modelling of Apulian coastal waters, including model of sediment transportation (CMCC).

General aspects and Limitations

The Puglia coastal zone is an area of intense activity; the most important are the urbanization and the tourism (bathing), although the industrialization of some specific areas can also affect the quality of the marine-coastal environment.

The Apulian marine-coastal ecosystems are and have been investigated by different technical-scientific local Institutions. The most important are the Universities of Bari and Lecce, the Polytechnic University of Bari, the C.N.R. Institutes of Lesina (ISMAR) and Taranto (IAMC), the Puglia River Basin Authority, the Regional

Agency for the Environmental Prevention and Protection (ARPA Puglia) and the CMCC (Centro Euro-Mediterraneo sui Cambiamenti Climatici). All the mentioned Institution have data and information on the specific topics related to the marine-coastal environment. Particularly, the Polytechnic University of Bari (LIC Laboratory) contributed, as technical-scientific support, to the drafting of the Regional Coast Plan (PRC), while ARPA Puglia is in charge of the surface waters monitoring according to the 2000/60/EC Directive (including the marine-coastal and the waters at specific use as the bathing or mussel cultivation purposes).

The SHAPE Project of the Apulian coastal zone is regulated by actors at different levels (region, municipality) through many Regional Acts, including Laws and Plans for the management of the human activities. Unfortunately, in the current situation the Puglia government system does not provide for the coordination of the integrated management of all the activities that take place on the coastal zone. The fragmentation of both information/data systems and governance levels, is probably the main limitation for a coherent and integrated coastal zone management.

3. LEVEL OF DESIGN OF THE PROJECT

The nut of the project was planned capitalizing the achievements and results of SHAPE project (<http://www.shape-ipaproject.eu/>), with explicit references to the action 3.2 ("Testing some provisions of the ICZM Protocol through local/regional demonstration projects") and 4.a ("Pilot Project on ICZM-MSP integration), both applied to the pilot area of Torre Guaceto and neighboring costal area of Brindisi (example figure 1 and 2).

4. BUDGET AMOUNT ESTIMATION & SCHEDULE of INTERVENTION

Project budget: to be estimated. The implementation is scheduled by 2015-2016

5. ACTORS INVOLVED

- Puglia Region
- Environmental Protection Agency of Puglia Region (ARPA)
- Basin Authority of Puglia Region
- Centro Euro-Mediterraneo sui Cambiamenti Climatici
- Universities and research centers

6. LOCATION MAP AND GENERAL FEATURES

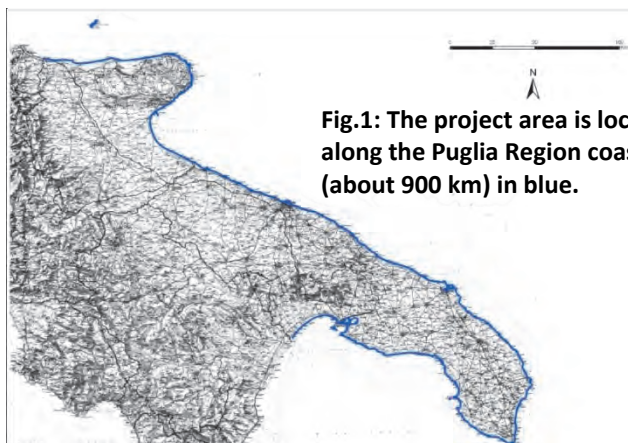


Fig.1: The project area is located along the Puglia Region coastline (about 900 km) in blue.

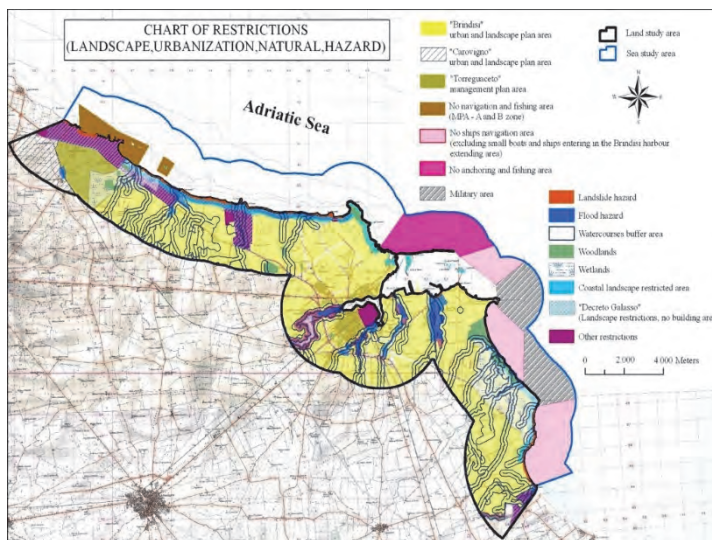


Fig.2: Distribution and delimitation of zones subjected to restrictions in the study area (SHAPE Project - ARPA Puglia)

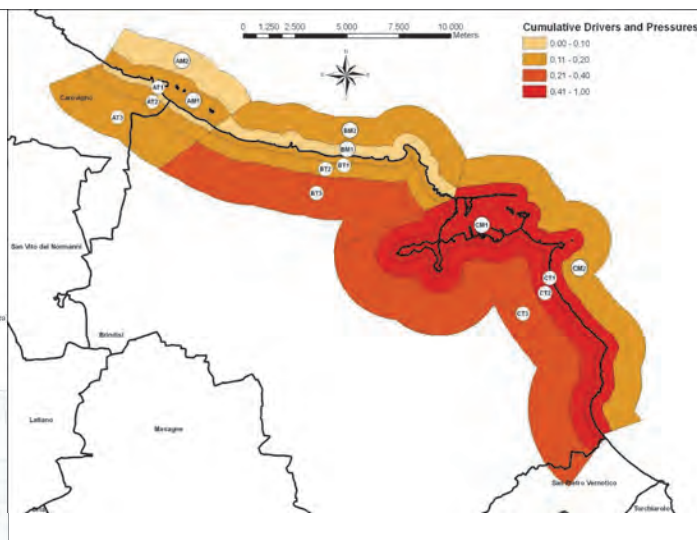


Fig.3: Map of the Driver-Pressure cumulative values in the 15 sectors of the study area (SHAPE Project - ARPA Puglia)

Region of East Macedonia Thrace

1. TITLE OF THE PROJECT: REMTH Coastal Management Master Plan (REMTH-MM01)

2. BRIEF DESCRIPTION OF THE TYPOLOGY OF THE PROJECT

REMTH disposes of approximately 450 km of coastline without any significant hard defences nor beach nourishment projects, till recently.

Locally severe erosion problems have occurred, **EUROSION**, **COASTANCE** and **MAREMED** projects have studied the phenomena but there are no detailed data for the entire coastline.

The Regional Direction of Technical Works of REMTH is responsible for the proposition, construction and management of coastal defence works including beach nourishment projects. Municipalities are also responsible for coastal protection. The Port Authorities are responsible for coastal defence works related to ports.

In the last years, because of severe erosion problems and pressure for the touristic development of the coastline, municipalities and other local authorities have proceeded in the design and construction of few coastal works with local impact (nearshore breakwaters in Kavala, seawall in Alexandroupoli etc.).

REMTH wishes to develop a regional Coastal Management Master Plan so as to better coordinate the local authorities and plan and manage coastal works in regional level so as to limit the erosion phenomena but also make the best of the available resources.

REMTH plans to create a digital database on the state of erosion of the coastline (an adaptation of SICELL) based on:

- existing survey data
- the acquisition and elaboration of satellite photos from multiple dates
- inventory of existing coastal works (build of planned to be build)

in order to be able to better plan future littoral management and also take preventive measures through planning procedures (urban and spatial planning, major infrastructure etc.)

This database will allow the identification of areas with the most important erosion rate.

The next step of the MasterPlan will be to implement the COFLERMAP methodology to selected critical areas, so as to produce Hazard and Risk Maps and prioritize the areas that need coastal works or the areas where future development should be limited because of high coastal flood hazard.

The MasterPlan will be completed by the proposition of a long term coastal Monitoring scheme.

