











THE EBM APPROACH FOR THE INTEGRATED MANAGEMENT OF MARINE-COASTAL ZONES

12-13 May 2022 – Sibari Cassano allo Ionio | Live streaming





















Integrated Coastal Zone Management in Tuscany: from history/national-local experiences to future challenges in territorial cooperation in the Mediterranean



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Water, Territory and Coastal Protection Sector









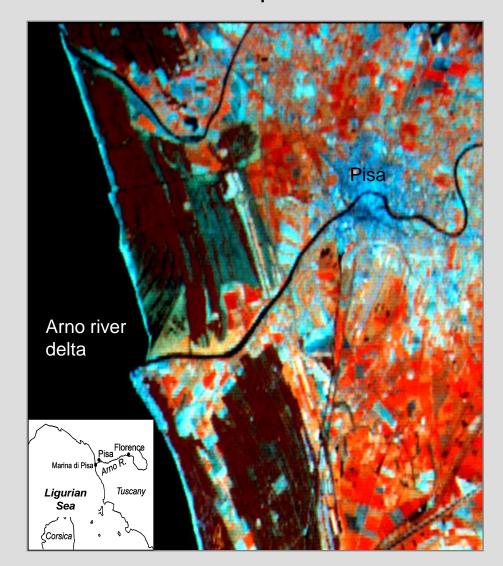


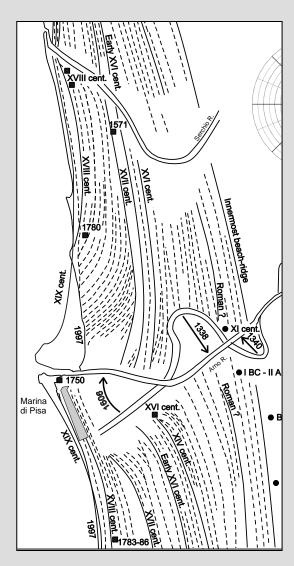
In historical times all the Italian coastal plains and beaches have experienced deposition and accretion as a consequence of the increased river sediment transport due to extensive deforestation and related soil erosion and land slides (as shown in these XVIII century paintings).



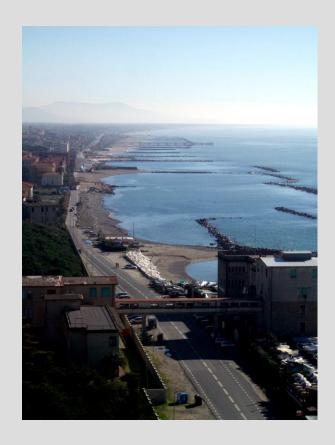


Beach erosion began in the mid-XIX century concentrating just at the river deltas, which, in previous periods, had acquired a very prominent shape. River deltas recorded these processes and they presently show the past accretion and erosion phases.





In the meantime, internal migration moved people and activities from the inland towards the coast, where they found better economic, social and recreational opportunities.



Coastal road



Coastal town



Industry



...and summer tourism

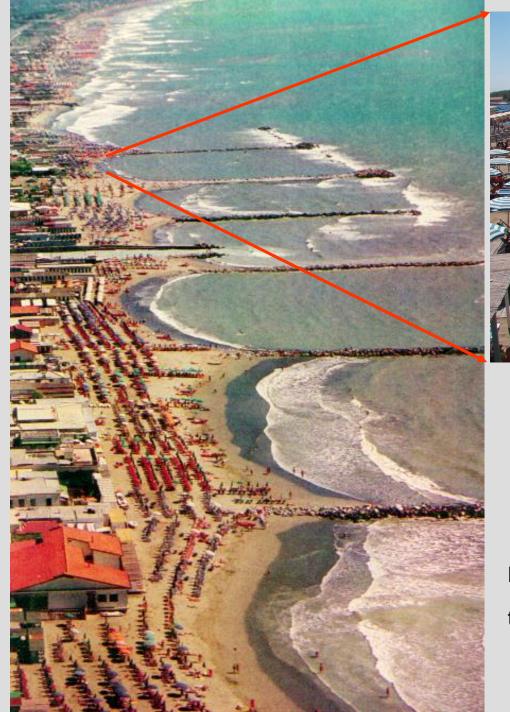
Follonica (Tuscany)



Capalbio (Tuscany)



Prato Ranieri (Tuscany)



