Regione Emilia-Romagna

servizio geologico sismico e dei suoli

COASTANCE – 10 Febbraio 2011 – COMPONENTE 3 COASTANCE

Coastal risks

Indicators and cartography developed in Emilia-Romagna

(ReF. Prog. Cadsealand – Plancoast – Micore)

Luisa Perini

Regione Emilia-Romagna

vulnerability indicators

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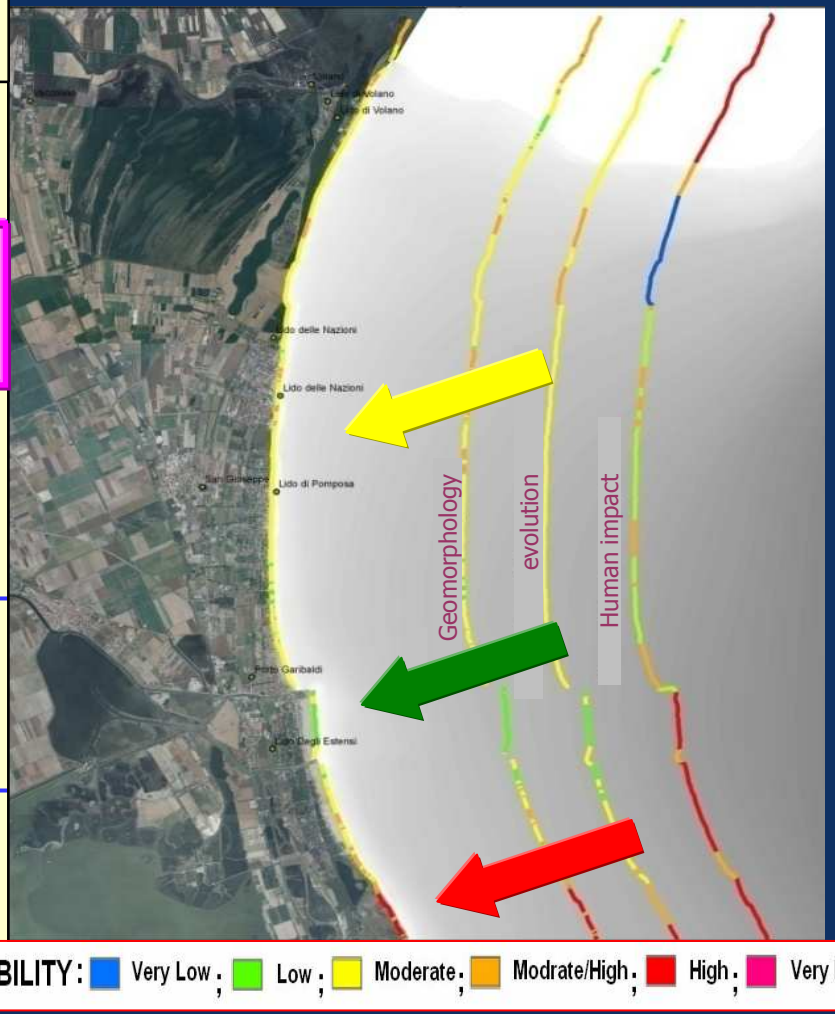
Several critical environmental factors were deeply studied and main **vulnerability index** were identified within **PLANCOAST** project (2006-2008) . Their analysis **using GIS overlay techniques** brought to a vulnerability classification of the coast. For coastal erosion, three different categories of parameters were analysed and then combined.

Critical factors	**Coastal vulnerability index** CVI
Flooding	Geomorphology Events frequency
Coastal erosion	Beach width Beach elevation Dune (extension and elev.) Beach slope and morphodynamic Shoreline evolution rate Seafloor evolution rate Subsidence rate Beach use Coastal defence
Marine flooding (LT-ST)	Topography Subsidence rate Sea level rise (m/y) Wheather condition (sea state)
Salt Intrusion of aquifers	Geologyical setting Hydraulic parameters Resistivity Aquifers exploitation

