

Let's talk about: Challenges of the climate change and biodiversity loss in the area of North Adriatic

Water management, disaster prevention and mitigation measures



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Why SAVEMEDCOASTS? Sea level rise is a global threat

Prevention and Preparedness is needed – "Early" Warning on a multi-decade scale





SAVEMEDCOASTS - Partners

INGV

ISTITUTO NAZIONALE DI GEOFISICA E VULCANOLOGIA (INGV)



CENTRO DI GEOMORFOLOGIA INTEGRATA PER L'AREA DEL MEDITERRANEO (CGIAM)



FONDAZIONE CENTRO EURO- MEDITERRANEO SUI CAMBIAMENTI CLIMATICI (FONDAZIONE CMCC)



ARISTOTELIO PANEPISTIMIO THESSALONIKIS (AUTH)



CENTRO TECNOLOGICO PER LE TELECOMUNICAZIONI DELLA CATALOGNA (CTTC)



COMUNE DI VENEZIA (COMUNE DI VENEZIA)

ISOTECH LTD (ISOTECH)



FONDAZIONE AMBIENTE RICERCA BASILICATA (FARBAS)







Funded by uropean Union lumanitarian Aid d Civil Protection







SAVEMEDCOASTS Context & main objectives

SAVEMEDCOASTS-2 is aimed at integrating climate change scenarios into disaster risk assessment and disaster risk management of the most exposed river deltas and lagoons of the Mediterranean Region.

To increase the availability and use of scientific knowledge on disaster, as explicitly stated in the new Union Civil Protection Mechanism, by developing 1) multi-hazard approach for risk assessment, and 2) macro-regional risk assessment integrating climate change scenarios including cascading impacts.

The project capitalizes DG-ECHO Projects

- **SAVEMEDCOASTS** (DGECHO www.savemedcoasts.eu), in particular the innovative multi-hazard approach and applied disaster risk assessment methods into disaster risk management policy in the Mediterranean Region, to raise the awareness and preparedness of coastal communities on climate change risks.
- KnowRisk (DGECHO <u>https://knowriskproject.com/the-project/</u>) on the dissemination and education actions on seismic risk;
- Tsumaps (DGECHO <u>http://www.tsumaps-neam.eu/</u>), for the tsunami hazard in the Mediterranean region.



SAVEMEDCOASTS data and products

Data

- IPCC AR5 (AR6) RCP 2.6 and 8.5 SLR projections for 2100
- Geodetic data (GPS, tide gauges and InSar)
- High resolution topography (Lidar, UAV) and bathymetry (regional, local)
- Climate, environmental, social and economic indexes

Products

- Rates of Vertical Land Movements and sea level trend (from GPS, tide gauges and InSar)
- RSLR projections for 2100 re-assessed for the Med region in targeted zones
- Multitemporal maps of flooding scenarios (up to 2100) in targeted zones
- Multitemporal maps of flooding scenarios for storm surges in RSLR conditions (up to 2100) in targeted zones
- WebGIS (mapping)
- Socio-economic and stakeholder analysis, exposure, risk assessment and cascade effects in targeted zones; RSLR Surveys
- Education by KnowFloodRisk campaigns (Ebre, Venice, Thessaloniki, Basento)
- Communication & dissemination (Website, Facebook, Twitter, YouTube, Flickr and Instagram)



SAVEMEDCOASTS Test sites



1. Venice Lagoon and Po delta Italy 3. Rhone delta France 2. Basento plain 5. Chalastra plain Italy Greece 4. Ebre delta Spain Mediterranean Sea Test Sites 6. Nile delta Spain KnowRiskFlood campaigns



SAVEMEDCOASTS workflow

2. Vertical land motion from GNSS & InSAR data analysis

1. SL trend from

tide gauge data





3. Realization of relative sea-level rise projections for 2100 in RCP2.6, RCP8.5 scenarios

23.00

Dosmario 1 scientific

4. high resolution topography & multitemporal flooding maps also in storm surge conditions







6. Raise awarness, knowledge transfer and dissemination

5. Multi risk analysis



Combined coastal flooding scenarios

Overview

The activity deals with the assessment of the flooding scenarios in target areas resulting from the combined effects of the different driving forces, coupling expeditive methodologies and modelling.