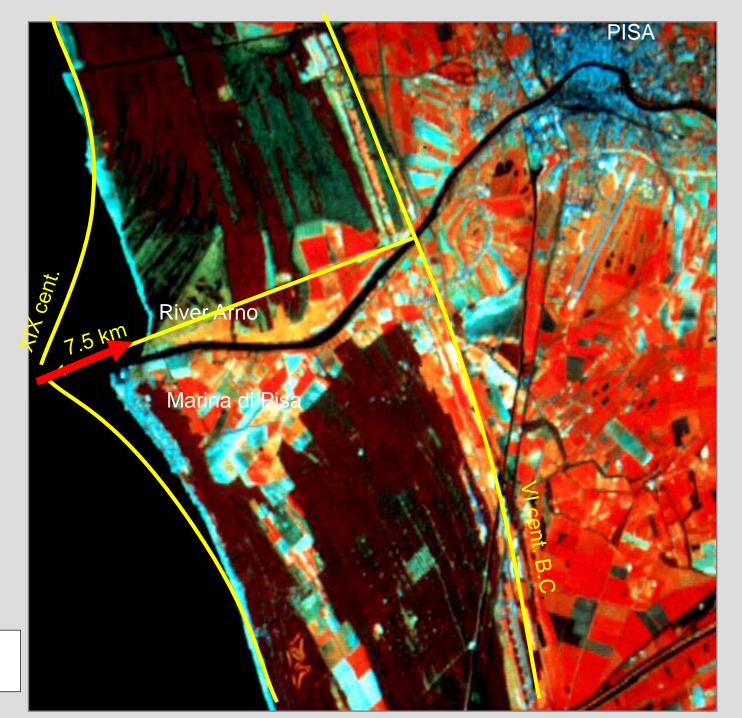


A day in the summer life of Marina di Massa (Tuscany)

N.B. The beach is given in concession to private entrepreneurs



Location map



Arno River Delta





Location map



Arno River delta northern wing

1.3 km



July 4, 1907 - National Law for the defense of the coastal settlements from marine erosion:

Coastal municipalities could ask for State intervention in order to protect urban areas and infrastructures from the aggression of the sea.

Three options were contemplated:

Groins;

Breakwaters;

Any other work suitable to counteract erosion.

At that time, shore protection was actually "town and road protection", since the tourist use of the beach was very limited and even less was the environmental awareness.

Only two strategies were applied:

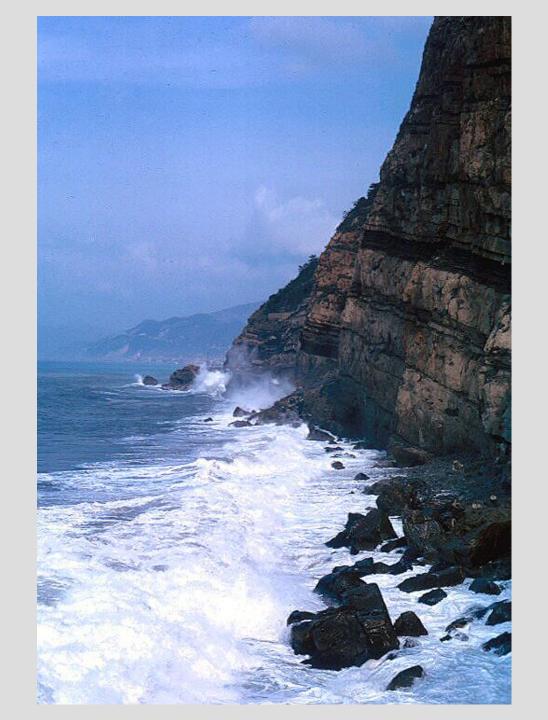
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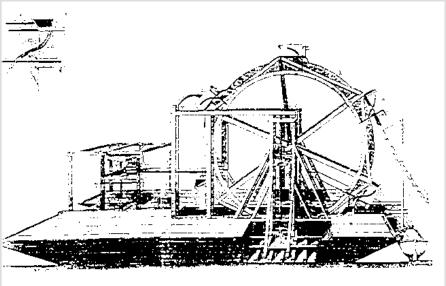
Coastal defense structures were designed by civil engineers with previous expertise in harbor constructions.

