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DIAGNOSTICS ON ADAPTATION TO CLIMATE CHANGE IN COASTAL AREAS

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Region	Tuscany
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Introduction

This questionnaire was developed by Regione Lazio for MAREMED Project, diagnosis phase, theme: Adaptation to Climate Change (ACC) in Coastal Areas.

It is addressed to Maremed partners and Mediterranean public administrations directly involved in coastal zone management.

MAREMED – Maritime Regions cooperation for Mediterranean, is a project started in 2010 and co-funded by the MED Programme, that involves 15 partners among Regions and local administrations from France, Italy, Spain, Greece and Cyprus together with the Conference of Peripheral Maritime Regions (CPMR)

The project is dealing with the following themes: maritime policy governance, the integrated management of coastal and maritime areas, fisheries, climate change adaptation in coastal areas, efforts to reduce pollution and data management.

Its objective is to develop tools for enhancing and coordinating regional, European and Mediterranean policies on these six thematic strategies.

In the first work phase (the present one), an overview of the policies implemented and their governance by the project partners will be carried out. In the second phase the partners will identify pilot coastal zones where they will promote transnational management initiatives and share operational tools in order to aid the decision-making process for the six thematic strategies.

This questionnaire took inspiration from two works already started during BEACHMED-e project and Coastance project (MED programme).

During the Obsemedi sub-project of Beachmed-e - whose aim was to realize a feasibility study to set up a Mediterranean Interregional Observatory for coastal zone management -, the results led to the realisation of a list of about 40 public structures operating in coastal zone management and the publication of the activities and tools necessary to deal with the problem.

Coastance questionnaire, developed by Département de l'Hérault, coordinator of component 3 "Coastal Risk: Submersion and erosion" led to the comprehension of the state of the art of the activities linked to Mediterranean coastal risks and submersion management and forecasting. Eight public Administrations coming from Italy, France, Spain, Greece, Cyprus and Slovenia took part in this work.

Regione Lazio, Maremed ACC theme coordinator, is now requested to take a step ahead: to understand and encourage the development of tools and methods to counter the problem of climate change adaptation in coastal areas.

"...Floods are natural phenomena which cannot be prevented. However, some human activities (such as increasing human settlements and economic assets in floodplains and the reduction of the natural water retention by land use) and climate change contribute to an increase in the likelihood and adverse impacts of flood events..."

EU flood directive 2007/60/CE

"White paper" on Adapting to climate change (http://www.medregions.com/pub/doc_travail/gt/66_en.pdf) suggests the integration of climate change issues for the implementation of the Floods Directive 2007/60/CE. "...Full implementation of this Directive by the EU Member States will help increase resilience and facilitate adaptation efforts.... (COM(2009) 147, p. 11)"

This work must consider European flood directive as the point of reference to regulate the problem of flood risk evaluation, taking into account climate change adaptation in coastal area. This

directive states in a specific way the need to consider climate change effects during the evaluation flood risks future scenarios.

Eventually, we have a regulation explaining how to assess and manage flood risks in coastal areas and the European Commission fixes clear deadlines for Member States to comply with the requirements of the flood directive.

This directive, approved by most Mediterranean Member States (http://ec.europa.eu/environment/water/flood_risk/timetable.htm), is reference point chosen by Regione Lazio for the development of this questionnaire.

Main Objectives of the questionnaire

- Understanding the knowledge level of the "flood directive" effectively demonstrated by the Maremed partners, and especially understanding the real capability of Mediterranean administrations to meet the milestones proposed by the European Commission.
- Research of tools and methods currently available to address the problem of risk map elaboration, also collecting some experiences and suggestions coming from MAREMED partners for the next financial programme (2013 - 2020).

EU Flood risk directive 2007/60/EC (Requirements and milestones).

The milestones fixed by the flood directive are reported below:

PRELIMINARY FLOOD RISK ASSESSMENT

Article 4

...4. Member States shall complete the preliminary flood risk assessment by

22 December 2011.

FLOOD HAZARD MAPS AND FLOOD RISK MAPS

Article 6

...8. Member States shall ensure that the flood hazard maps and flood risk maps are completed by

22 December 2013.

FLOOD RISK MANAGEMENT PLANS

Article 7

...5. Member States shall ensure that flood risk management plans are completed and published by

22 December 2015.

The Flood Directive gives Member States some suggestions for the development of flood risk maps. In particular, some detailed information is requested for the elaboration of hazard maps and risk maps.

Some of the main requirements set by the directive are the following:

FLOOD SCENARIOS...

Flood hazard maps shall cover the geographical areas which could be flooded according to the following scenarios:

- (a) floods with a low probability, or extreme event scenarios;
- (b) floods with a medium probability (likely return period ≥ 100 years);
- (c) floods with a high probability, where appropriate

ELEMENTS TO BE SHOWN...