3. LEVEL OF DESIGN OF THE PROJECT

- Regional Coastal Protection MasterPlan

REMTH wishes to use the MasterPlan in order to use at operational level the Bologna Charter Best Practices

4. BUDGET AMOUNT ESTIMATION & SCHEDULE of INTERVENTION

- Budget estimation for the MasterPlan 500K€ to 1M€
- Necessary time 3 year

5. ACTORS INVOLVED

- Central Administration, Cadastral Service, Ministry of Infrastructure and Ministry of Environment
- Regional Directorate of Technical Works, Regional Service of Environmental and Spatial Planning, Regional Service of Water Bodies – All Coastal Municipalities – Management Bodies of the protected coastal areas – Port Authorities of Kavala and Alexandroupoli – Democritus University of Thrace
- Private sector – Owners of coastal land, professional of tourism (hotels, bars, restaurants, cafes)

6. MAP WITH LOCATION AND GENERAL FEATURES

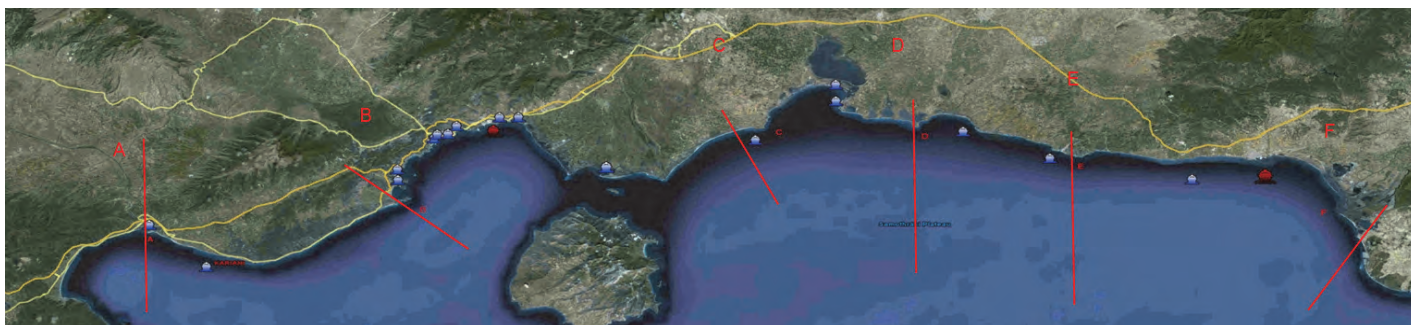


Figure 1: Picture of REMTH coastline from the Strimonas River Delta, on the west to Evros River Delta on the east.

Dubrovnik-Neretva County

1. TITLE OF THE PROJECT: ICZM PLAN FOR THE DUBROVNIK NERETVA COUNTY (DNC-MM01)

2. BRIEF DESCRIPTION OF THE TYPOLOGY OF THE PROJECT

The project area is **Dubrovnik-Neretva County (DNC)**, the southernmost county in the Republic of Croatia. It encompasses an area of 1785 km² and has about 127,000 residents. Territorially, it is organized into 22 local self-administration units, divided into 5 cities (*Dubrovnik, Korčula, Ploče, Metković and Opuzen*) and 17 municipalities (*Blato, Dubrovnik coastal region, Janjina, Konavle, Kula Norinska, Lastovo, Lumbarda, Mljet, Orebić, Pojezerje, Slivno, Smokvica, Ston, Trpanj, Vela Luka, Zažablje and Župa dubrovačka*) (Fig. 1). The center of the County is the city of Dubrovnik. The specificity of the Dubrovnik-Neretva is in its **narrow and heterogeneous coastline**, separated from the interior by a mountain range, and divided at Neum by the state border with Bosnia Herzegovina, while it has a natural connection to the interior and the northern Pannonic part of Croatia in the area of the Lower Neretva Valley. Thus, the territory of the county is comprised of two basic entities: the relatively narrow coastal area with its series of islands near the mainland and in the open sea (*the most significant of which are the islands of Korčula, Mljet, Lastovo and those in the Elaphite archipelago*), and the Lower Neretva Valley with its coastline which is listed as Ramsar site with the most valuable remnants of Mediterranean wetlands on the eastern Adriatic coast.

Dubrovnik Neretva coastal area is very indented and varies from protected bays with sandy beaches of exotic beauty to the exposed steep coast with cliffs to the open sea which makes this county one of the most beautiful areas in the Mediterranean. The County area has all the characteristics of Mediterranean climate with climatic differences that result from the existence of high mountain barriers adjacent to the coast, numerous islands and occasional continental influences.

This area's rich endowment of **NATURAL HERITAGE** (according to the Nature Protection Act total of 39 natural areas and 1 mineral: 1 national park, 10 special reserves, 4 special forest vegetation reserve, 4 special reserve – ornithological, 1 special reserve - ichthyological – ornithological, 1 special marine reserve, 1 nature park, 6 nature monuments, 5 nature monuments – geomorphological, 1 nature monument - rare specimen tree, 8 significant landscapes, 5 park-forest, 8 park architecture monuments, 1 park, 1 arboretum, 4 individual trees, 2 group of trees, 1 protected mineral; in addition, there is a 166 areas, total of 56,7 % DNC area under NATURA 2000 program) and **CULTURAL HERITAGE** (especially rich history, total of 1893 cultural monuments, of which 259 registered, 486 preventive protected and in 1145 recorded monuments, urban center of Dubrovnik is UNESCO protected and registered as a World Heritage Site, in this category for protection currently in the process of registration are urban units of Korčula and Ston and tombstone monuments “Stećci”). Besides the valuable, protected historical center of world importance, it should be noted numerous fortifications, civil structures, religious buildings and summer residences in Dubrovnik. Furthermore, there are extremely valuable prehistoric archaeological sites - stand out those in Dubrovnik area, and Vela Luka, from Greek heritage - Corkyra, Epidaurus and the Roman period - Naron, underwater around Cavtat and Polače on Mljet, also extremely valuable and intangible cultural heritage of great importance are Dubrovnik Summer Festival and the Festival of St. Blaise in Dubrovnik) exemplify the need for **INTEGRATED COASTAL ZONE MANAGEMENT (ICZM)**.

This process should emphasize the management of the coast using an integrated approach, regarding all aspects of the coastal zone, including geographical and political boundaries, in an attempt to achieve sustainability. It should cover **the full cycle of data collection, planning, decision making, management and monitoring of implementation**. It should also involve informed participation and cooperation of all stake-

holders to assess the societal goals in the given coastal area. In the long-term context it should balance environmental, economic, social, cultural and recreational objectives, all within the limits set by natural dynamics. ***The ICZM Plan is crucial for balanced and sustainable development of Dubrovnik Neretva coast, islands and hinterland, as an integrated approach for adaptation concerning climate variability and climate change threats and for preservation and protection of natural and cultural heritage while also improving the quality of life of local population thus increasing the quality of touristic offer as the backbone of economy in this County. The ICZM Plan is document of strategic importance for all development projects and could give direction to our County for application of project ideas on available EU funds.***

The area of Dubrovnik-Neretva County has, in the European context, a significant level of natural preservation and good prospects for economic development. A number of obstacles to administrative, institutional, financial and organizational or, simply, the human plane prevents its full momentum today. In addition to the demographic structure, inadequate waste disposal, endangering valuable natural habitats, etc., development and planning documents DNC's, as well as consultation meetings with targeted stakeholders, point to several key issues that require a more detailed discussion. These are:

- Littoralization process, with insufficient mechanism and control of the implementation of spatial planning solutions;
- Underdeveloped infrastructure;
- Unplanned growth of tourism (including nautical tourism);
- Inefficient management of maritime property;
- Inadequate and insufficient use of professional capacities;
- Climate change threats.

PROJECT OBJECTIVES:

- ***Analysis and prediction of key problems and vulnerability of the project area***, in order to propose optimal development scenarios, analyzing only the strategic matters necessary for proper development of the Plan for Integrated Coastal Zone Management. This objective is crucial for prediction of future development trends and for estimation of the need for coastal resources and their ability to submit these pressures. The predictions should be based on the assessment of the possible effects of activities on natural resources and socio-economic opportunities in coastal areas. It should be displayed in the form of inter-sectorial alternative scenarios, some of which are each dealing with different development directions in the future. Using criteria and indicators defined for each of the fundamental objectives, the most suitable scenario should be elected. Influence of neighboring countries should also be taken into consideration because the environmental issues cannot be viewed individually, but as a synergistic initiatives and through cooperation of all countries involved. By using integrated approach, analysis should also take into account state of the art concerning climate variability and climate change threats.
- Formation of ***Integrated Coastal Zone Management Plan*** as an official document for creating conditions for making operational decisions with the purpose of sustainable development of the given coastal area and adaptation to climate change threats. It must be in connection with the national strategic documents relating to coastal zone management, primarily with the national ICZM strategy and it must set the carrying capacity and terms for the sustainable use of the environment, marine and terrestrial coastal area. Following the formation of the official Plan, strategic environmental assessment (SEA) should also be implemented as a mandatory document for each plan or program which is adopted at the national, regional or local level. The objectives of the Coastal Plan for Dubrovnik Neretva County should be to promote accepting sustainability and resilience as coastal

zone development criteria; to create prerequisites for defining sustainability in concrete domains (population, coast, space, water, sea, nature, production); to contribute to the strengthening of participation and education; provide guidelines for sectoral policies and plans to achieve sustainability and resilience; make recommendations for resolving conflicting issues in achieving sustainability and resilience; offer a platform for sustainable development of the DNC coastal zone based on water as its fundamental resource, blue economy and smart specialization; offer best adaptation scenarios for climate change threats. The Coastal Plan may also have an influence concerning allocation of EU funds linked to coastal development. In addition to other things, the Coastal Plan contributes to protection, restoration and preservation of the coastal zone's resources. Special emphasis should be given to the fact that about 30% of the coastal area in DNC is under a certain level of protection. It should be noted that the preparation and adoption of management plans for protected areas need to be in accordance with the respective laws and regulations.