The coastline was "stabilized" with seawalls and "protected" from the incoming sea waves through detached breakwaters. In Italy, hard engineering techniques were favored by the availability of rocks and boulders near or along the coast, which made this solution less expensive than in other countries.



In Italy, the absence of river and lagoon navigation and harbors did not help to develop sand and gravel dredging techniques, which, in other countries, resulted to be crucial in order to find and adopt soft engineering solutions to shore protection problems.





The limited knowledge of coastal sediment transport processes and the lack of sensibility for the coastal landscape and related environmental issues allowed the construction of harbors and ports along sandy coasts, often in the middle of a sediment cell, thus inducing chronic and severe downdrift erosion.

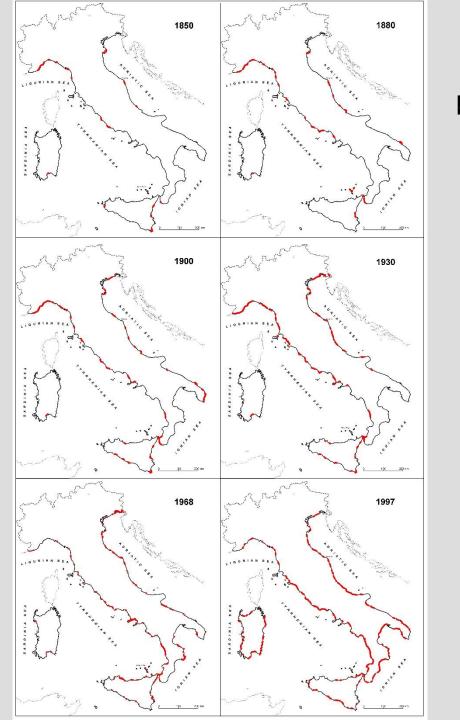


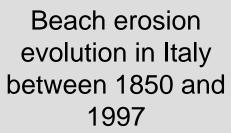
Marina di Carrara harbor (Tuscany)

Most of the Italian beaches are now protected with seawalls, detached breakwaters and groins, which in turn modify the coastal landscape, induce downdrift erosion altering the coastal sediment transport processes. In addition, hard engineering techniques often prevent a full recreational use of the beach and have extremely high maintenance costs.