Coastal erosion



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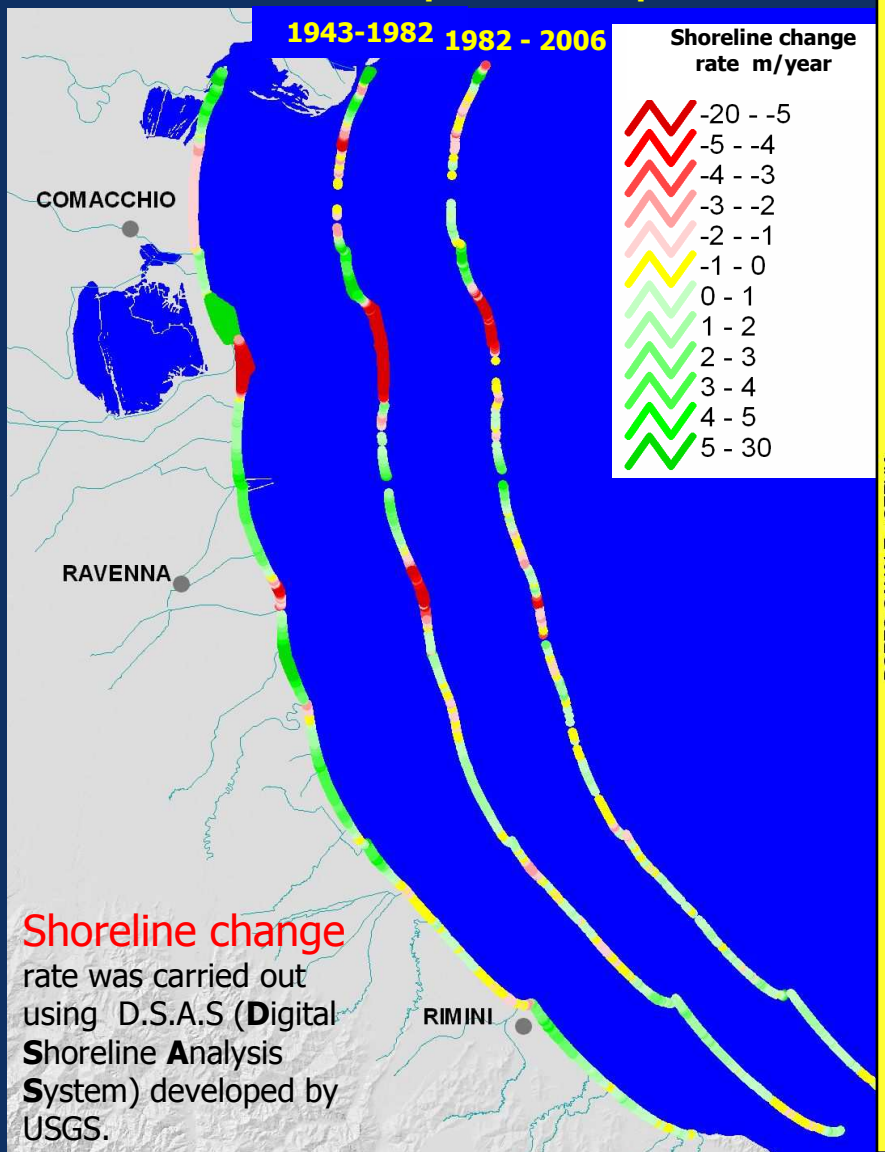
Geoindicators: some examples