For each scenario the following elements shall be shown:

- (a) the flood extent;
- (b) water depths or water level, as appropriate;
- (c) where appropriate, the flow velocity or the relevant water flow

FLOOD SCENARIOS SHOULD BE EXPRESSED IN TERMS OF:

- (a) the indicative number of inhabitants potentially affected;
- (b) type of economic activity of the area potentially affected;
- (c) installations as referred to in Annex I to Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control (1) which might cause accidental pollution in case of flooding and potentially affected protected areas identified in Annex IV(1)(i), (iii) and (v) to Directive 2000/60/EC;
- (d) other information which the Member State considers useful such as the indication of areas where floods with a high content of transported sediments and debris floods can occur and information on other significant sources of pollution.

FLOOD RISK MANAGEMENT PLAN...shall take into account relevant aspects such as:

...costs and benefits, flood extent and flood conveyance routes and areas which have the potential to retain flood water, such as natural floodplains, the environmental objectives of Article 4 of Directive 2000/60/EC, soil and water management, spatial planning, land use, nature conservation, navigation and port infrastructure.

Flood risk management plans shall address all aspects of flood risk management focusing on prevention, protection, preparedness, including flood forecasts and early warning systems and taking into account the characteristics of the particular river basin or sub-basin.

Flood risk management plans may also include the promotion of sustainable land use practices, improvement of water retention as well as the controlled flooding of certain areas in the case of a flood event.

The questionnaire:

State of the art: inventory of the cooperation projects on adaptation to climate change

1. Have you participated in former European programmes on adaptation to climate change in coastal areas?

yes	X
no	

If so, could you provide the names of these projects and any links to their websites?

EUROSION (www.euroSION.org); BEACHMED and BEACHMED-e (www.beachmed.eu); CONSCIENCE (www.conscience-eu.net); RES MAR (www.resmar.eu); PERLA (www.progettoPERLA.eu)

2. Could you describe the main Results, Experiences and Best Practices that you identified in these projects?

Restoring the sediment balance and providing space for coastal processes;

“Favourable sediment status” in order to promote coastal Resilience;

Coastal sediment cell: a coastal compartment that contains a complete cycle of sedimentation including sources, transport paths, and sinks;

Coastal and Offshore Sediment Management Plans.

State of the art: inventory of the atlases and databases regarding coastal risks: erosion, submersion, flood

3. Have you already acquired information or been informed on floods and submersions which already occurred in the past, and which have significant adverse impact on coastal zones?

yes	X
no	

If so, what kind of information do you have in order to describe the characteristics of the floods already occurred in the past?

GEOMORPHOLOGICAL AND SEDIMENTOLOGICAL FEATURES OF THE SHORELINE:

The Geomorphological map: the adopted method involves performing the following operational stages:

Exploratory stage and acquisition of material made available by the Public Administrations.

Remote sensing using photointerpretation before and during direct surveys on the ground.

Direct survey on the ground using GPS tools and Regional Design Paper mapping on a 1:10.000 scale.

The comparison between the results of the geomorphological survey and the data obtained from the interpretation of the batimetric surveys carried out during the first stages of the study.

Shoreline evolution maps from 1938 to 2005.

. Have you already defined a methodology to identify priority areas of risks (erosion, submersion, flood)?

yes	X
no	

4. Have you already produced risk maps on coastal areas?

yes	X
no	

If so, could you briefly describe the overall methodology that you have adopted to produce risk maps?

Mapping *HAZARDOUS AND INVARIANCE* Areas:

Hazardous areas means a portion of territory affected by extreme meteo-marine weather, and refer to a return period of 50 years.

For the definition of hazardous areas the following data was used:

- the survey of the shoreline (2005);
- the results of the modelling calculation of the effects induced by the wave with a 50-year return period, considering:
 - The maximum set-up value, namely the rise in sea level caused by the wave compared to the average sea level;
 - The maximum run-up value, namely the highest elevation in relation to the set-up value, reached by the water as it rises up the beach.

The flooding of the beach being surveyed and, consequently, delimiting the hazardous areas, was assessed on the basis of the coastline and the height of the overflow of the meteo-marine weather, with reference to current conditions and trends (provided by the model).

Invariance area means the planimetric delimitation of the following urban invariances: urban areas, network infrastructures and areas of environmental and natural interest. The activities that were carried out consisted in the production of GIS files, by updating and standardizing the data provided by the regional SIT and the acquisition and digitization of municipal planning instruments (mapping out the PRGs).

The risk from rising sea levels on the coast of northern Tuscany was also assessed (Coastal Studies No 6 - 2003)

5. Did your risk maps refer to the EU flood directive (2007/60/EC) requirements?

yes	
no	X

6. Have you produced atlases and/or databases regarding coastal area management?

yes	X
no	

If so, could you provide the names of these atlases and/or databases (in case of web tools, please specify the link to the web page)?