Bellaria, Northern Adriatic coast



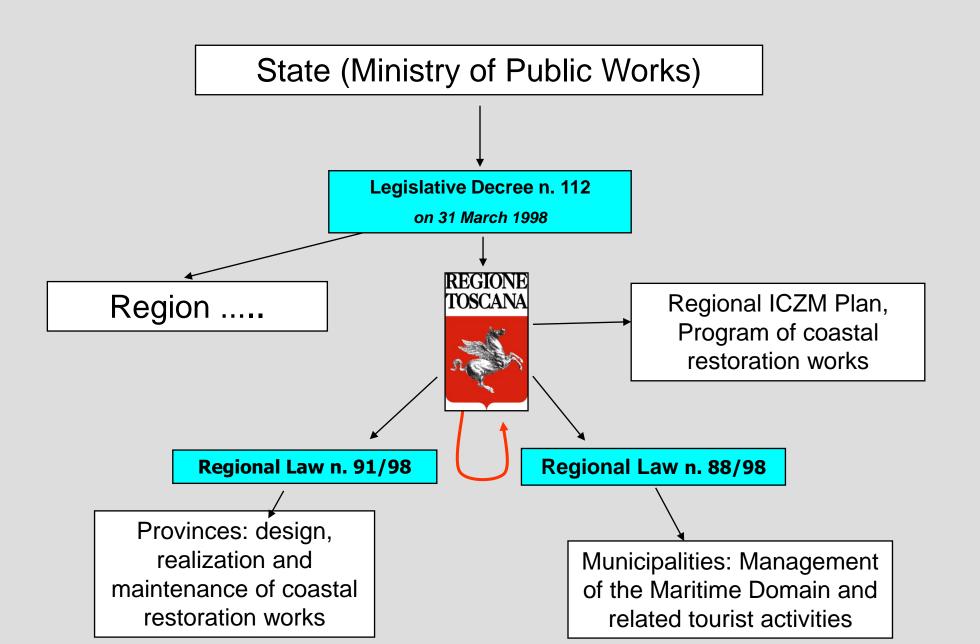




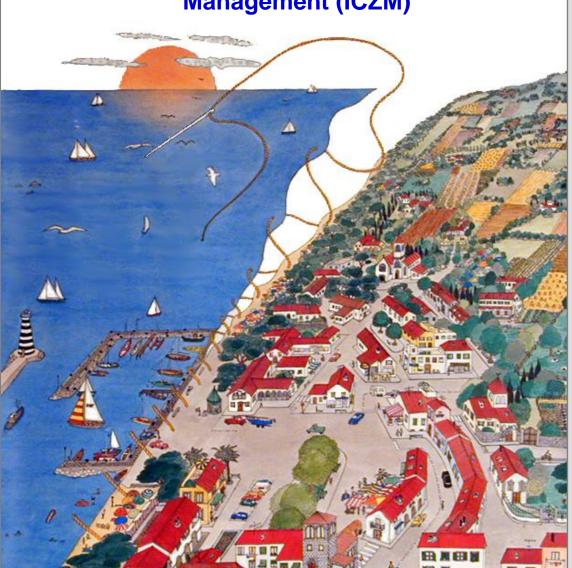
During recent decades more soft engineering techniques were applied in Italy: i.e. submerged breakwaters, submerged groins, beach nourishment with or without protection.

In Tuscany, for example, the "Back to the beach" strategy was adopted, with the goal to gradually transform old hard structures into soft engineering techniques, dedicating a strong effort to the monitoring of the effectiveness of the old and new restoration works and keeping in mind the importance of building with natural processes and relaying on natural elements such as sand and gravel.

Coastal Legislation (Italy)



Synergy between Region of Tuscany and Universities in order to develop a "Tuscan Model" for Integrated Coastal Zone Management (ICZM)

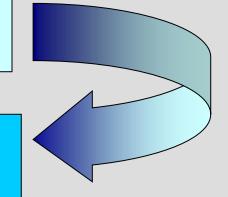








Tuscany Regional Council in 2003 has approved and financed the following:



PROGRAMME OF PRIORITY INTERVENTIONS TO RESTORE **ERODING BEACHES AND RESEARCH ACTIVITIES TO IMPLEMENT TUSCANY REGION ICZM PLAN** € 109.800.000



Research activities and restoration projects design € 8.800.000



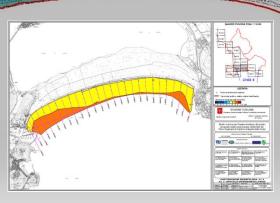
Realization of coastal restoration works € 96.000.000



Monitoring program to evaluate the effectiveness of the restoration projects € 5.000.000

Study and research for the implementation of coastal zone database

- River sediment transport rates
- Shoreface and nearshore morphology
- Beach sand texture and petrography
- Coastal zone Geomorphologic map
- Numerical model simulation of future evolution
- Coastal protection structures inventory











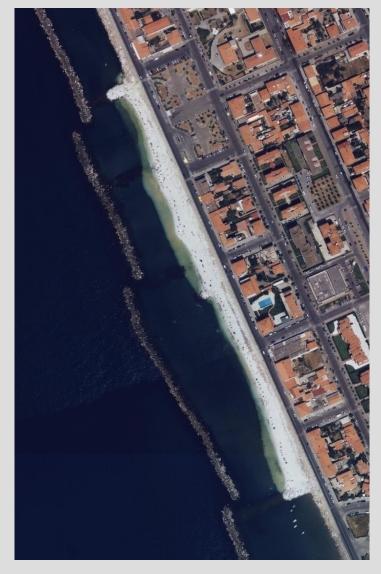




Marina di Pisa – Southern wing of the Arno River delta



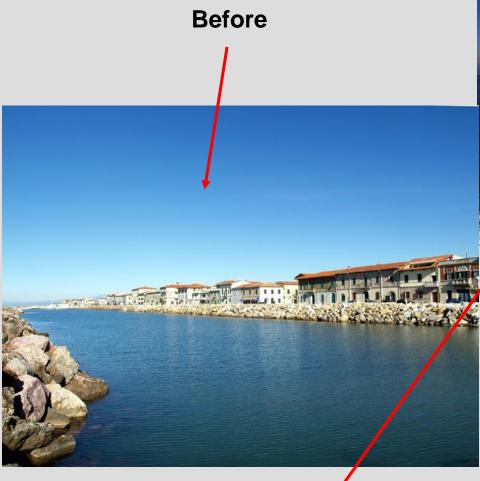
Coastal restoration project at Marina di Pisa – artificial coastal cells # 6 e 7 (DCR 47/2003 Intervention # 5 – Province of Pisa – Territorial defense unit)



First phase

Second phase

Beach fill with marble gravel coming from Carrara quarries production waste



After







SEDIMENT AND SPACE FOR SUSTAINABILITY



EUROSION is a project commissioned by the General Directorate Environment of the European Commission, which was won by a consortium led by the National Institute for Coastal and Marine Management of the Dutch Ministry of Transport, Public Works and Water Management.