What we have done

The main products are the following:

- 1. the maps of potential land inundation scenarios for each study area, based on the RSLR projections estimated for 2030, 2050 and 2100 epochs;
- 2. the assessment and mapping of storm surge scenarios in target areas through expeditive methodologies and modelling to define possible combined inundation scenarios.

The analysis takes into account the combination of:

- a) regional SLR extracted from the Special Report Ocean and Cryosphere in a Changing climate;
- b) rates of land subsidence estimated by InSAR and GNSS analysis assuming they will continue at the same rates up to 2100 epoch;
- c) amplitude of astronomical tide and
- d) storm-surge (SS) referred to different return times (RT) for 2021, 2030, 2050 and 2100 epochs.



Lidar analysis, mapping and UAV surveys



Ebre delta (SP)





Rhone delta (FR)



Basento coast (IT)



Venice Lagoon (IT)



Nile delta (EG)



Chalastra delta (GR) UAV surveys

High resolution DEMs from available Lidar data (national agencies)





Mapping RSLR scenarios



The Ebro delta. RSLR projections in the 5 AOIs for 2030, 2050 and 2100 epochs.

				RSLR (m)					
_			I	20	30	20	50	21	.00
i	d	Area of Interest (AOI)	Vup (mm/yr)	RCP 2.6	RCP 8.5	RCP 2.6	RCP 8.5	RCP 2.6	RCP 8.5
	1	left Ebro	-0.94±1.09	0.07±0.03	0.08±0.03	0.17±0.03	0.22±0.04	0.38±0.07	0.76±0.14
	2	right Ebro	-1.11±1.87	0.07±0.03	0.08±0.03	0.17±0.04	0.23+0.05	0.39±0.07	0.78±0.14
L	3	Natural Park of Ebro Delta	-0.47±1.55	0.06±0.03	0.07±0.03	0.15±0.03	0.21±0.04	0.34±0.07	0.72±0.14
	4	l'Ampolla	0.27±0.6	0.05±0.03	0.06±0.03	0.13±0.03	0.18±0.04	0.28±0.07	0.66±0.14
	5	Sant Carles de la Ràpita	-0.06±0.92	0.05±0.03	0.06±0.03	0.14±0.03	0.20±0.04	0.30±0.07	0.69±0.14









SLR projections (WP2)

The Ebro delta. Areas of interest (AOIs) considered.

- Each study area has been subdivided into AOIs.
- For each AOI, the mean ground vertical velocity (Vup) and the resulting RSLR values for RCP 2.6 and RCP 8.5 scenarios at 2030, 2050 and 2100, were evaluated.
- Finally, each of the six flooding scenarios per AOI has been mapped grouped by RCP (2 maps/AOI).

Land subsidence from GNSS and InSAR data analysis (WP2)