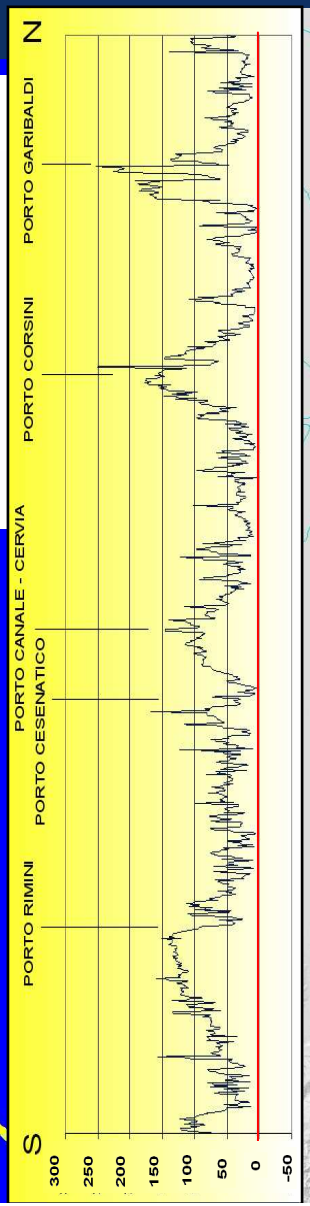
pre- urban sprawl
1893-1945

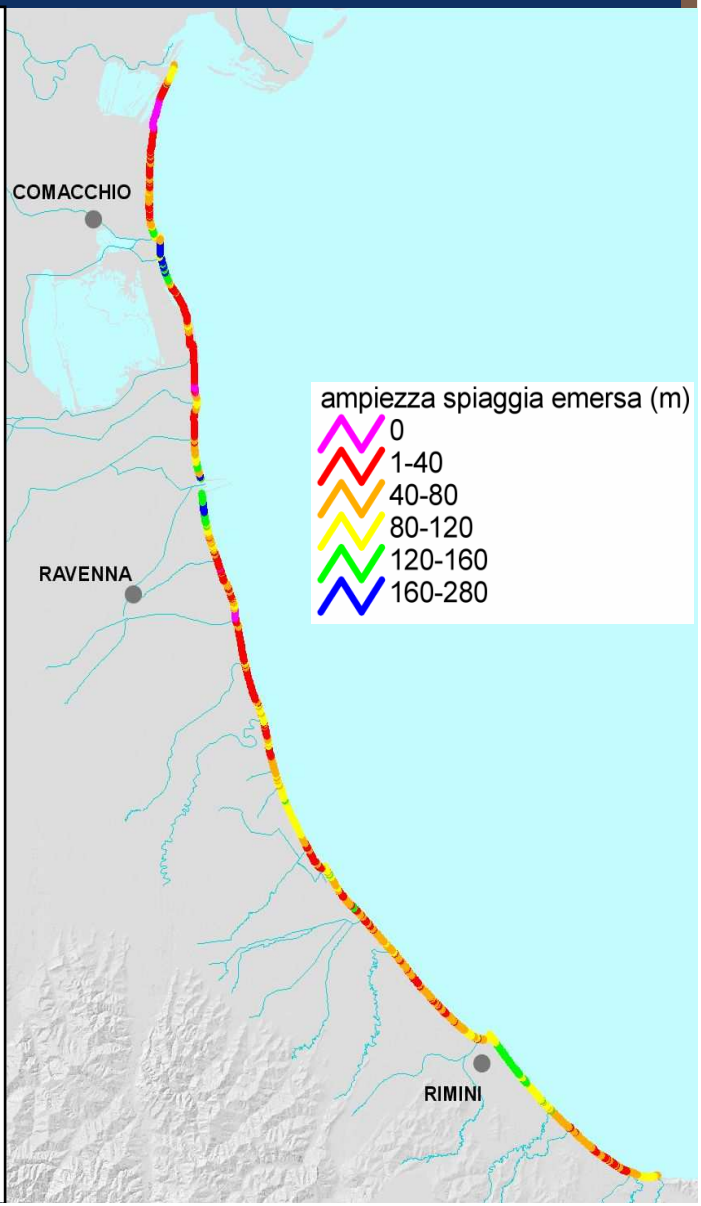
post- urban sprawl



Shoreline change rate m/year

-20 - -5
-5 - -4
-4 - -3
-3 - -2
-2 - -1
-1 - 0
0 - 1
1 - 2
2 - 3
3 - 4
4 - 5
5 - 30





Shoreline change

rate was carried out using D.S.A.S (**D**igital **S**horeline **A**nalysis **S**ystem) developed by USGS.

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SUMMARY OF HAZARD AND RISKS MAPS (static) with reference to the directive 2007/60 requests

1. STORM IMPACT HAZARD MAPS

data:
Topo-bathymetric profiles, wave, surge and runup

Output:
scenarios for T1, T10, T100
definition of
high, medium, low
criticital
coastal sector

2. FLOOD RISK MAPS

data:
DEM, surge values, land-use, subsidence (for sea.level rise)

Output:
scenarios for T1, T10, T100
high, medium, low
criticital
coastal areas

3. HISTORICAL DAMAGE MAPS

data:
Catalogue of historical sea storm

Output:
Maps of tipology and recurrence of damage and scenarios for Bora and Scirocco winds

4. EROSION VULNERABILITY MAP

data:
Beach width, shoreline change rates, etc....