The implementation of the project started in January 2002 and it finished in 2004.

- 1. Restoring the sediment balance and providing space for coastal processes
- 2. "Favourable sediment status" in order to promote coastal <u>Resilience</u>
- 3. Coastal sediment cell: a coastal compartment that contains a complete cycle of sedimentation including sources, transport paths, and sinks.
- 4. Coastal Sediment Management Plan (CSMP)
- 5. Internalize coastal erosion cost and risk in planning and investment decisions

WWW.EUROSION.ORG























CTMED

















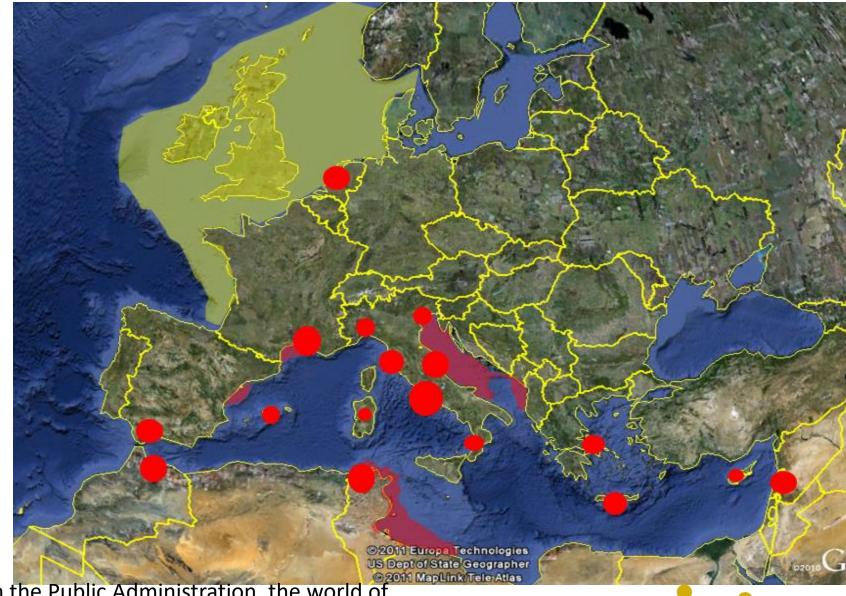






51 MEMBERS FROM 10 COUNTRIES





Objective: to promote interaction between the Public Administration, the world of Research, sectors of the Blue Economy, in the management of coastal areas, for sustainable blue growth.

Ente del Terzo Settore a.p.s.