- ***Institutionalization of ICZM at the county level*** by the Dubrovnik Neretva County decision to launch the formal process of ICZM and to form a coordinating body by opening workplaces for the implementation of ICZM within the Institute for Spatial Planning of DNC. This objective involves professional training of staff for the implementation of ICZM courses and practice at qualified institutions, organization of expert workshops, study visits, seminars and promotional activities on ICZM in the County thus strengthening human resources as a fundamental prerequisite for the establishment and perpetuation of the process of ICZM. This objective includes all relevant data on ICZM coordination among all relevant institutions. For this purpose, inclusion of GIS (geoinformation system), computer-supported information system is planned. Digital display and analysis of geographic features and events that take place over them, which integrates spatial and other data types on ICZM relevance within a known database structure, provides software tools and functions that can be used in the processing and presentation of geographic objects. In addition to the GIS system, introduction of internal web platform to facilitate data exchange is proposed. Establishment of a permanent coordination body on the County level will ensure compliance and the integration of public policies and local development plans.

3. LEVEL OF DESIGN OF THE PROJECT

At this point, we have developed ***Manual for integrated coastal management in Dubrovnik Neretva County*** as the base document for ICZM Plan creation and implementation. This Manual has been created through project **COASTANCE** (*Regional action strategies for coastal zone adaptation to climate change*) and main makers of this document are experts from Priority Actions Programme/Regional Activity Centre (PAP/RAC) which are key component of the Mediterranean Action Plan (MAP), itself part of the United Nations Environment Programme (UNEP). Initially through project **COASTANCE** and following through project **COASTGAP** (*Coastal Governance and Adaptation Policies in the Mediterranean*) we have formed a ***Group for integrated coastal management in Dubrovnik Neretva County*** which consists of representatives of all institutions in the DNC that directly or indirectly deal with the protection, evaluation and management of coastal areas of the County.

4. BUDGET AMOUNT ESTIMATION & SCHEDULE of INTERVENTION

To be defined.

5. ACTORS INVOLVED

Institution members of **ICZM Group in Dubrovnik Neretva County**:

- Dubrovnik Neretva Regional Development Agency DUNEA
- Institute for Spatial Planning of Dubrovnik Neretva County
- Department of Tourism, Maritime, Enterprise and Energy of Dubrovnik Neretva County
- Department for Environmental and Nature protection of Dubrovnik Neretva County
- Public Institutions for Management of Protected Natural Values of Dubrovnik Neretva County
- Institute of Public Health of Dubrovnik Neretva County – Department for Environmental Health
- University of Dubrovnik – Aquaculture department
- University of Dubrovnik – Maritime department
- Dubrovnik-Neretva County Port Authority
- Vela Luka Municipality Port Authority
- Croatian Forests (Forestry offices Metković)
- Croatian Roads (Technical offices Dubrovnik)
- Municipality of Župa dubrovačka
- City of Dubrovnik Development Agency DURA
- City of Dubrovnik Department for Urbanism, Spatial Planning and Environmental Protection
- Natural History Museum Dubrovnik

In coordination with experts from **Priority Actions Programme/Regional Activity Centre (PAP/RAC)**.

Kind of involvement will be defined through future collaboration in coordination with all relevant institutions.

6. MAP WITH THE LOCATION AND GENERAL FEATURES

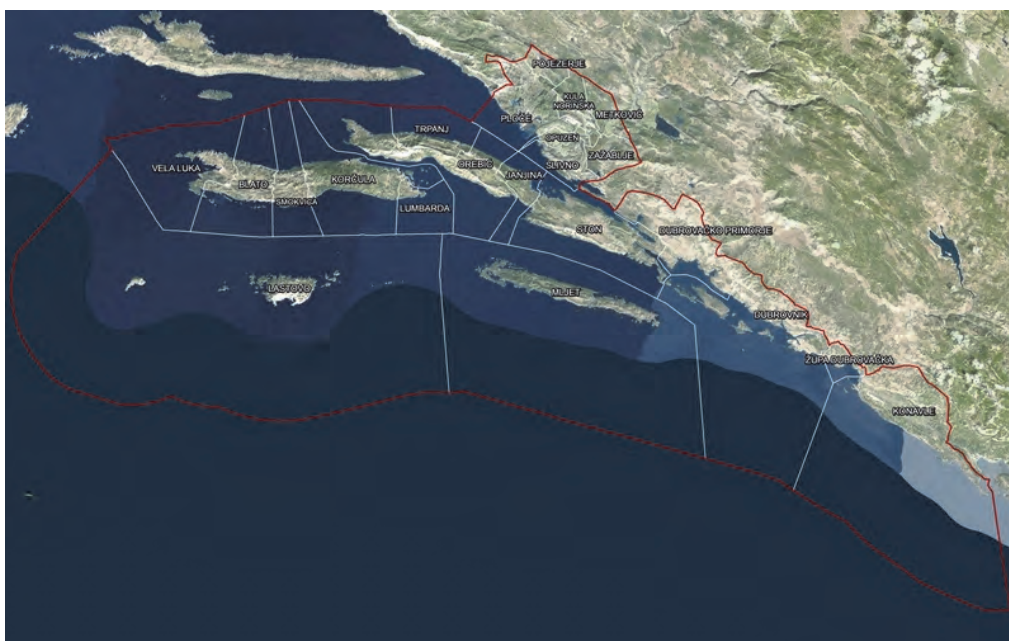


Fig. 1 Location area – Dubrovnik Neretva County

Decentralized Administration of Crete

1. TITLE OF THE PROJECT: Crete Integrated Coastal Zone Management Master Plan, Observatory implementation (**DAC-MM01**)

2. BRIEF DESCRIPTION OF THE TYPOLOGY OF THE PROJECT

Crete disposes of approximately 1148 Km of coastline out of which 27.7% beaches and 2.7% artificial beach (according to the EuroSION 2004 project), 70% to 80% of the beaches is estimated to be threatened by erosion but no global vulnerability map is available. Based on a thorough vulnerability analysis of the Cretan coast, using the Coastal Vulnerability Index by Alexandrakis (2014), for the nationally funded ClimaTourism project, established that approximately 65% of the Cretan beaches are under erosion.

Locally severe erosion problems have occurred, EUROSION, **COASTANCE**, AKTAIA, ClimaTourism and **MAREMED** projects have studied the phenomena but there are no detailed data for the entire coastline.

In the context of the **COASTANCE** project a first inventory of 125 sites disposing of coastal works have been identified. These works have been constructed without taking in consideration the dynamics of the whole sedimentary cell and many of them have created erosion problems or they have not produced the desired results. In the context of the national AKTAIA project detailed data have been collected for the erosion in the East Crete part, a data set which was further integrated and completed within the ClimaTourism project. This dataset now includes data for all Cretan beaches, referring to shoreline retreat, sedimentology and wave climate. Littoral cells have been identified for 302 beaches. Also, the coupled ClimaTourism and AKTAIA dataset available at FORTH-IACM, include information for man-made structures, and, a specific database recording the interference of these structures with environment.

DAC wishes to unify all these available scientific data and create an operational tool for Integrated Coastal Zone Management.

DAC in collaboration with FORTH-IACM wishes to develop a regional Integrated Coastal Zone Management Master Plan so as to better coordinate the local authorities and plan and manage coastal works in regional level so as to limit the erosion phenomena but also make the best of the available resources.

DAC in collaboration with FORTH-IACM plans to create a digital GIS database on the state of erosion of the coastline based on:

- existing survey data
- existing data and from research projects like AKTAIA and ClimaTourism
- the acquisition and elaboration of satellite photos from multiple dates
- inventory of existing coastal works (build or planned to be build)
- socio-economic data like land-use, concentration of economic activities, touristic development etc.

in order to be able to better plan future littoral management and also take preventive measures through planning procedures (urban and spatial planning, major infrastructure etc.)

This database will allow the identification of areas with the most important erosion rate.

The next step of the Master Plan will be to implement the COFLERMAP methodology (from the **MAREMED** and **COASTGAP** project) and the Coastal Vulnerability Index (from the nationally funded Clima Tourism project) to selected critical areas, so as to produce Hazard and Risk Maps and prioritize the areas that need coastal works or the areas where future development should be limited because of high coastal flood hazard.

The joined environmental and socioeconomic approach of the problem can provide a management tool to mitigate the impact of coastal erosion, through a realistic cost-benefit analysis for planning protection measures.

The MasterPlan will be completed by the proposition of a long term coastal Monitoring scheme. DAC in collaboration with FORTH-IACM will use the results of the Monitoring scheme and any other new data to periodically update the database and function as a Coastal Observatory. For that purpose, DAC will seek for international collaborations in order to become a member of a Mediterranean Network of Coastal Observatories and be able to improve the operation of the Cretan Observatory.