Output:
definition of
high, medium, low
criticital
coastal sector

To be considered in order to define adaptation

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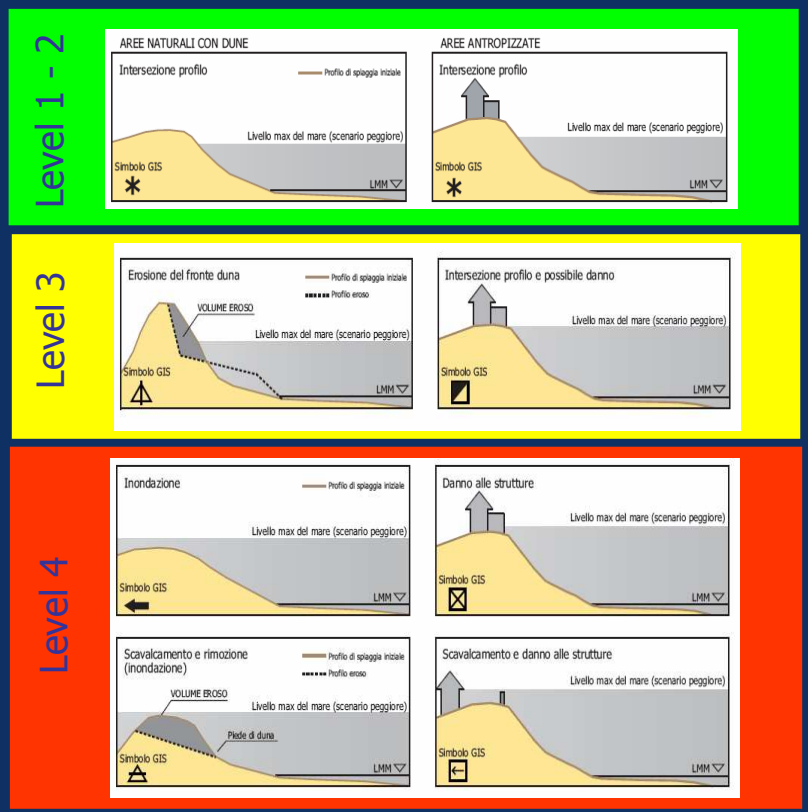
1. Storm Impact Hazard maps : T1 – T10 – T100

worst-case-scenario of storm + surge

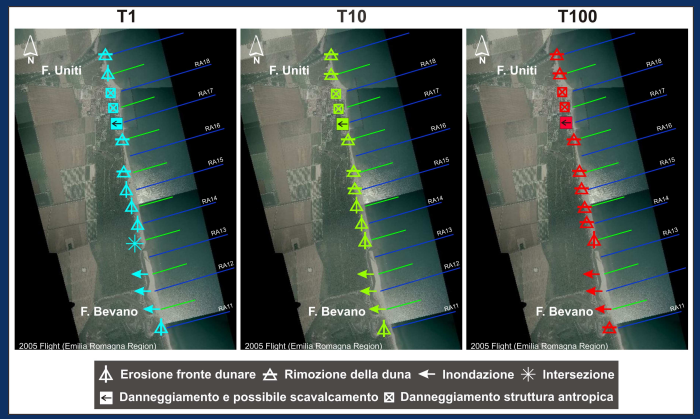
Run-up calculation along parallel transects using Komar (1998 formula) + Van derMeer (1990) for Wave Transmission at Low-Crested Structures