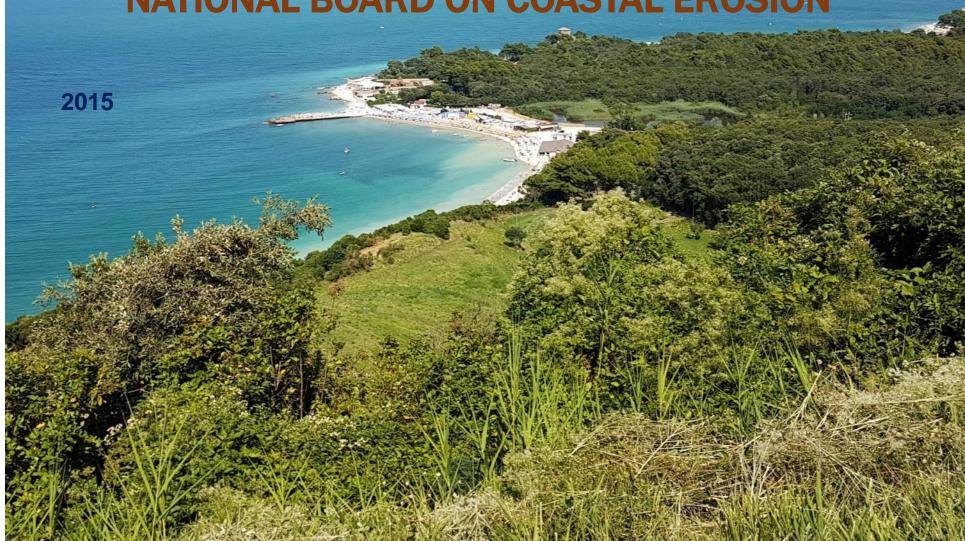






THE ITALIAN

NATIONAL BOARD ON COASTAL EROSION



PARTICIPANTS to the NBCE



Undersecretary-of-State Mrs. Silvia Velo

DG for Nature and Sea Protection

DG for Land and Water Protection

ISPRA



COASTAL REGIONS AUTHORITIES



NATIONAL RIVER BASIN AUTHORITIES

SCIENTIFIC RESEARCH INSTITUTES



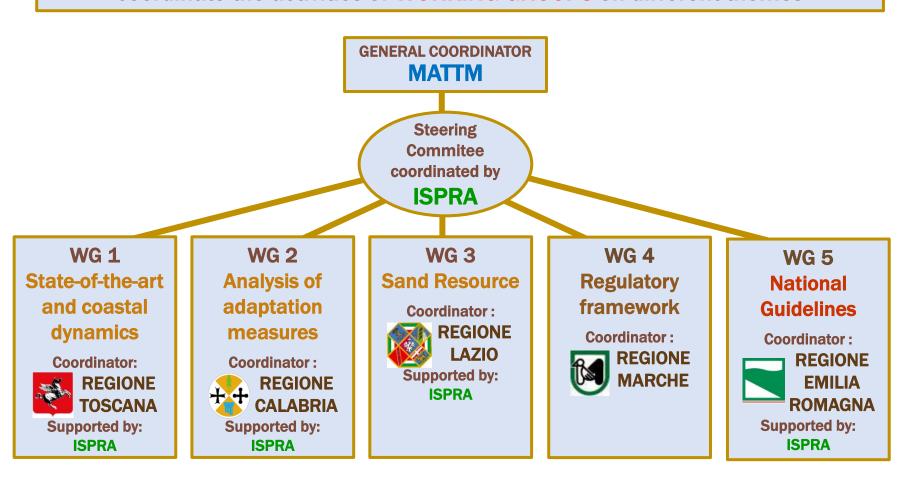




WORKING METHOD of the NBCE

Activities of the NBCE are coordinated by MATTM, which is supported by ISPRA

Delegates of coastal region authorities, supported by ISPRA researchers, coordinate the activities of WORKING GROUPS on different themes



NATIONAL GUIDE LINES

By Regional Administrations and River Basin Authorities (2016) Version 1.0



Feedback from Academia (2017)



Discussion and implementation by the Steering Commitee (2018) Version 2.0



www.erosionecostiera.isprambiente.it









2013 - 2017

Useful components of recent CAMP Projects

- Vertical and horizontal coordination
- Involvement of stakeholders (programme for the participatory process active stakeholders engagement)
- Integration between sea and land uses (ICZM Vs. MSP i.e. LSI)
 - Capacity building
 - Awareness raising activities

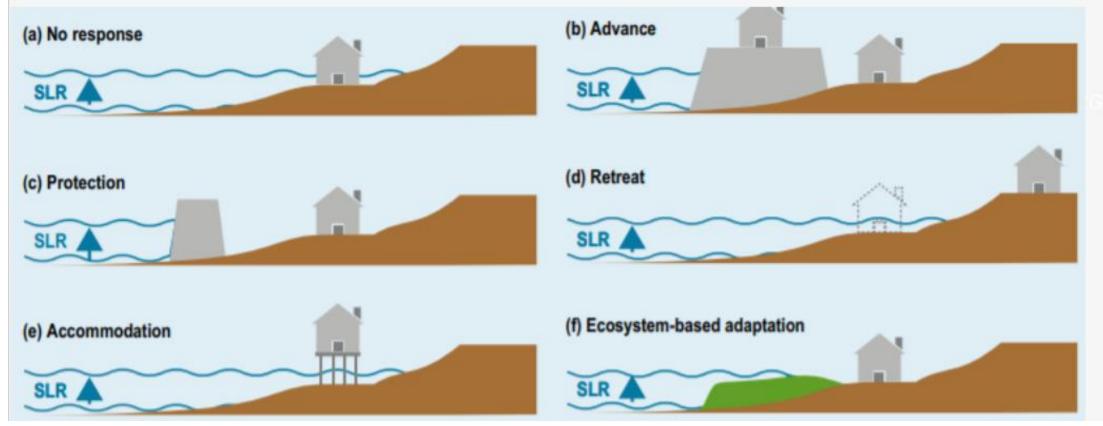




AR6 WGII SPM, SLR CCB

Responses to ongoing sea level rise and land subsidence include protection, accommodation, advance and planned relocation