The produced database and Hazard and Risk Maps will be open to the public and available on-line. Training sessions will be organized for public services as Regional and Municipal Technical services, cadastral services etc. so as to get familiar with these tools and use them operationally. All new projects public and private (municipal planning, coastal works, portal works, hotel resorts etc.) will be able to use these data free of charge. The proposed division of Crete in sediment cells will become a reference for all projects that influence coastal areas and be used as such in the licensing process. For example:

- Coastal protection works XX are positioned in the sedimentary cell 14B which is under erosion and under the MasterPlan is a first priority zone for coastal protection works.
- Hotel Resort YY is positioned in the sedimentary cell 11A, which is not under erosion according to the MasterPlan and the proposed construction works are outside the critical zone

The proposed Master Plan will be a useful tool for implementing Integrated Coastal Zone Management in Crete and will gather the necessary information in order to introduce ICZM into the standard Environmental and Spatial planning procedures.

3. LEVEL OF DESIGN OF THE PROJECT

- Regional Coastal Protection MasterPlan. DAC wishes to use the MasterPlan in order to use at operational level the Bologna Charter Best Practices

4. BUDGET AMOUNT ESTIMATION & SCHEDULE of INTERVENTION

Budget estimation for the MasterPlan 750K€ to 1M€. Necessary time 3 year

5. ACTORS INVOLVED (*and kind of involvement*)

- Central Administration, Cadastral Service, Ministry of Infrastructure and Ministry of Environment as managing bodies
- Regional Directorate of Technical Works, Regional Service of Environmental and Spatial Planning, Regional Service of Water Bodies – All Coastal Municipalities – Management Bodies of the protected coastal areas – Port Authorities as management authorities
- IACM – FORTH’s Lab of Coastal research as Expert in coastal modelling, surveying and monitoring, will develop and adapt the database for the needs of DAC and will provide the data needed.
- Private sector – Owners of coastal land, professional of tourism (hotels, bars, restaurants, cafes) as end users

6. MAP WITH LOCATION AND GENERAL FEATURES



Fig.2: Picture of Crete’s coastline, the region comprises the island of Crete and small neighboring islands

Tuscany Region

1. **TITLE OF THE PROJECT:** Creation of a Coastal morpho-sedimentological Monitoring Plan at regional scale (**Tuscany-MM01**) **NEW**

2. BRIEF DESCRIPTION OF THE TYPOLOGY OF THE PROJECT

Creation of a Coastal morpho-sedimentological Monitoring Plan at regional scale for the integration among ICZM, MSP, MSFD and BD, and impact of climate change on the Tuscany Region coastal zone.

The implementation of the European directives related to the coast and sea at regional scale presents considerable difficulties because it is necessary to integrate governance tools at different levels, such as the Marine Strategy Framework Directive (MSFD; 2008/56/EU), the Marine Spatial Planning (MSP; 2014/89/EU), the Integrated Coastal Zone Management (ICZM) or Land-Sea Interactions (LSI), and also the monitoring tools for coastal water quality (Water Framework Directive and Bathing Directive).

The implementation of most of the European directives and protocols related to coastal and marine environments, requires an updated data framework, at regional level, to support the needs for planning, the implementation of effective decision support systems (adaptive management), as well as of systems for the real-time environment forecasting and monitoring, the long-term evaluation of the impacts of climate change on the natural environment (ecosystem services) and on human settlements, and the design of coastal defence structures.

Most of the economic activities referred to by the Blue Economy, including fishing, port development, tourism, are concentrated along the coastal area.

Tuscany Region supports coastal monitoring activities, realizing a regional-scale monitoring of the entire coast that is carried out, every year, through the integration of *in-situ* observed data (surveys) and satellite data for monitoring shoreline evolution and other coastal features observable by remote sensing (shoreline position, dune limits, vegetation status, land use).

The present monitoring activity is accompanied by:

1. monitoring of the meteo-marine conditions by integrating in-situ detection systems (buoys, current meters) and numerical forecasting systems to describe both open sea conditions and their impact along the coast, in order to alert population (early-warning, civil protection activities, MAREGOT project);
2. the prediction of coastal circulation and quality of coastal waters in order to improve the management of Bathing Directive activities (bathing water quality forecast);
3. the evaluation of long-term conditions through a dedicated coastal climatology (SP ECMWF, MAREGOT project).
4. an integrated GIS database for the Tuscany Coastal and Marine Area based on the INSPIRE Directive.

These activities are not yet supported by an adequate number of information regarding the morphology of the emerged and submerged active beach profile. These can be acquired only by planning and realizing a complete survey of the morpho-bathymetric and sedimentological situation of the entire regional coast.

The project proposal therefore is the following:

- a. a complete morphological survey of the entire Tuscan coast, including the Archipelago, in particular of the sandy coast, to be carried out at the beginning of the project;
- b. a systematic, morphological and sedimentological survey repeated annually in some Pilot sites (see point 6). These were selected on the basis of their representativeness of the regional situation, or where the presence of updated data is crucial in order to support forecasting systems in critical areas;
- c. in areas of considerable criticality, the acquisition of observing systems (webcams, USV with single beam/multi beam echo sounder) in order to allow seasonal-scale monitoring, essential for the calibration of effective models for hydrodynamic/morphodynamic simulation from medium to long-term.

3. LEVEL OF DESIGN OF THE PROJECT

The core of the project will be planned capitalizing the achievements and results of the present coastal monitoring activities of the Tuscany Region (L.R. n. 80/2015), and of some recent projects such as the CAMP-Italy (<http://www.camp-italy.org>), the MAREGOT project (<http://interreg-maritime.eu/web/maregot>).

Projects/Activities achieved in the last 3 years	Budget
Coastal monitoring activities of the Tuscany Region (L.R. n. 80/2015)	75.000 €/yr
CAMP Italy Project	150.000 €
MAREGOT Project (INTERREG IT/F Maritime)	200.000 €

4. BUDGET AMOUNT ESTIMATION & SCHEDULE of INTERVENTION

Project budget: approximately **1.500.000,00 Euro**. The project plan is as follows.

1st year: Creation of an updated monitoring framework concerning the entire Tuscan coast which also includes the realization of a detailed survey (geomorphological, sedimentological and environmental quality) extended to the entire Tuscan coast. Update of the regional database and integration of missing data.

2nd-10th year: Monitoring activities in the Pilot sites.

5. ACTORS INVOLVED

- Tuscany Region - Direzione Difesa del Suolo e Protezione Civile.
- LaMMA Consortium - Environmental Modelling and Monitoring Laboratory for Sustainable Development / CNR - National Council for Research.

6. MAPS WITH PILOT SITES LOCATION AND GENERAL FEATURES



Versilia coast, a renowned tourist area in the northern Tuscany. The zone suffers from bathing water quality problems due to some little rivers that outflow into this area.



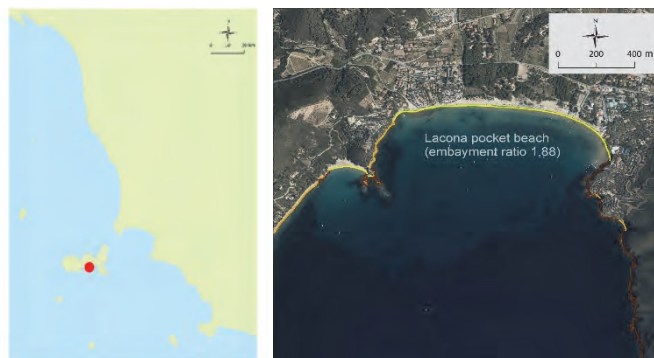
Migliarino San Rossore Massaciuccoli Regional Park, near the Arno river mouth. The shoreline in 2017 was approx 30 m backward respect to 2005.



Marenmma Regional Park, beside the Ombrone river mouth. At some points the beach is experiencing shoreline retreat for approximately 10 m per year.



Tombolo di Cecina natural park, with a strongly eroded beach characterized by coastal dunes and a pine forest behind; the area is situated near the urban area called Marina di Cecina, characterized by a large amount of shore protection structures, and nourishments carried on in recent years.



Lacona (Elba Island), one of the largest pocket beach of the entire Tuscan Archipelago, and the only one with a natural and well preserved coastal dune system.



JOINT ACTION PLAN

Annex 5

GUIDELINES ON PROTECTION OF THE COASTS FROM EROSION PHENOMENA AND FROM THE EF- FECTS OF CLIMATE CHANGE (SYNTHESIS)

INTRODUCTION

Hereafter are reported, as schematic summary, the indications coming from the Guidelines introduced in chapter 3 of the Joint Action Plan, **outlining a framework of recommendations for developing knowledge, databases, monitoring systems, strategy and actions for the protection and adaptation to climate change effects of the coastal areas in the Mediterranean.**

It is the output of an operation started in 2015-2016, promoted and developed in cooperation between the IT Ministry of Environment Land and Sea Protection and the 15 IT coastal Regions (also active **partners of the Bologna Charter Initiative**), that is continuing operating for its constant upgrading and updating in collaboration also with ISPRA, Basin Authorities, Research and Scientific Community (CNR, Universities) and main stakeholders (see also <http://www.erosionecostiera.isprambiente.it/>).