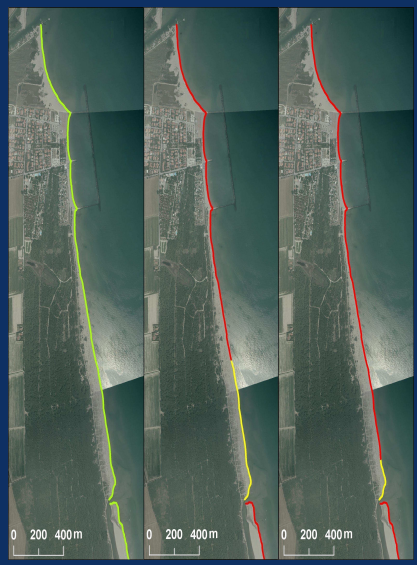
Type of hazards



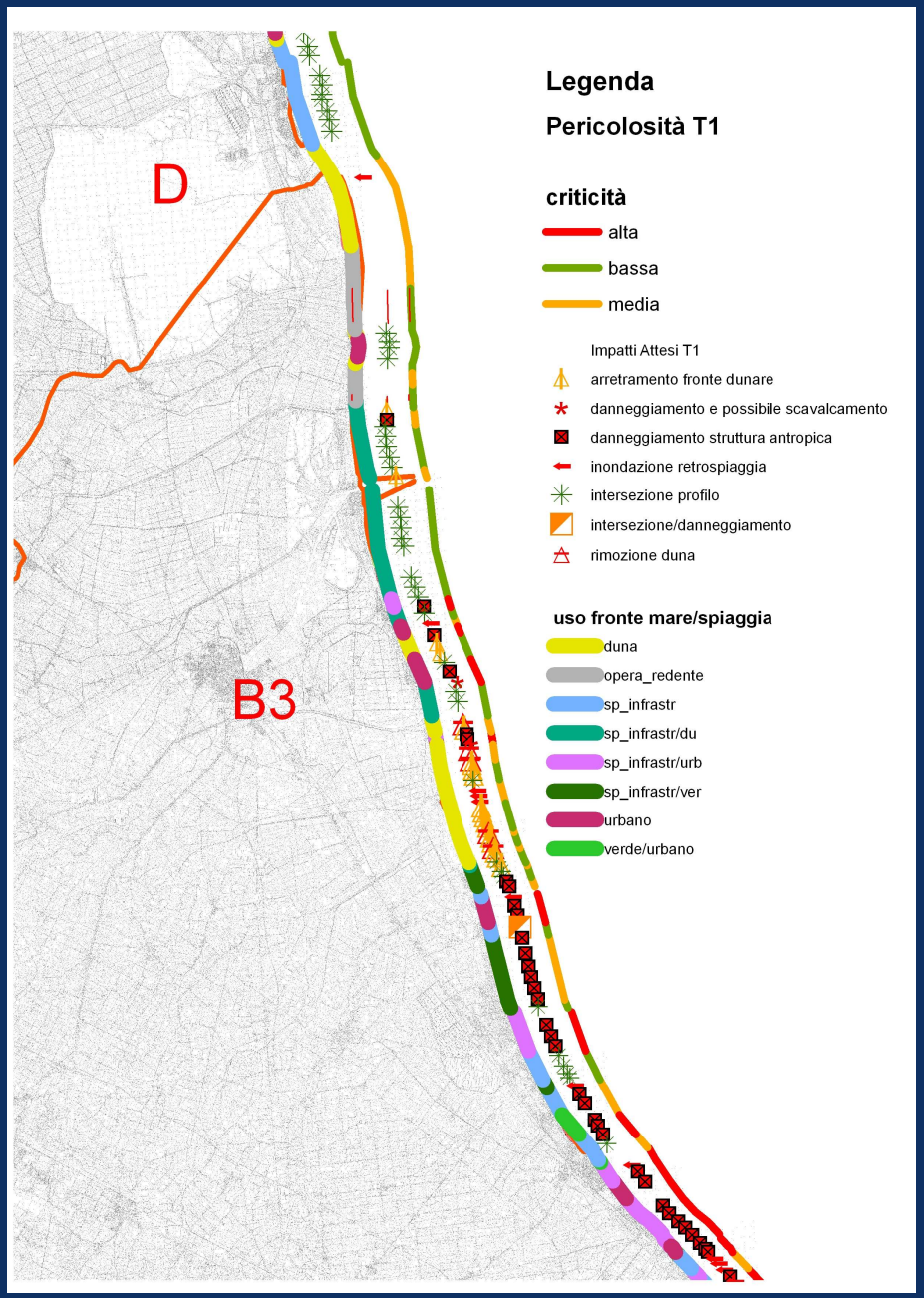
output

output





From SGSS project with Micore contribution

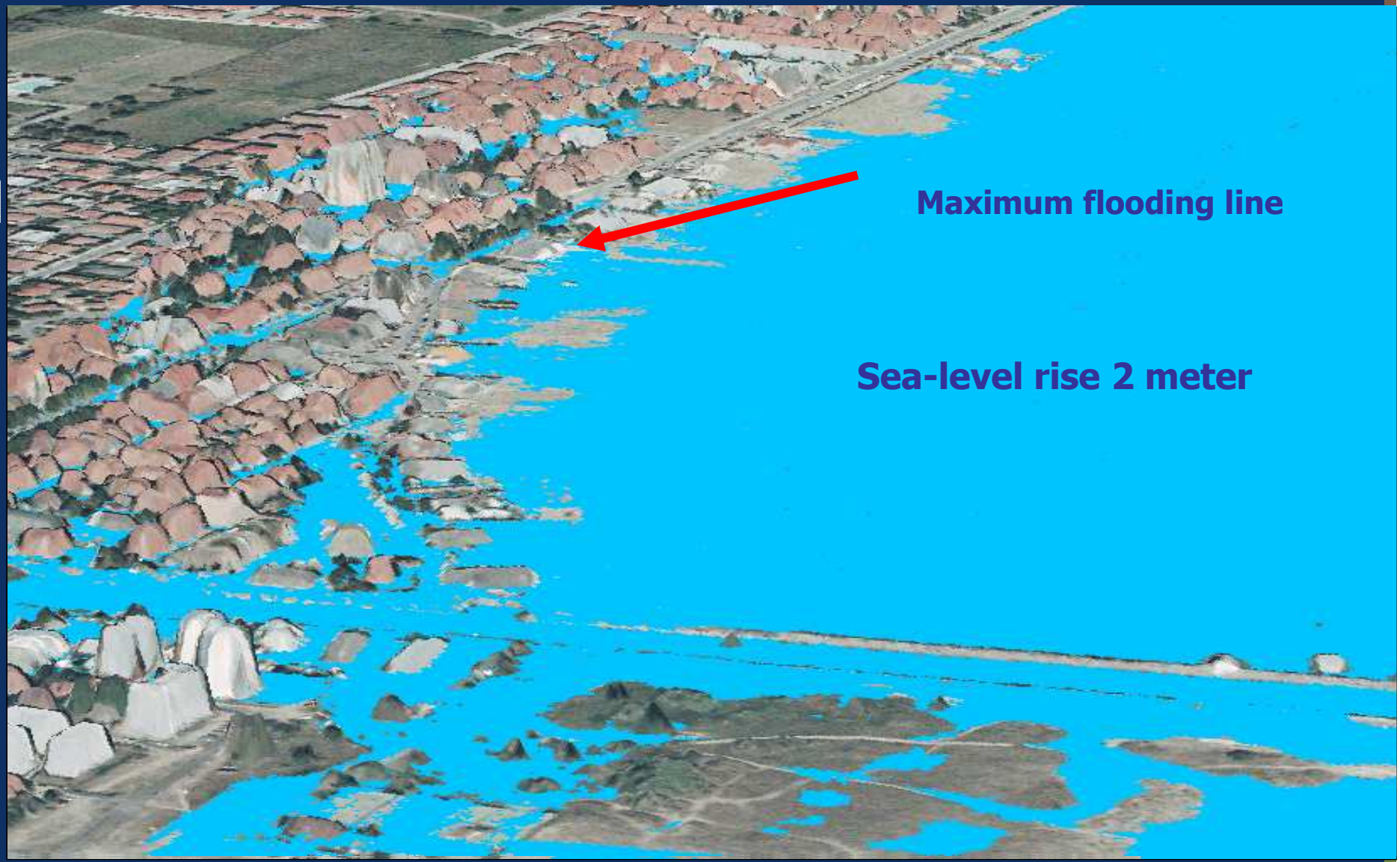


Risk map : T1

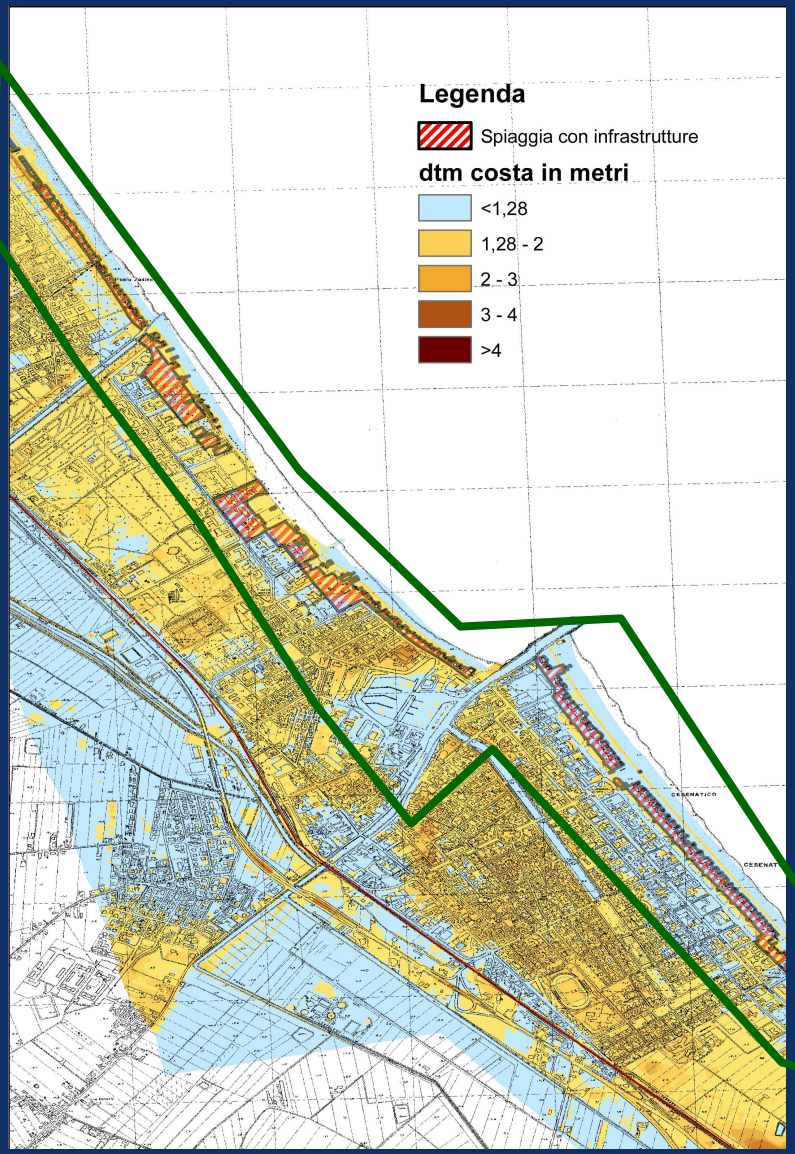
Based on

Hazard + land use

2. Semplified method for Sea-level rise 3D simulation based on GIS



Semplified method for Sea-level rise 3D simulation based on GIS



Example for Cesenatico zone

Simulation for surge event T100 = 1.28 cm

MIKE 21 simulation of combinate effect of surge + river flooding

MIKE 21 simulation of combinate effect of storm surge (T100) + river flooding (T30).

Duration 22 hours (sea-storm 2+6; increasing river flow, maximum after 10 hours)