Mapping RSLR scenarios





The Venice lagoon

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	15	Store St		and a state	201					
	1 1	10 18	1							
	8 0									
	6									
	11									
	61									
HE STA									_	
				- 10	10	RSD 20	c (m)		00	
		Area of Interest (AOI)	Mun (mm/ur)	RCD 2.6	PCD 9 5	RCB 2.6	BCD 9 5	RCD 2.6	PCD 9 5	
		Manina Manina	-1 52±0.58	0.06±0.03	0.05+0.03	0.15+0.03	0.21+0.04	0.3940.06	0.72+0.12	
		Guderra	-1.6520.46	0.06±0.04	0.05+0.03	0.16+0.03	0.21±0.04	0.40±0.06	0.72±0.12	
	3	San Giorgio Maggiore	-0.81±0.56	0.05±0.04	0.05±0.03	0.14±0.03	0.18±0.04	0.33±0.06	0.67±0.12	
	4	La Grazia	-3.61+0.29	0.09±0.04	0.09+0.02	0.23±0.02	0.27+0.04	0.57±0.06	0.90±0.12	
	S 5	San Clemente	-7.93±0.15	0.15±0.04	0.14±0.02	0.37±0.02	0.42+0.04	0.92±0.06	1.26+0.12	
	G	Sacca Sessola	-2.610.65	0.0810.04	0.0710.03	0.1910.03	0.2410.04	0.4810.06	0.8110.12	
	7	Lido	-2.15±0.79	0.0710.04	0.07±0.03	0.18±0.03	0.2310.04	0.4410.06	0.78±0.12	
	8	Pellestrina	-1.55±0.89	0.06 ± 0.04	0.05±0.03	0.16±0.03	0.21±0.04	0.39±0.06	0.73±0.12	
	9	Chioggia	-1.95±1.2	0.07±0.04	0.06±0.03	0.17±0.03	0.22±0.04	0.43±0.06	0.76±0.12	
	10	Porto Marghera	-2.18±1.11	0.07±0.04	0.07±0.03	0.18±0.03	0.23±0.04	0.45±0.06	0.78±0.12	
					-				0.7940.12	
	11	Campalto	-1.63±0.75	0.06±0.04	0.06±0.03	0.16±0.03	0.21+0.04	0.40±0.06	0.7320.12	
	11	Campalto Tessera & Marco Polo Airp.	-1.63±0.75 -1.97±0.87	0.06±0.04 0.07±0.04	0.05±0.03 0.05±0.03	0.16±0.03 0.17±0.03	0.21+0.04 0.22+0.04	0.40±0.06 0.43±0.06	0.76±0.12	
	11 12 13	Campalto Tessera & Marco Polo Airp. Mazzorbetto	-1.63±0.75 -1.97±0.87 -1.78±0.28	0.06±0.04 0.07±0.04 0.0710.04	0.05±0.03 0.05±0.03 0.05±0.02	0.16±0.03 0.17±0.03 0.17±0.02	0.21±0.04 0.22±0.04 0.21±0.04	0.40±0.06 0.43±0.06 0.41±0.06	0.76±0.12 0.75±0.12	
	11 12 13 14	Campalto Tessera & Marco Polo Airp. Mazzorbetto Mazzorbo	-1.63±0.75 -1.97±0.87 -1.78±0.28 -1.26±0.33	0.06±0.04 0.07±0.04 0.07±0.04 0.06±0.04	0.06±0.03 0.06±0.03 0.06±0.02 0.06±0.02	0.16±0.03 0.17±0.03 0.17±0.02 0.15±0.02	0.21±0.04 0.22±0.04 0.21±0.04 0.20±0.04	0.40±0.06 0.43±0.06 0.41±0.06 0.37±0.06	0.76±0.12 0.75±0.12 0.70±0.12	
	11 12 13 14 15	Campalto Tessera & Marco Polo Airp. Mazzorbetto Mazzorbe Burano	-1.63+0.75 -1.97±0.87 -1.78±0.28 -1.26±0.33 -1.59±0.27	0.06±0.04 0.07±0.04 0.06±0.04 0.06±0.04	0.06±0.03 0.06±0.02 0.06±0.02 0.06±0.02	0.16±0.03 0.17±0.03 0.17±0.02 0.15±0.02 0.16±0.02	0.21±0.04 0.22±0.04 0.21±0.04 0.20±0.04 0.21±0.04	0.40±0.06 0.43±0.06 0.41±0.06 0.37±0.06 0.40±0.06	0.75±0.12 0.75±0.12 0.75±0.12 0.73±0.12	
	11 12 13 14 15 10	Campalto Tessera & Marco Polo Airp. Mazzorbetto Mazzorbo Burano Murano	-1.63±0.75 -1.97±0.87 -1.78±0.28 -1.26±0.33 -1.59±0.27 -1.78±0.3	0.06±0.04 0.07±0.04 0.06±0.04 0.06±0.04 0.07±0.04	0.05±0.03 0.05±0.03 0.05±0.02 0.05±0.02 0.05±0.02 0.05±0.02	0.16±0.03 0.17±0.03 0.17±0.02 0.15±0.02 0.16±0.02 0.17±0.02	0.21±0.04 0.22±0.04 0.21±0.04 0.21±0.04 0.21±0.04	0.40±0.06 0.43±0.06 0.41±0.06 0.37±0.06 0.40±0.06 0.41±0.06	0.75±0.12 0.75±0.12 0.75±0.12 0.73±0.12 0.75±0.12	