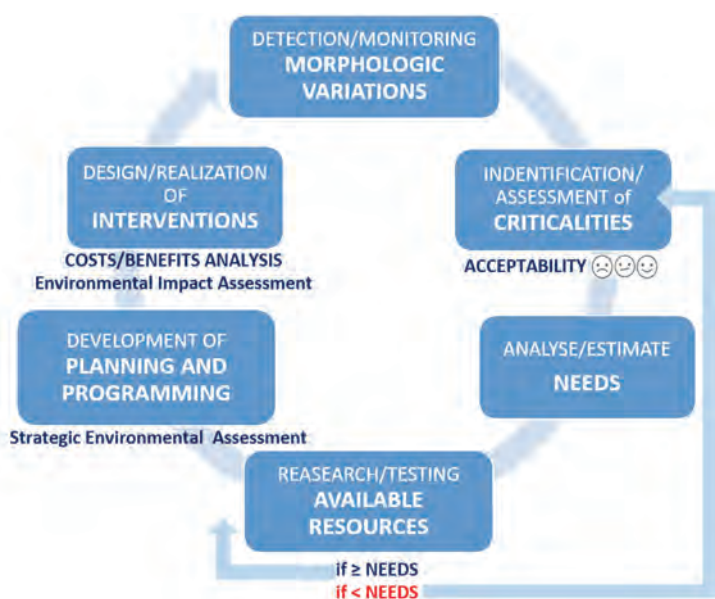
These recommendations, indications, good practices, are **proposed to the attention of the Mediterranean community as a contribution within the discussion on coastal protection and adaptation issue**, with the aim to build up together a common vision and strategic actions to deal with the challenge driven by climate change, assisting coastal adaptation in the region and helping in setting and maintaining conditions for a sustainable development and Blue Growth in the Mediterranean.

Recommendations, indications and good practices are referred to the following 15 topics:

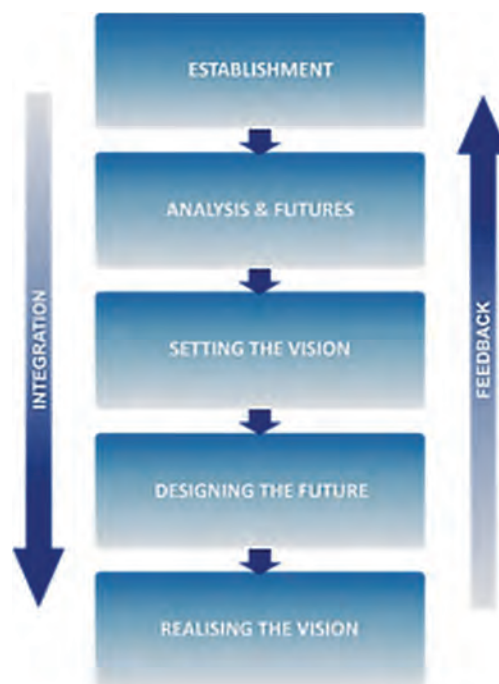
- 1) COASTAL EROSION AND MANAGEMENT ASSESSMENT INTEGRATED APPROACH
- 2) INCREASE COASTAL RESILIENCE
- 4) DATA AND INFORMATION MANAGEMENT IN ADEQUATE INFORMATION SYSTEMS PURSUANT TO THE INSPIRE DIRECTIVE
- 5) CONSTRUCTION OF A CATALOG OF HISTORIC SEA STORMS AND RELATED IMPACTS
- 6) DIAGRAM FOR AN INTEGRATED APPROACH IN COASTAL PROTECTION MANAGEMENT
- 7) GOOD PRACTICES FOR A PROPER BEACH SEDIMENT MANAGEMENT AND BALANCE [RP-1]
- 8) GOOD PRACTICES FOR SUBSIDENCE REDUCTION IN COASTAL ZONES [RP-2]
- 9) INTERVENTIONS WORKS AIMED AT REDUCING SEDIMENT LOSSES AND COASTAL RECESSION [RP-3]
- 10) GOOD PRACTICES OF NOURISHMENT USING EXTERNAL SEDIMENTS BEACH SYSTEM [AS-1]
- 11) GOOD PRACTICES OF NOURISHMENT USING INTERNAL SEDIMENTS [AS-2]
- 12) MAIN CHARACTERISTICS TO BE CONSIDERED IN THE SEDIMENT COMPATIBILITY ASSESSMENT
- 13) ASSESSMENT METHODS AND ECONOMIC COMPARATIVE ANALYSIS BETWEEN DIFFERENT TYPES OF INTERVENTIONS
- 14) ENVIRONMENTAL ASPECTS RELATED TO THE BUILDING OF COASTAL DEFENSE WORKS
- 15) INDICATIONS FOR AN EFFICIENT CULTIVATION OF THE SEDIMENT RESOURCE IN SUBMARINE DEPOSITS

1) COASTAL EROSION AND MANAGEMENT ASSESSMENT INTEGRATED APPROACH

An integrated approach for criticality assessment and management of the coastal systems means setting up a **planning process** that takes care of the physical, environmental, social and economic aspects concerned, in a circularity of actions interdependent, also **taking care of interaction between the different mentioned aspects and sectors operating on the coastal ambit**. Integrated vision, analysis and action on the coast find extraordinary support in applying the **ICZM principles and process**, codified in the Recommendation CE 2002/413 and in the ICZM Protocol of the Barcelona Convention.



Scheme for a correct approach to the protection and management of coastal areas www.erosionecostiera.isprambiente.it



ICZM Process diagram

http://www.coastalwiki.org/wiki/ICZM_Process_diagram

2) INCREASE COASTAL RESILIENCE

Increasing the capability of a coastal system to adapt to changing conditions (resilience) is a particularly important concept to be taken into account in coastal zone management. The restoration of the sedimentary balance, the creation of spaces that allow the development of natural processes, the identification of strategic sediment sources/stocks for beach nourishment purposes are at the basis of the "reconstruction" of the coastal system resilience.

In order to **increase coastal resilience** and the **preservation of coastal stretches free from hard defense works**, spatial governance tools should include provisions such as:

- **Protection measures of sea stretches** to avoid the construction of hard defense works;
- **Protection and conservation measures of existing dune systems** and promotion of their recovery, whenever possible;
- **Promotion of coastal strip redevelopment projects** that envisage the retreat of bath-house facilities, service and linear facilities, whenever possible;
- **Strengthening of the coastal system** through direct beach nourishment along the beach concerned or on any "recharging zones", identified in relation to the local dynamic conditions, from which the sediments are distributed towards a wider coastal stretch to be maintained, over time.

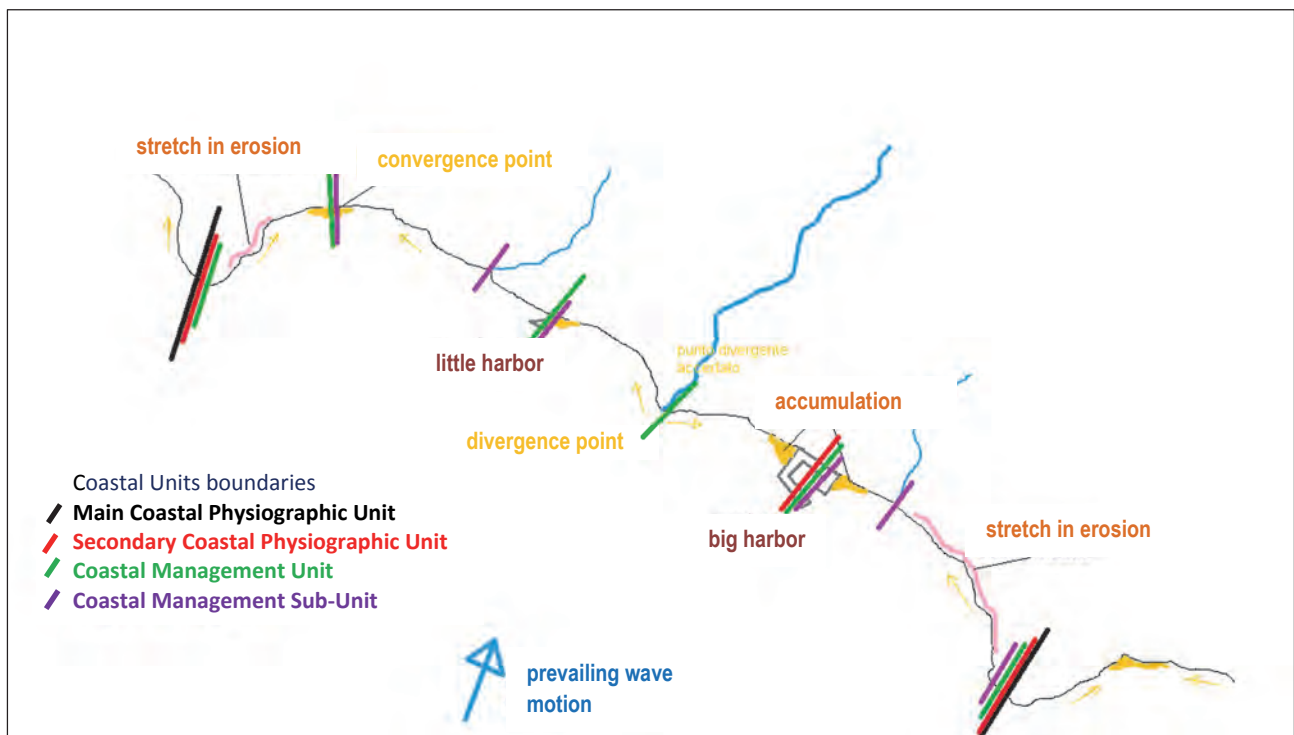
3) DEFINITION AND HIERARCHY OF COASTAL AREA AMBITS