C. BARTOLINI, L.E. CIPRIANI, E. PRANZINI, and M. SARGENTINI, 1989. The shoreline of coastal Tuscany between 1938 and 1985. In: Tuscan coasts - Studies on erosion, winds, and wave motion. The Region of Tuscany - Regional Council, 16 Tables.

Study and research for the implementation of the profile of the Tuscan coast in the Regional Plan for Integrated Coastal Management for the hydrogeological provision - Geomorphological map of the coastal belt on a 1:5,000 scale (2005).

Atlas of Italian beaches. C.N.R., S.EL.CA., Florence.

7. Have you adopted a specific guideline to produce these tools?

yes	X
no	

If so, do you think your guideline should be shared and adopted by the MAREMED partnership?

Technical specifications to assign feasibility studies at the level of physiographic units for the implementation of the profile of the Tuscan coast in the Regional Plan for Integrated Coastal Management for the hydrogeological provision.

Could you list some general surveys concerning erosion and submersion events carried out in your Region over the past five years?

Study of the sedimentary supply in main rivers;

Geomorphologic (shoreline and emerged and submerged beach profiles) and sedimentological (grain size and petrography) features of the coast;

Drafting the Geomorphologic Map of the coastal belt on a 1: 5000 scale;

Identification of hazardous and invariance areas;

Inventory of marine works designed to defend the coast and coastal settlements.

Cartographic and morphological data

8. *Have you already acquired morphological data describing your coastal zone?*

YES	<i>Shoreline acquisition?</i>
YES	<i>Equilibrium beach section acquisition?</i>
YES	<i>Erosion trend?</i>
YES	<i>Sand grain size?</i>
YES	<i>Chemical and Physical characteristics of sediments?</i>
YES	<i>Sand Dune acquisition?</i>
YES	<i>Other (Morphology, texture and chemistry of continental shelf sand and gravel reservoirs)</i>

9. *What kind of tools do you use for coastal monitoring?*

Yes	<i>Webcam</i>
Yes	<i>Topobathimetric measurement</i>
Yes	<i>Satellite images</i>
Yes	<i>Lidar</i>
yes	<i>Beach sediment grain size and colour measurements</i>

10. *Have you developed common cartographies together with your neighbour region?*

yes	X
no	

11. *Have you collected information evaluating the subsidence phenomenon along your coast?*

yes	X
no	

Meteorological and wave climate data, climate change effects.

12. Have you collected information on high tide level in your region?

yes	X
no	

13. Have you collected information evaluating sea level evolution of your Region in the medium/long term (100÷200/500 years)?

yes	X
no	

14. Have you collected information evaluating offshore meteorological characteristics (wind speed, wind direction, atmospheric pressure, water and air temperature, ...) along your coasts?

yes	X
no	

If so, could you specify the period of time the data collected refers to?

	<5 years
X	5÷20 years
	>20 years

15. Have you collected information evaluating offshore (about -100 m) wave characteristics (Wave height H, Wave period T and main direction) along your coasts?

yes	X
no	

If so, could you specify the period of time the data collected refers to?

X	<5 years
	5÷20 years
	>20 years

16. Have you collected information evaluating nearshore (about -20 m) wave characteristics (Wave height H, Wave period T and main direction) along your coasts?

yes	<input checked="" type="checkbox"/>
no	<input type="checkbox"/>

If so, could you specify the period of time the data collected refers to?

<input checked="" type="checkbox"/>	<5 years
<input type="checkbox"/>	5÷20 years
<input type="checkbox"/>	>20 years

Social economic data, exposed values

17. Have you already developed land use maps for your coastal area?

yes	<input checked="" type="checkbox"/>
no	<input type="checkbox"/>

If so, please indicate a reference below, or the website of publication.

<http://web.rete.toscana.it/sgr/webgis/consulta/viewer.jsp>

18. Have you already assigned economic values to your coastal area?

yes	<input type="checkbox"/>
no	<input checked="" type="checkbox"/>

If so, could you briefly describe the methodology adopted to evaluate the economic values of your coastal area?

Future scenarios

19. Are there any key studies containing future scenarios for your area with a focus on:

Yes	Climate change
No	Changes in population size
No	Population dynamics
No	Economic evolution
Yes	Land use changes
No	Spatial planning
	Other.....

20. *Could you list some interventions in your Region concerning adaptation measures to climate change in coastal areas, realised over the past 10 years?*

Program of priority operations to reclaim and rebalance the littoral zone and the training activities under the integrated coastal management plan (Regional Council Resolution n. 47/2003).

21. *Could you identify problems that hinder the development of risk maps in coastal zones (budget; technical competences; technical tools; lack of data or lack of shared data...)?*

Budget and lack of appropriate technical tools

22. *What would you suggest to the European Regional Development Fund (ERDF) for the next financial program (2013-2020)?*

The Development of Forecasting Models that are able to evaluate the morphologic response of the coastal plains to the rise in sea level (migration/changes in the beach-dune system).