	11 12 13 14 15 10 17	Campaito Tessera & Marco Polo Airp. Mazzorbetto Mazzorbo Burano Murano San Michele	-1.63±0.75 -1.97±0.87 -1.78±0.28 -1.26±0.33 -1.59±0.27 -1.78±0.3 -2.14±0.48 -4±0.42	0.06±0.04 0.07±0.04 0.06±0.04 0.06±0.04 0.07±0.04 0.07±0.04	0.05±0.03 0.05±0.03 0.05±0.02 0.05±0.02 0.05±0.02 0.05±0.02 0.05±0.02	0.16±0.03 0.17±0.03 0.17±0.02 0.15±0.02 0.16±0.02 0.17±0.02 0.18±0.03	0.21+0.04 0.22±0.04 0.21±0.04 0.21±0.04 0.21±0.04 0.21±0.04 0.23±0.04	0.40±0.06 0.43±0.06 0.41±0.06 0.37±0.06 0.40±0.06 0.41±0.06 0.44±0.06	0.75±0.12 0.75±0.12 0.75±0.12 0.75±0.12 0.75±0.12 0.75±0.12	
	11 12 13 14 14 15 10 17 17 18	Campaito Tessera & Marco Polo Airp. Mazzorbotto Burano Murano San Michele La Certosa Contenado	-1.63±0.75 -1.97±0.87 -1.78±0.28 -1.26±0.33 -1.59±0.27 -1.78±0.3 -2.14±0.48 -1±0.62 -0.28±0.2	0.06±0.04 0.07±0.04 0.06±0.04 0.06±0.04 0.07±0.04 0.07±0.04 0.07±0.04 0.07±0.04	0.06±0.03 0.06±0.03 0.06±0.02 0.06±0.02 0.06±0.02 0.06±0.02 0.07±0.03 0.05±0.03	0.16±0.03 0.17±0.02 0.15±0.02 0.15±0.02 0.16±0.02 0.17±0.02 0.18±0.03 0.14±0.03	0.21±0.04 0.22±0.04 0.21±0.04 0.21±0.04 0.21±0.04 0.21±0.04 0.23±0.04 0.23±0.04	0.40+0.06 0.43±0.06 0.37±0.06 0.40±0.06 0.41±0.06 0.41±0.06 0.35±0.06	0.76±0.13 0.75±0.12 0.70±0.12 0.73±0.12 0.75±0.12 0.75±0.12 0.78±0.12 0.68±0.12	
	11 12 13 14 14 15 10 17 7 7 7 7 18 18 19	Campaito Tessera & Marco Polo Airp. Mazzorbotto Mazzorbo Burano Murano San Michele La Certosa Le Vignole	-1.63±0.75 -1.97±0.87 -1.78±0.28 -1.26±0.33 -1.59±0.27 -1.78±0.3 -2.14±0.48 -1±0.62 -0.28±0.8 -2.84±0.7	0.06±0.04 0.07±0.04 0.06±0.04 0.06±0.04 0.06±0.04 0.07±0.04 0.07±0.04 0.06±0.04 0.06±0.04	0.06+0.03 0.06±0.02 0.06±0.02 0.06±0.02 0.06±0.02 0.06±0.02 0.07±0.03 0.05±0.03 0.05±0.03	0.16+0.03 0.17±0.03 0.17±0.02 0.15±0.02 0.16±0.02 0.17±0.02 0.18±0.03 0.14±0.03 0.14±0.03	0.21+0.04 0.22±0.04 0.2110.04 0.2010.04 0.21±0.04 0.21±0.04 0.23±0.04 0.19±0.04 0.19±0.04	0.40±0.06 0.43±0.06 0.41±0.06 0.37±0.06 0.40±0.06 0.41±0.06 0.44±0.06 0.35±0.06 0.29±0.06	0.76±0.13 0.76±0.13 0.75±0.12 0.75±0.12 0.75±0.12 0.75±0.12 0.75±0.12 0.75±0.12 0.66±0.12 0.66±0.12 0.66±0.12	
	11 12 13 14 15 16 16 17 17 17 18 19 20	Campaito Tessera & Marco Polo Airp. Mazzorbetto Mazzorbetto Burano Murano San Michele La Certoss Le Vignole Sant'Lrasmo Campile Tenenti	-1.63±0.75 -1.97±0.87 -1.78±0.28 -1.26±0.33 -1.59±0.27 -1.78±0.3 -2.14±0.48 -1±0.62 -0.28±0.8 -2.54±1.21 2.79±1.02	0.06±0.04 0.07±0.04 0.07±0.04 0.06±0.04 0.06±0.04 0.07±0.04 0.07±0.04 0.07±0.04 0.06±0.04 0.05±0.04 0.08±0.04	0.06+0.03 0.06±0.02 0.06±0.02 0.06±0.02 0.06±0.02 0.06±0.02 0.07±0.03 0.05±0.03 0.05±0.03 0.04±0.03 0.04±0.03	0.16+0.03 0.17±0.03 0.17±0.02 0.15±0.02 0.16±0.02 0.17±0.02 0.18±0.03 0.12±0.03 0.12±0.03 0.12±0.03	0.21+0.04 0.22+0.04 0.21±0.04 0.21±0.04 0.21±0.04 0.21±0.04 0.23±0.04 0.19±0.04 0.16±0.04 0.24±0.04	0.40±0.06 0.43±0.06 0.41±0.06 0.41±0.06 0.40±0.06 0.41±0.06 0.44±0.06 0.35±0.06 0.29±0.06 0.48±0.06	0.75±0.12 0.75±0.12 0.75±0.12 0.70±0.12 0.73±0.12 0.75±0.12 0.75±0.12 0.78±0.12 0.68±0.12 0.62±0.12 0.81±0.12	