For the purposes of the analysis of coastal dynamics and the assessment of adaptation actions to the effects of climate change, a coastal area management approach is adopted according to a hierarchy associated to the level of attention for the studies of hydrodynamic phenomena and for the design of actions also in relation to their mutual degree of interference.

Summary of the definitions of Physiographic Units and Management Units

Coastal Physiographic Unit (CPU)	Hierarchy of coastal areas	Equivalent definitions	Delimitation elements	Return times for closing depth	Reference framework
Main	1st order	Main CPU	Natural elements	100 year-long RT	Hydrogeological structure plan
Secondary	2nd order	Secondary CPU (Macrocell)	Natural elements and large ports	50 year-long RT	Hydrogeological structure plan, design of large ports
Management Unit	3rd order	Management MacroCell (or Cell)	Natural elements, large ports, medium ports, singular points	10 year-long RT	Coastal defense works, planning of medium and small-sized ports and maritime works, sediment management activities
Management Sub-unit	4th order	Management Cell (or Micro-cell)	Natural elements, large ports, medium ports, singular points, management limits	2-5 year-long RT	Statistics, ordinary maintenance, ordinary and seasonal management

The reference of Return Time (RT) is intended as the frequency of occurrence of a meteorological event of a certain intensity. More specifically, a "long return time" as 100 years and an "average return time" as 50 years are generally used for port planning and other big works, while a "short return time" as 10 years is used for medium size coastal defense works, little and medium ports and other maritime works.



Sketch with example of the proposed subdivision of coastal areas (boundaries of the different units)

4) DATA AND INFORMATION MANAGEMENT IN ADEQUATE INFORMATION SYSTEMS PURSUANT TO THE INSPIRE DIRECTIVE

These tools are designed to collect and organize the acquired data, to process data, analyzes and indicators, to produce cartographies integrating all the information on the influential processes, in order to guarantee the technical support necessary for the decision-making process for the management of the coastal strip.

Key elements to be contained in a Coastal Information System

1. Administrative data, such as territorial limits, both on land and at sea
2. Technical cartography
3. Shorelines
4. Bathymetry and digital bathymetric models and high-resolution altimetry digital models
5. Altimetry data and high-resolution altimetry digital models
6. Geological and geomorphological data and related cartography
7. Analysis of erosive trends: of the shore line, foot of the dune and of all the key morphological elements
8. Subsidence rate analysis
9. Catalogs of coastal defense works and infrastructures
10. Catalogs of beach nourishment interventions or other types of 'soft' defense interventions
11. Meteorological, hydrological, sea and coastal meteorological and sea tide data
12. Information on sea level rise
13. Land use data and dynamics
14. Data on protected areas with high ecological, landscape and archaeological value.
15. Data on maritime property, including concessions
16. Data on the local economy, labour, income and other socio-economic data
17. Climate and sea level rise projections / scenarios

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5) CONSTRUCTION OF A CATALOG OF HISTORIC SEA STORMS AND RELATED IMPACTS

The knowledge and study of areas historically affected by coastal erosion and/or flooding is of great importance for the prevention and management of coastal risks. The construction of a catalog of historical storms, suitably organized with various information and data, is a great help for assessing current vulnerabilities and risks and their possible evolution.

Example of information of a storm surge catalog, to be collected for each event

- Sea climate data
- Boundary conditions: rainfall and river flood events
- Monitoring of the dune / beach system and impacts (post-event surveys)
- Geographical impact location (GIS cartography)
- Description and quantification of damages
- Description and quantifications of interventions
- Update of critical points
- Socio-economic data of the affected area and its surroundings

6) DIAGRAM FOR AN INTEGRATED APPROACH IN COASTAL PROTECTION MANAGEMENT

To manage the erosion of critical coastal stretches and to supplement other spatial policies, on the one hand, it is necessary to nourish the coastal system and the critical coastal stretches, through an optimal coastal sediment management, the diversification of available stocks and the optimization of sampling and nourishment practices, and on the other hand, in parallel to all those actions, good practices, interventions and works, aimed at reducing sediment losses from coastal systems.

REDUCTION OF LOSSES

	AMBITTS OF ACTION	POSSIBLE ACTIONS / MEASURES
RP - REDUCTION OF COASTAL SEDIMENT LOSSES FROM THE SYSTEM	RP-1 Managing beach sediments	RP-1.1 Beach cleaning operation
		RP-1.2 Construction of wind traps
		RP-1.3 Construction of winter embankment defense works
	RP-2 Reduction of subsidence	RP-2.1 Reduction in groundwater withdrawals, water supply infrastructures
		RP-2.2 Hydrocarbon Extraction Control, regulation
		RP-2.3 Mitigation measures, regulation
	RP-3 works to reduce losses and re-treating of the coastline	RP-3.1 Interventions and works to reduce the energy of incident waves
		RP-3.2 Interventions and works for the reduction of coastal sediment transport

FEEDING THE SYSTEM

	AMBITTS OF ACTION	POSSIBLE SOURCES / MEASURES
AS - COASTAL SYSTEM NOURISHMENT	AS-1 Contributions from sediments stocks external to the coastal system	AS-1.1 Offshore Deposits management and cultivation for beach nourishment
		AS-1.2 River sediment transport enhancement (actions aimed at restoring) for natural beach nourishment
		AS-1.3 Excavations in the coastal hinterland, using sediments for nourishment
	AS-2 Contributions from sediments stocks internal to the coastal system <i>(Management of coastal sediment and littoral accumulations)</i>	AS-2.1 Surface Coastal Deposits along the littorals of the coastal system
		AS-2.2 Submerged coastal Deposits, submerged fans, accumulation nearby coastal protection works or harbor works
		AS-2.3 Hydraulic management, dredging for and navigation safety

More details on “possible actions/measures” are given from point 7 to 11 in the following pages. Topics are recalled by colors.

7) GOOD PRACTICES FOR A PROPER BEACH SEDIMENT MANAGEMENT AND BALANCE [RP-1]

The following **best practices aimed at reducing losses due to beach cleaning** should be included in technical specifications of services for beach cleaning and management of stranded materials:

- **On-site direct screening** during beach cleaning and waste collection operations in autumn - winter, creating sandy mounds available for successive nourishment in beach backward areas;
- **transport in authorized storage areas** during beach cleaning operations in the spring - summer period, with subsequent sand screening and recovery and quality control, for transport to the beach to be nourished or for the development of winter protection embankments;
- **adoption of selective cleaning methods** and indication of appropriate technical specifications for handling machines to reduce the removal of sand amounts;
- **no removal of stranded logs**, wherever possible in the autumn – winter season, so that they can fight against sea storms and wind effects and act as sand traps;
- **stranded biomass management** giving priority to its on-site maintenance to protect the beach against erosion, keeping it on site or repositioning it to reinforce the dune line, if any, or through its removal, accumulation or repositioning on the beach at the end of the bathing season;
- **estimate of on-site unmanageable stranded biomass quantities** and assessment of their different production destination (composting, energy, biorefinery, or other production types) or landfill disposal, after sorting on-site sediments.

to **reduce sediment loss from the beach system due to the wind action**, where this phenomenon is relevant, it is appropriate to introduce specific measures, technical indications and provisions into the coastal land management and governance system for:

- the **creation of seasonal windbreak barriers**, coupled with any winter protection embankments, in the beach stretches exposed to wind;
- the **creation of permanent barriers**, where possible and appropriate for the conditions of the sandy shore;
- the **sizing of barriers**, in terms of height and supports, mesh opening, geometry and orientation, depending on the specific wind conditions, the morphology and granulometry of the beach sediments;
- the **study and monitoring of local wind transport** aimed at a more in-depth knowledge and assessment of the most suitable site-specific technical solutions.

to **improve the effectiveness of temporary protection dykes**, where allowed, and to **reduce sediment loss** due to their incorrect construction and management, and to **guide an effective beach management**, specific technical provisions may be issued addressed to municipalities and facility managers providing implementation and operational procedures that include, among others:

- the **ban to use shoreline sand** and/or sand located in front of the winter protection dyke line, for temporary protection dykes building operations;
- the **ban to extend the seaward beach surface, during seasonal operations**, thus lowering the existing beach level;
- the **use of sands external to the coastal system**, for example deriving from dredging or excavation operations of various kinds, from any specifically identified authorized storage sites;
- the **use of sands coming from the recovery** of on-site sand sifting during the beach or backshore cleaning operations;
- the **use of alternative handling solutions**, such as the installation of temporary windbreaks and barriers.