Coastal impacts of SLR can be avoided by preventing new development in exposed coastal locations



Working Group II - Impacts, Adaptation and Vulnerability

INTERGOVERNMENTAL PANEL ON Climate chance





The future of our coasts depends on immediate mitigation and adaptation actions

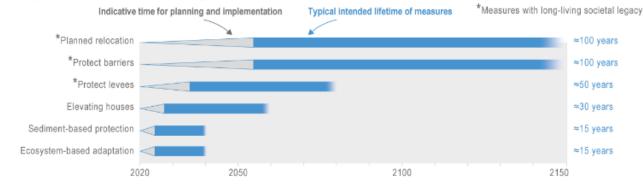
- Mitigation, to keep sea-level rise rates at 4mm/an and preserve resilient ecosystems
- Adaptation, in particular to coastal flooding

While implementing climate policies, we also have the opportunity to create more resilient coastal environments with EBM

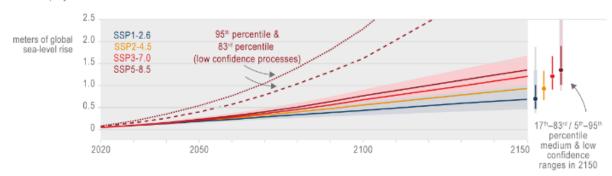
AR6 WGII Ch3 SLR CCB from Gonéri Le Cozannet

Sea-level rise challenges the timing of coastal adaptation planning and implementation



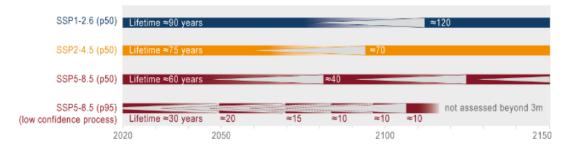


(b) Sea level rise projections



(c) Projected sea-level rise demands earlier or larger adaptation actions and reduces the lifetimes of measures

Illustrative example with measures for 0.5m of additional sea-level rise:





