The Venice lagoon. Areas of interest considered (in figure) and corresponding values of Vup and RSLR projections for 2030, 2050 and 2100 epochs (in table).



Assessing and mapping storm surge scenarios

 The expeditive methodology for coastal flooding risk assessment implemented in the previous SAVEMEDCOASTS project considered the storm-surge component as a static uplift of the sea level due to the maximum runup occurring during the considered extreme events. However, this approach was not applicable in SAVEMEDCOASTS-2, due to the relatively flat morphology of the investigated coastal areas, with the exception of the waterfront of the Venice lagoon.



BLUE ECONOMY FORUM

Alternatively, an hydrodynamic modelling for the assessment of the storm-surge propagation was implemented in **XBeach** for each study area. The **1-D model for wave propagation along a defined transect** was adopted for the assessment of the maximum storm runup, to take into account the evaluation of the inundation area, under the combined boundary condition imposed for each RCP, RT and reference epoch (2021, 2030, 2050 and 2100).

• For each transect, **the RSLR value was evaluated locally** considering the mean ground vertical velocity (Vup) along the transect as the mean subsidence rate inside a 200 m buffer of the transect itself, and then the calculation of the RSLR values relative to different IPCC scenarios (RCP 2.6 and RCP 8.5) for each transect considering such subsidence rate.

No overtopping $\rightarrow \max(\text{RSLR} + \tau_{\max})$



Overtopping → max (overtopping)





Ebro delta (overtopping at 2021)

No overtopping



Figure 71 - The Ebro delta: transect 1 output for RCP 2.6 and storm surge RT = 1 yr

Overtopping



Figure 74 - The Ebro delta: transect 1 output for RCP 8.6 and storm surge RT = 100 yr









RT = 100 yrs





Venice - Piazza San Marco



HWL 150 cm above mean sea level = 70% of flooded area HWL 270 cm above mean sea level = 100% of flooded area (mean land subsidence of the lagoon = 3.3±0.85 mm/yr from GNNS data Lidar data by CORILA

letaponto (overtopping at 2050)

16.750°E

16.775°E

METAPONTO



BLUE ECONOMY FORUM

apar site an



RT = 1 yr

16 810'E

16.825'E

16.850'E

16.875'E

16.900°E

RT = 100 yrs16.800°E 16.825'E 16 750°E 16.775'E 16.850'E 16.875'E 16.900°E METAPONTO Relative Bea Level RCP 2.6 Storm surge RT = 100 yr 0.30 m (2021) 0.43 m (2030) 0.56 nt (2050) 0.91 m (2100) -- transects SAVEMEDCOASTS-2 · · Later file di 212 01012 e 100 8456 58 TO M 10.825 E 16.250°E 16.779 E 16.800°E 16.85D-E 16.875'E 16.900°E





Figure 165 - Metaponto: transect 3 output for RCP 8.5 and storm surge RT = 100 yr



Sito pilota:

Cetraro (CS)

Responsabili scientifici: prof. Francesco Aristodemo (UNICAL), prof. Pasquale Filianoti (UNIRC) e prof. Michele Greco (UNIBAS).