8) GOOD PRACTICES FOR SUBSIDENCE REDUCTION IN COASTAL ZONES [RP-2]

In order to combat or reduce subsidence in the coastal strip, coastal area and water resource governance tools should provide specific measures and actions intended to:

- **regulate, reduce or ban the extraction of underground water**, namely from the most superficial coastal aquifers and in the most critical areas;
- supplement the regulatory measures with **water saving policies aimed at improving procurement** in the various urban, agricultural, industrial sectors, and identifying any abusive withdrawals;
- **carry out infrastructural interventions for the water supply** of the various sectors to constitute, where necessary, valid alternatives to the removal of water from the aquifers of the coastal subsoil;
- **implement studies and monitoring of coastal aquifers**, also in relation to the phenomenon of saline wedge intrusion, with reference to assessment and recharge experiments of surface aquifers;
- **implement studies and monitoring of subsidence** in the coastal area also through the use of remote sensing techniques;
- **regulate, reduce or ban the extraction of hydrocarbons**, namely from onshore and offshore deposits close to the coastal strip and in correspondence of the most critical areas;
- **experiment and launch fluid injection projects** in exploited reservoirs or in suitable deep geological units in order to counteract the effects of induced depressurization and subsidence;
- **economic compensatory measures** in agreement with the operating companies, for the financing of subsidence mitigation or coastal defense interventions in the territories affected by exploitation.

9) INTERVENTIONS AND WORKS AIMED AT REDUCING SEDIMENT LOSSES AND COASTAL RE-CESSION [RP-3]

The choice of the type of interventions and works that involve a substantial modification of a stretch of coastline must be carried out in the pre-project or preliminary design phase, through a comparative assessment of different design options, with reference to:

- a detailed **cognitive framework on the environmental, geological and sedimentary aspects** of the coastal stretch and of the reference physiographic unit;
- an **in-depth knowledge of the dynamic conditions and set-up** of the specific site and of the neighboring areas, from the coastal Cell or section, to the Macro-cell or physiographic unit;
- the **definition of a clear and somewhat quantifiable objective**, (i.e. "designed beach") in relation to the specific problems to be addressed and the expected performance of the intervention;
- the **use of models**, powered by available or specifically acquired data to complete the necessary set, in order to simulate the behavior of the various design options hypothesized in relation to specific site conditions and obtain outputs to support the evaluation and selection of the type of work to be carried out;
- the **impact assessment of works, both in environmental and cost/benefit terms**, their acceptability, temporariness or permanence, possible reversibility, need for any necessary mitigation, in the construction and life cycle of the work, as well as for any necessary maintenance;
- any **preferential choice of interventions with minor impacts**, or that may have characteristics of reversibility or substantial reduction of the impacts, if it is subsequently necessary to modify or remove all or part of the work itself;
- a **monitoring of the work carried out and of the effects generated** on the specific site and in the neighboring areas, according to the evaluation of its actual performance according to the given objective;

10) GOOD PRACTICES OF NOURISHMENT USING EXTERNAL SEDIMENTS BEACH SYSTEM [AS-1]

Elements to be considered and good practices on the use of sediments from submarine deposits for coastal nourishment purposes:

- **Characterization of deposits** and advanced data representation and management system;
- **Verification of the physical and chemical parameters of sediments** and their compatibility with the destination areas;
- **Verification of deposits and dredging activities** during planning and execution of interventions;
- **Dredging impact assessment** in the sampling areas, neighboring areas and fishing areas;
- **Planning of interventions** on a regional or even macro-regional scale for optimization purposes;
- **Evaluation of possible multi-year management solutions** with project finance modalities.

In order to put in place effective actions aimed at restoring or improving **river solid transport** useful for the natural coastal nourishment, it is appropriate to develop adequate knowledge, testing and actions for the management of basins and waterways, with reference to:

- **geomorphological framing of watersheds and riverbeds of water courses**, geological formations, land use, morphology, profiles and sedimentology of riverbeds;
- **knowledge, quantification of the solid transport fluvial**, where possible in a direct way, through monitoring, or indirectly, through appropriately calibrated hydraulic models;
- **experimentation of sediment bypass interventions, devices installation**, where appropriate, in correspondence with hydraulic works and barriers;
- **revision of hydraulic works, embankments and crossbars**, namely where over-flooding effects are found in the upstream areas;
- **maintenance and management measures for riparian vegetation**, accompanied by any necessary re-insertions of riverbeds and floodplain areas, aimed at reducing the sediment holding capacity;

An **excavation material management model for coastal nourishment purposes** should be directed towards "integrated" systems based on some basic criteria:

- **preparation of an excavation material utilization plan**, including a material treatment protocol where necessary, or protocol for material selection and screening;
- **characterization of the material** in relation to a nourishment project (grainsize, wear resistance, metal content, color, compatibility with the destination site);
- **preparation of a nourishment project** in connection with a **utilization plan** (project grainsize, volumes, nourishment method, execution times and temporary storage);
- **implementation of nourishment monitoring activities** by the competent Environmental Agency;
- **drafting of a sedimentological and bio-naturalistic monitoring plan**;

In order to better understand and evaluate **potential accumulations in the reservoirs** for possible use as nourishment material, it would be advisable to:

- **carry out a survey of artificial reservoirs**, through facility managers, for a full estimate of the sediment volume trapped, in particular for the reservoirs closest to the coastal strip;
- **define agreements with managers of artificial reservoirs** in relation to possible collaborations in the management of sediments, if proven to be compatible (characterization and technical feasibility), even after treatment or selection, for nourishment purposes;
- **launch experimental or demonstrative projects**, in relation to the situations with the highest technical and economic feasibility and proximity to the coastal strip, for the use of materials suitable for coastal nourishment.

11) GOOD PRACTICES OF NOURISHMENT USING INTERNAL SEDIMENTS [AS-2]

For an effective and proper **use of coastal sand accumulations for the management of the eroding stretches** it is necessary to adopt an "integrated approach" that includes:

- **taking stock of the resources available**, in the best possible manner, including emerged and submerged coastal stocks, in relation to distances and compatibility with the erosion stretches to be managed (dedicated information-management tool);
- **planning of interventions on erosion areas according to any possible recurring dredging needs** of ports or port mouths, river mouths, lagoon mouths, also with the installation of fixed sediment transfer devices;
- **streamlining of the authorization procedures for recurrent operations**, such as port dredging or port mouths, river mouths, lagoon mouths, for a constant sediment quality monitoring;
- **evaluation of the possible use of any fine materials deriving from dredging**, with the necessary qualitative characteristics for nourishment of near shore in compatible bathymetric ranges, as an alternative to their discharge in offshore areas;
- **use of sediments accumulated in the outer breakwaters of the rear port area within the same coastal stretch or cell**, in relation to the seasonal coastal management practices;
- **evaluation of the possible use of materials to be removed from the terminal stretches of water-courses**, to restore their hydraulic functionality, in relation to technical and economic feasibility assessment, for their transfer to the coastal erosion stretches.

12) MAIN CHARACTERISTICS TO BE TAKEN INTO CONSIDERATION IN THE SEDIMENT COMPATIBILITY ASSESSMENT

In relation to the different stocks that can be used for beach nourishment purposes, it is appropriate to take into account the type of sediment required, the "history" and environmental value of the areas in which these resources are located and their compatibility with the destination areas. The compatibility must be assessed based on a set of characteristics:

1. **Chemical characterization:** assessments of the chemical characteristics of sediments intake (presence of potentially hazardous contaminants for the environment and human health) must be carried out already during the impact assessment phase in view of their collection and handling.
2. **Microbiological characteristics:** with regard to the microbiological quality, the characterization criteria differ in particular for the different sediment resources (submarine deposits, sediments derived from dredging in the port area, other sediments accumulated along the coast).
3. **Particle size characteristics:** the physical aspects related to particle size differences between external and on-site sediments are related to the nourishment effectiveness in terms of different balance profile of the beach and its different response to longshore and cross-shore transport.
4. **Mineralogical characteristics:** starting from the assumption that in nature there are no two identical sediments and therefore any nourishment will lead to an alteration of the characteristics of the nourished beach, it is necessary to analyze the mineralogical component to minimize these alterations.
5. **Colorimetric characteristics:** sand color is an important landscape and ecological component of the coast, which must be carefully evaluated in cases of nourishment, especially in the presence of beaches with high environmental and ecological value.