Coastal dune reconstruction with reinforced sand

















EXOTIC VEGETATION REMOVAL







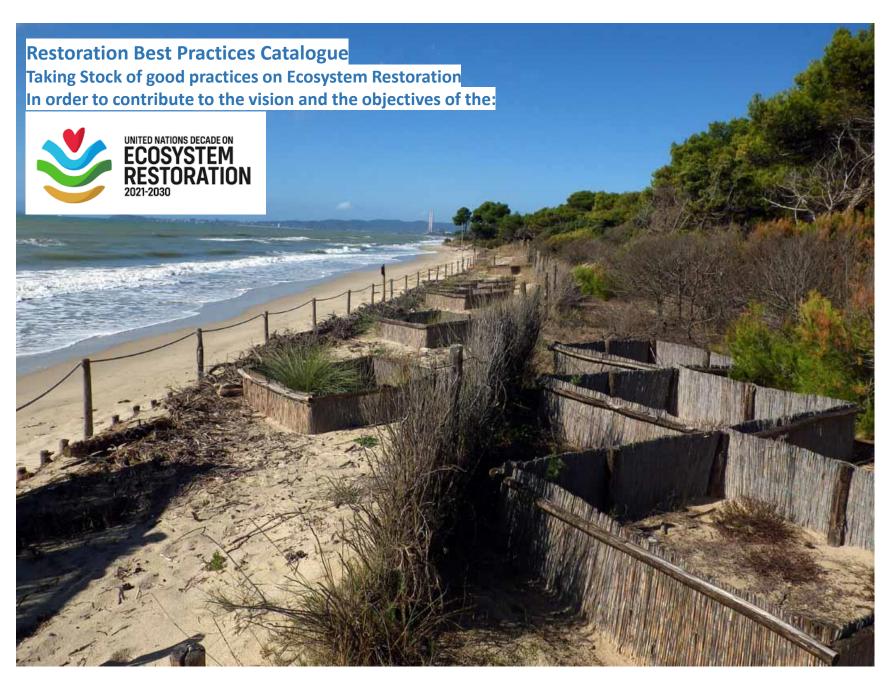


PLANTATION OF LOCAL HERBACEOUS SPECIES









The Ecological Beach Model





SPIAGGIA ECOLOGICA E POSIDONIA SPIAGGIATA



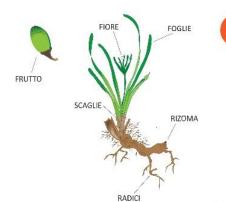
POSIDONIA OCEANICA: RUOLO ECOLOGICO, RISORSA E PROTEZIONE DELLE SPIAGGE

L'habitat Posidonia oceanica è protetto dalla Direttiva Habitat (92/43/CEE) ed è classificato come habitat prioritario (1120)



SEI SU UNA SPIAGGIA ECOLOGICA SE:

- LA POSIDONIA SPIAGGIATA E LE SUE BANQUETTES SONO LASCIATE SULLA SPIAGGIA ANCHE PER PROTEGGERLA DALL'EROSIONE
- ALTRI ELEMENTI NATURALI QUALI ALGHE, PEZZETTI DI LEGNO, CONCHIGLIE VENGONO LASCIATI SULLA SPIAGGIA
- I RIFIUTI DI ORIGINE ANTROPICA SONO RIMOSSI MANUALMENTE
- SONO PRESENTI E SI USANO GLI ACCESSI APPOSITAMENTE. SEGNALATI PER EVITARE IL CALPESTIO DELLE DUNE



Posidonia oceanica "una specie protetta"

- È UNA PIANTA, NON È UN ALGA
- VIVE ESCLUSIVAMENTE NEL MAR **MEDITERRANEO**
- È IL POLMONE DEL MAR MEDITERRANEO
- È L'ECOSISTEMA MARINO A PIÙ ELEVATA BIODIVERSITÀ
- È INDICE DI BUONA QUALITÀ DELLE ACQUE MARINO-COSTIERE
- CONTRASTA L'ENERGIA DEL MOTO ONDOSO PROTEGGENDO LA SPIAGGIA DALL'EROSIONE



formando strutture tondeggianti, marrone chiaro, chiamate egagropili o comunemente palle di mare

Le foglie che cadono dalla pianta, specie in autunno, possono arrivare sulla spiaggia e formare accumuli chiamati banquettes. Queste strutture proteggono naturalmente le spiagge dall'erosione contrastando l'energia del moto ondoso









e lunghe fino a 1.5 m. La massima produzione

Le radici sono presenti sui rizomi

ATTENUAZIONE

DEL MOTO ONDOSO

plagiotropi e servono ad ancorare la pianta al substrato. L'insieme di rizomi, radici e sedimento forma la "matte", tipica struttura a terrazzo su fondo sabbioso. La crescita in altezza della matte è di circa 1cm l'anno



plagiotropo con ortrotropo con accrescimento

foglie, fiori, frutti e semi. Le foglie sono di colore verde brillante, a forma di nastro con apice tondeggiante

Posidonia oceanica (Linnaeus) Delile, 1813

La Posidonia oceanica è una pianta.

per la presenza di radici, fusto (rizoma),

Si differenzia dalle alghe

POSIDONIA OCEANICA

è in primavera, sono vitali per 5-8 mesi, invecchiando diventano brune e cadono

POSIDONIA SPIAGGIATA

BANQUETTE

EGAGROPILI

POSIDONIA OCEANICA



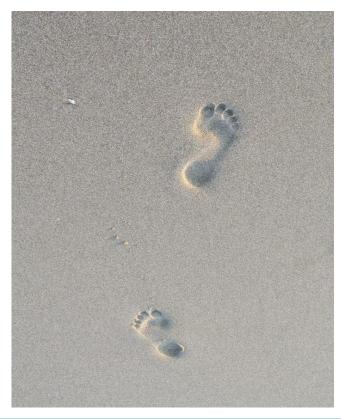












Grazie! THANK YOU! اشکرًا

Luigi E. Cipriani Region of Tuscany