Studio meteomarino





Diagramma polare

- Dati MeteOcean (serie storica dal 1979 al 2017)
- Clima meteomarino al largo
 - o Diagrammi polari
 - o Correlazioni altezze-periodi
 - Mareggiate (Hs soglia=3.5 m)
 - o Onde di progetto (T=1, 50 e 100 anni)

	Settore	250° - 2	280° N	Settore	280° - 3	310° N
T (anni)	Hs (m)	Tm (s)	Tp (s)	Hs (m)	Tm (s)	Tp (s)
1	6.45	10.03	11.77	5.62	9.59	11.27
50	9.23	11.25	13.19	9.51	11.36	13.32
100	9.72	11.44	13.41	10.20	11.62	13.62

Onde di progetto

PP2 - Azione 7

Responsabili scientifici: prof. Francesco Aristodemo (UNICAL), prof. Pasquale Filianoti (UNIRC) e prof. Michele Greco (UNIBAS).



SWAN (Simulating WAves Nearshore)



PP2 - Azione 7

Responsabili scientifici: prof. Francesco Aristodemo (UNICAL), prof. Pasquale Filianoti (UNIRC) e prof. Michele Greco (UNIBAS).



KBeach

- Carta nautica
- Carta topo-batimetrica (0.5 m)
- Rilievi Lidar sulla spiaggia emersa (2 m)



Griglia strutturata curvilinea (189x361)

Dati di input: Hs=6,58 m Tp=11.3 s Dir=237.15°N

(scenario climatico RCP8.5)





PP2 - Azione 7

XBeach

Responsabili scientifici: prof. Francesco Aristodemo (UNICAL), prof. Pasquale Filianoti (UNIRC) e prof. Michele Greco (UNIBAS).





XBeach output Spatial distribution of Maximum coastal

Dati di input: Hs=6,58 m Tp=11.3 s Dir=237.15°N

(climatic scenarios RCP8.5)



Preliminary cascading effects

Overview

The task is addressed to provide a preliminary assessment of cascading effects induced on infrastructures, human activities, coastal protected areas, etc. in the study areas due to the flooding scenarios evaluated in Task T4.1.

What we have done

The approach adopted to achieve this goal is a **"flood-damage model like"**, overlapping the flooding scenarios (flooded areas) with human settlements (buildings, transportation networks, drainage channels, valuable crops, etc.) and environment ecosystems (land use/land cover, protected areas, etc.) and evaluating the measure of such interferences in terms of percentage indicators of damage/integrity with regard to the particular component taken into account. The main products of this task are the following:

- 1. the maps of damage indicators for each study area, based on the flooding scenarios estimated by Task 4.1 for 2021, 2030, 2050 and 2100 epochs;
- 2. time series, stage-damage curves and charts on the weight of indicators.



Preliminary cascading effects

Damage Indicators (DI)

	Accom	Buildings	Drainage Network	Irrigation Areas	Protected Areas	Road network	Rice fields
Metaponto plain	х	Х	Х	Х	Х	Х	
Venice lagoon (Lido + Cavallino Treporti)		x		х	x	х	
Ebro delta					x	Х	Х
Rhone delta					Х	Х	Х
Chalastra plain					Х	Х	Х

 $DI(\%) = A_{damaged} / A_{ref}$

where: $A_{damaged}$ is the damaged area of the element considered (e.g., buildings)

 A_{ref} is the reference area, i.e. the domain of interest within which the indicators have been defined and then calculated.

or

$$DI(\%) = L_{damaged} / L_{ref}$$

(2)

(1)

where: $L_{damaged}$ = damaged length of the element considered (e.g., roads)

 L_{ref} is the reference length, i.e. the total length of the element considered falling into the domain of interest within which

the indicators have been defined and then calculated.

The percentage defined per each damage indicator represents the ratio between the flooded element and the total value of the element falling into the reference area.

Note: The pilot area of Metaponto Plain presents the highest number of damage indicators to be included in the analysis due to the very features of the area which is urbanized in the back-dune of the coastal zone with touristic accommodations, agricultural <u>areas</u>, <u>surface and sub-services</u> infrastructures like roads and drainage networks, beyond the protected areas.