13) ASSESSMENT METHODS AND ECONOMIC COMPARATIVE ANALYSIS BETWEEN DIFFERENT TYPES OF INTERVENTIONS

It is necessary to develop **econometric models for the coastal erosion risk assessment** to allow coastal authorities to assess the beach value to perform a cost/benefit analysis in the case of coastal defense works, with varying degrees of accuracy in relation to the availability of data and the detail required.

In the development of defense work designs, objective comparability criteria between the different hypotheses are met, and in particular:

- **Clear definition of the reference objectives** (e.g. morphological stability of the coastline in a given conformation);
- **Adoption of the reference objective** for all the solutions analyzed;
- **Comparison of the Current Net Value** of the different solutions analyzed;
- **Sensitivity analysis of the Current Net Value** in relation to the most important elements (eg nourishment sand cost, effectiveness of hard defense works in loss reduction, etc.).

14) ENVIRONMENTAL ASPECTS RELATED TO THE BUILDING OF COASTAL DEFENSE WORKS

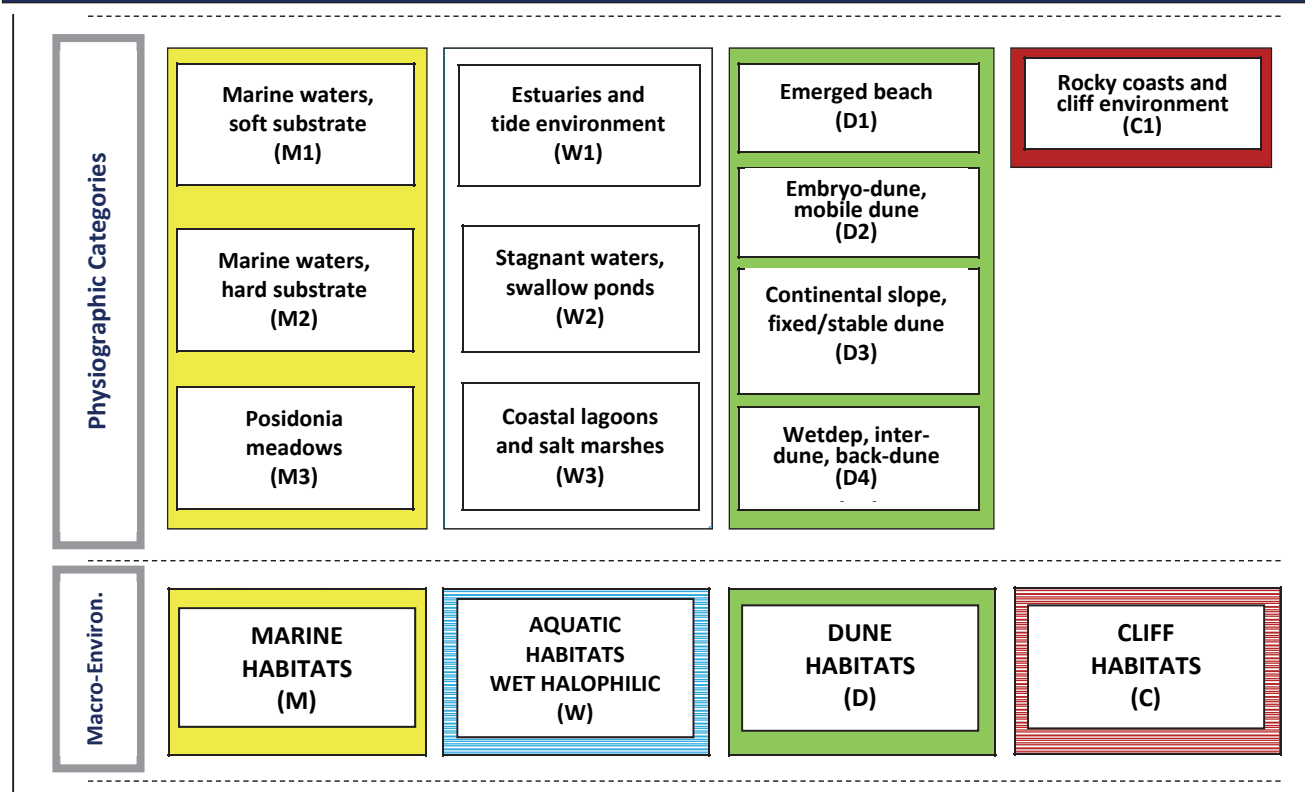
With reference to the "Guidelines for environmental studies related to the implementation of coastal defense works" published by ISPRA (2014), reference should be made to the steps envisaged in the **drafting of work/impact Vs habitat/species matrices for environmental study purposes:**

- **Identification of the reference area.** A preliminary investigation, based on the technical and environmental information acquired during the design phase of the work, should be carried out to identify the reference area, i.e. the area affected by the direct and indirect effects that may be generated by the work implemented on the near shore and on shore.
- **Identification of protected habitat types.** An accurate bibliographic survey and appropriate field surveys should be carried out to identify the physiographic categories in the reference area and to identify for each of them the types of protected habitats (pursuant to the Habitat Directive). It is important to underline that all the physiographic categories present in the reference area must always be kept into account in the matrix. In fact, even if there are no protected habitat types, the reference area can be characterized by the presence of protected flora and fauna species.
- **Identification of protected flora species and their attribution to habitat types.** Through an accurate bibliographic survey and specific flora investigations to be carried out in the field, the flora species present in the reference area must be identified, including species directly related to the habitats present and species protected by current regulations.
- **Identification of protected fauna species.** Through an accurate bibliographic survey and specific field surveys, the census of the species of fauna species present in the reference area must be carried out, taking into account the rules and regulations and conventions in force concerning fauna protection.
- **Attribution of protected fauna species to "physiographic categories".** Each protected fauna species, registered in the area of reference, must be attributed to one or more habitat use categories, specifying the scale of use (local or wide) and the time frequency (perennial or seasonal), also in order to be able to identify proper "time windows" in which the interventions should be carried out minimizing the impact.

The Matrices drafted to support environmental studies refer to 9 specific coastal defense works categories:

- seawalls;
- detached breakwaters and island platforms (emerged and submerged);
- groins (permeable and waterproof);
- composite groins;
- *headlands*;
- nourishment;
- drainage systems;
- morphological reconstruction of coastal dunes;
- windbreaks, dune restoration and consolidation by vegetation and access management

Macro-Environments (4), Physiographic Categories (11) and Marine-coastal Habitat Types (37), identified for the assessment of the expected effects and potential impacts of the different types of coastal defense works and interventions.



15) INDICATIONS FOR AN EFFICIENT CULTIVATION OF THE SEDIMENT RESOURCE IN SUBMARINE DEPOSITS

The awareness that submarine sands deposits usable for beach nourishment are "finite resources" imposes their optimal exploitation that can be put into practice only through a deep knowledge and management of the deposits in relation to the different physical and environmental aspects and the specific projects.

The key elements available for a proper knowledge and management of submarine deposits, which also require assessments and high data availability, are:

- **extensive seabed mapping** (seabed mapping);
- **characteristics of the deposits** (lithological, density, etc.);
- **actual accessibility**: depth, distance, possible silt coverage ("Potential Accessibility - PA");
- **characterization** of deposits;
- **estimate of actually available resources**, in terms of quality, quantity and compatibility, net of any other use of the areas and limitations ("Verified Potential and Profit -PU");
- **cost estimate** of exploitation;
- **estimate of current and future needs** of sediments;
- **impacts on the physical system** (e.g. changes in the local hydrodynamics due to the creation of excavation depressions, reduction of mobile sediment and influence on other areas);
- **impacts on the biological system** (e.g. removal of the substrate and associated benthic epifauna; decrease of biodiversity and richness of species; benthic habitats losses and effects on the water column, etc.);

For the purposes of an optimal management and a more effective exploitation of submarine deposits, the following indications should be considered:

- **Unified and coordinated knowledge management**, dedicated information tools that help optimize research, analysis and exploitation capabilities;
- **preventive analysis of the possible conflicts or impacts of an exploitation** of the deposits, with other uses of the sea, with the dynamics of the seabed, etc.;
- **differentiation of investigations** where appropriate and possible, to acquire more detailed information on in situ physical parameters useful to improve dredging operation planning;
- **monitoring of the state of the deposit and calculation of the residual volumes following the intervention**, considering also the possibility of obtaining daily reports during dredging (track position of the dredger, depth of excavation, etc.).
- **restriction of the deposit dredging area**, in relation to the volumes to be extracted and the characteristics of the dredger, also envisaging a "batch" sectioning, if necessary, in order to obtain a more homogeneous possible exploitation of the area down to the established excavation depth.