Buildings - METAPONTO- rt100 - rcp85-2100



Metaponto

Drainage network - METAPONTO-rt100-rcp85-2100

Scenarios	Accom. (%)	Building (%)	Drainage Network (%)	Irrigation Area (%)	Protected Area (%)	Road network (%)
RCP2.6-2030	0.00	0.00	19.90	<0.01	1.30	0.00
RCP2.6-2050	0.00	0.00	22.70	<0.01	2.90	0.00
RCP2.6-2100	0.00	0.60	27.10	<0.01	12.80	3.40
RCP8.5-2030	0.00	0.00	17.80	<0.01	1.10	0.00
RCP8.5-2050	0.03	0.05	22.70	<0.01	4.00	1.10
RCP8.5-2100	26.00	11.30	37.30	<0.01	44.40	12.10
RT001-2021	0.00	0.30	22.30	<0.01	4.70	1.50
RT001-RCP2.6-2030	0.00	0.30	24.80	<0.01	9.30	3.70
RT001-RCP2.6-2050	0.00	0.90	29.10	<0.01	16.30	5.30
RT001-RCP2.6-2100	28.50	11.00	29.10	0.01	43.60	11.70
RT001-RCP8.5-2030	0.00	0.70	24.80	<0.01	9.30	3.50
RT001-RCP8.5-2050	2.10	1.50	29.30	<0.01	20.20	4.70
RT001-RCP8.5-2100	60.60	30.90	50.00	0.21	70.00	21.40
RT100-2021	0.00	0.30	22.50	<0.01	4.70	1.50
RT100-RCP2.6-2030	0.00	0.30	24.80	<0.01	9.30	3.70
RT100-RCP2.6-2050	0.00	0.90	29.10	<0.01	9.30	5.30
RT100-RCP2.6-2100	29.60	11.00	38.40	0.01	43.60	11.70
RT100-RCP8.5-2030	0.00	0.70	24.80	<0,01	9.30	3.50
RT100-RCP8.5-2050	2.10	1.50	29.30	<0.01	20.20	4.70
RT100-RCP8.5-2100	76.70	44.80	59.90	4.10	81.00	30.60

Table 2 – List of the interference indicators for Metaponto plain

CASCADING EFFECTS - BASENTO COAST

DRAINAGE NETWORK IN RSLR CONDITION

DRAINAGE NETWORK IN RSLR AND EXTREME STORM-SURGE CONDITION

Metaponto

Multi risk analysis and socio-economic assessment risk framework

Development of methodologies for the assessment of risks induced by multiple climaterelated hazards in coastal flood-prone areas.
Evaluation of environmental and socio-economic impacts due to specific types of climate-events and scenarios.

Exposed assets Expected flooded area

Lido (Granviale)

Exposed assets Expected flooded area Alberoni

Exposed assets Expected flooded area

Knowledge transfer Stakeholder Mapping

Category	Number of stakeholders identified	
Government and/or Policy Makers	71	
Coastal and/or Marine Industry	21	
Environmental Organisations	33	
Education/Academia/Resear ch	97	
Commercial/Industrial Representatives	36	
Insurance Sector	2	
The Media	13	
Various Professional Sectors	26	
Civil Protection	17	
Utility Providers	11	
Total	327	

Knowledge transfer: analysis of stakeholder perceptions on sea level rise

Aim: Gain a better understanding of the perceptions of stakeholders in each of the targeted sites with regards to causes, impacts and mitigation/adaptation measures for sea level rise.

How: Questionnaires & Face-to-face Interviews.

Site	Institutions	Teachers	Students
Basento	32	23	111
Chalastra	20	20	44
Ebro	63	17	158
Venice	145	31	132
Cyprus			76
TOTAL	260	91	521

A total of 872 respondents to the questionnaires

Site	No. Stakeholders
	Interviewed
Chalastra (GR)	4
Venice (IT)	7
Basento (IT)	7
Ebro (ES)	6
Total	24

Partecipatory workshops

Identification of gaps and needs of risk data end-users, decision-makers, and other key stakeholders & Development of Policy Tools for SLR mitigation.

(Virtual) Face-to-face Interviews

www.savemedcoasts2.eu

Dissemination

Workshops, meetings conferences, etc.

social networks

webGIS: a decision support tool for coastal spatial planning

One of the main outputs of SAVEMEDCOASTS-2 project is the **webGIS**, a collaborative web platform aimed at storing and contributing to disseminate the results of the project.

A first experimental version of the webGIS was launched during the SAVEMEDCOASTS project, so it is publicly accessible online since October 2017 through the following URL: <u>http://webgis.savemedcoasts.eu</u>.

The webGIS has been redesigned and further enriched with new data and features during the SAVEMEDCOASTS-2 project. It will be available (at least) until June 2025.

Welcome

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GeoNode

Architecture of GeoNode

Corti, P.; Bartoli, F.; Fabiani, A.; Giovando, C.; Kralidis, T.; Tzotsos, A. (2019). GeoNode: An Open Source Framework to Build Spatial Data Infrastructures. DOI: 10.7287/peerj.preprints.27534v1

"GeoNode is an open source framework" designed to build geospatial content management systems (GeoCMS) and spatial data infrastructure (SDI) nodes. Its development was initiated by the Global Facility for Disaster Reduction and Recovery (GFDRR) in 2009 and adopted by a large number of organizations in the following years. Using an open source stack based on mature and robust frameworks and software *like Django, OpenLayers, PostGIS, GeoServer* and pycsw, an organization can build on top of GeoNode its SDI or geospatial open data portal. GeoNode provides a large number of user friendly capabilities, broad interoperability using Open Geospatial Consortium (OGC) standards, and a powerful authentication/authorization mechanism. Supported by a vast, diverse and global open source community, GeoNode is an official project of the Open Source Geospatial Foundation (OSGeo)."

Main activities

BLUE ECONOMY FORUM

Improving an online mapping platform to share information on flooding scenarios

- restyling the webGIS homepage and layout in good agreement with the styles (color of the navigation bar, logo, banner, font, etc.) of the project website;
- enhancing and fine tuning the deployment environment, monitoring the server performance and detecting potential vulnerabilities and bugs;
- testing and enabling specific features of GeoNode (e.g. user registration and site wide announcements) in order to improve the site navigation and optimize the user experience;
- adding an analytics tool with user data protection, a Cookie Consent Manager in compliance with GDPR, and then a Privacy & Cookies Policy page;
- adding a Disclaimer page;
- last but not least, developing and integrating new web mapping applications ("apps") in order to visualize and analyze the flooding scenarios and their cascaded effects interactively.

Main activities

Cookie Consent Manager

Privacy & Cookies Policy

Privacy & Cookies Policy.

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Analytics tool with user data protection

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Documents

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BLUE ECONOMY FORUM

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Maps

OCEANS The Ebro delta (Spain): RSLR flooding scenarios The Ebro delta (Spain): potential inundation scenarios at 2030, 2050 and 2100 due to the relative sea level rise (RCP2.6 or RCP8.5). [WP4 Task 4.1] Disclaimer: http://webgis.savemedcoasts.eu/disclaimer

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The Ebro delta (Spain): flood risk indicators

The Ebro delta (Spain): map containing the main layers considered in the assessment of flood risk indicators [WP4 Task 4.2]

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The Ebro delta (Spain): RSLR+HAT+SS flooding scenarios

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The Ebro delta (Spain): vertical land motions

The Ebro delta (Spain): vertical land motions by integrated InSAR and GNSS analysis. [WP2 D2.4] Disclaimer: http://webgis.savemedcoasts.eu/disclaimer

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The Venice Lagoon (Italy): RSLR flooding scenarios

The Venice Lagoon (Italy): potential inundation scenarios at 2030, 2050 and 2100 due to the relative sea level rise (RCP2.6 or RCP8.5). [WP4 Task 4.1] Disclaimer: http://webgis.savemedcoasts.eu/disclaimer

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Maps on Venice Lagoon (Italy)

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Maps on Metaponto (Italy)

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App 1: Storm surge scenarios

App 2: Comparison between scenarios

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App 3: Flood risk indicators

Flood risk indicators

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A Falciano, M Anzidei, M Greco, ML Trivigno, A Vecchio, C Georgiadis,	
Journal of Marine Science and Engineering 11 (11), 2071	
Relative Sea-Level Rise Projections and Flooding Scenarios for 2150 CE for the Island of	2023
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M Anzidei, D Trippanera, A Bosman, FF Martin, F Doumaz, A Vecchio,	
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Relative sea-level rise scenarios for 2100 in the Venice lagoon by integrated geodetic data,	2021
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M Anzidei, M Crosetto, J Navarro, C Tolomei, P Patias, C Georgiadis,	
EGU General Assembly Conference Abstracts, EGU22-5138	

Sea level rise is a growing threat to the Mediterranean coasts

Photo by Tim Marshall on Unsplant

http://webgis.savemedcoasts.eu

a.falciano@cgiam.org