After 3 hours of sea-storm

After 9 hours of sea-storm

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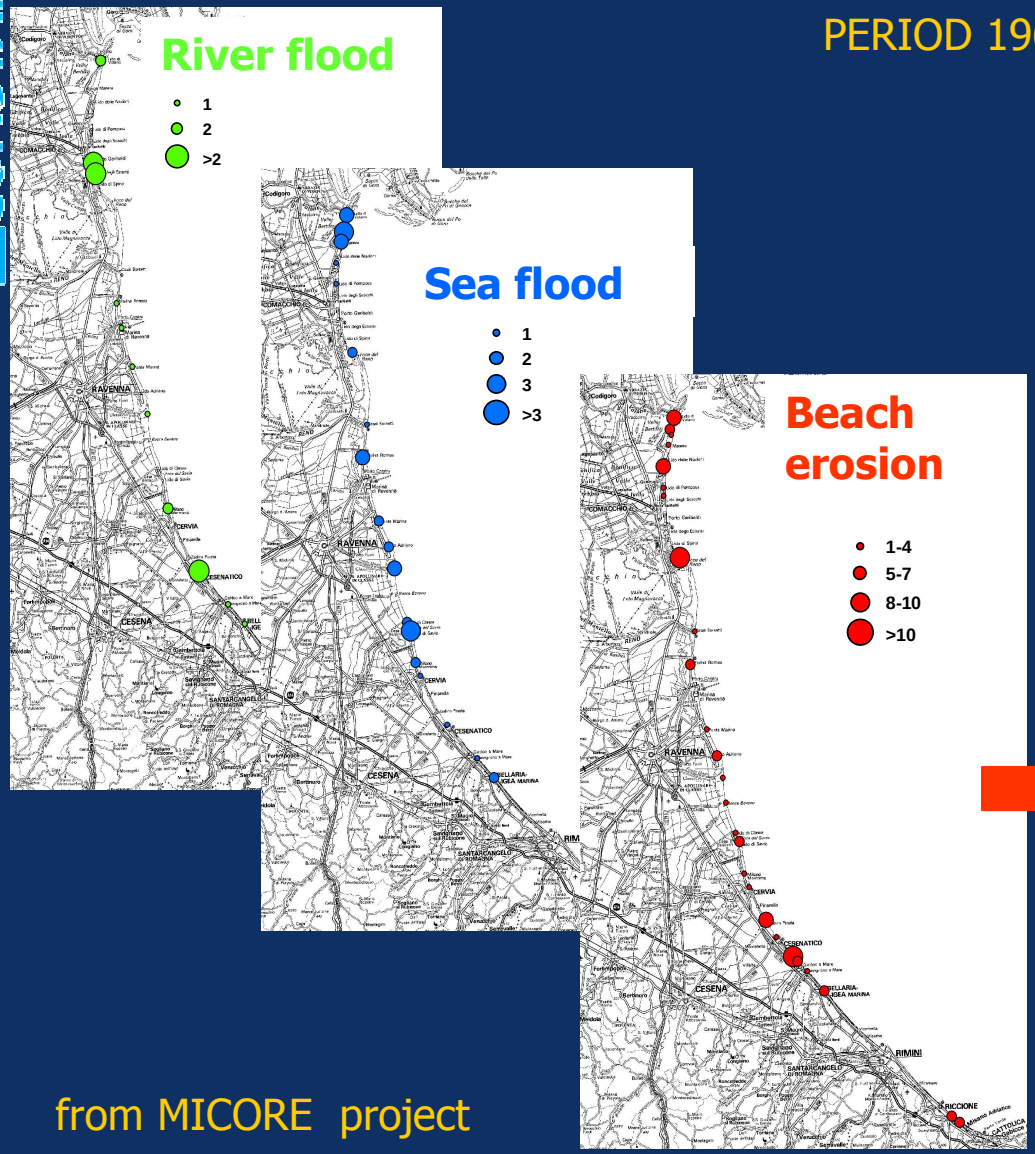
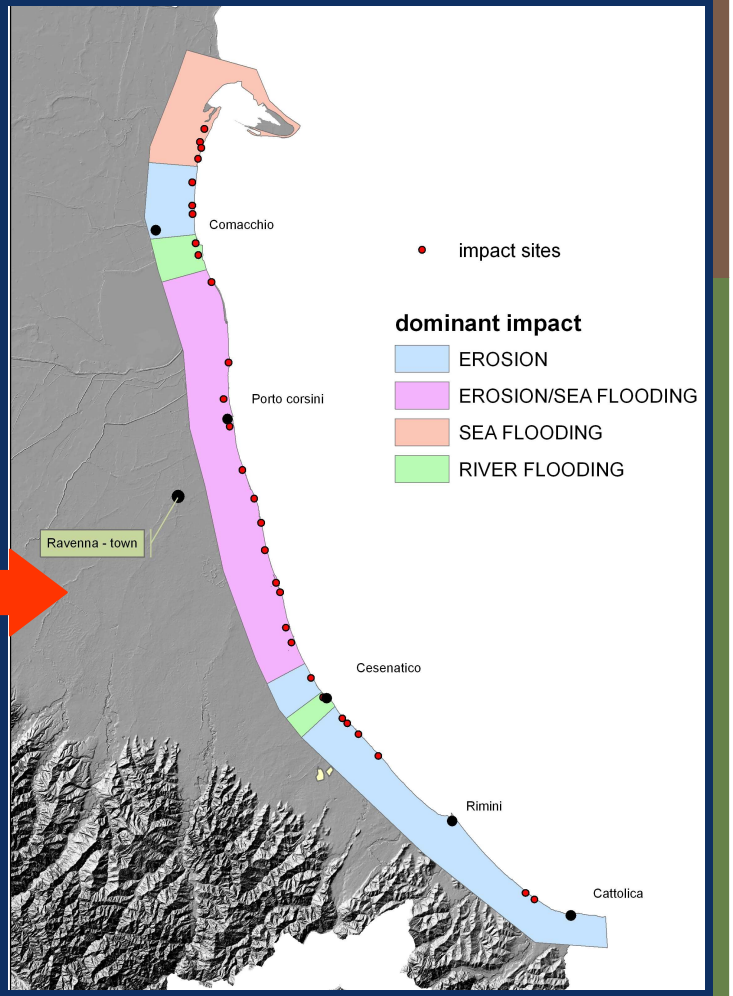
3. Historical damage map: from catalogue developed within WP1

PERIOD 1966 - 2008

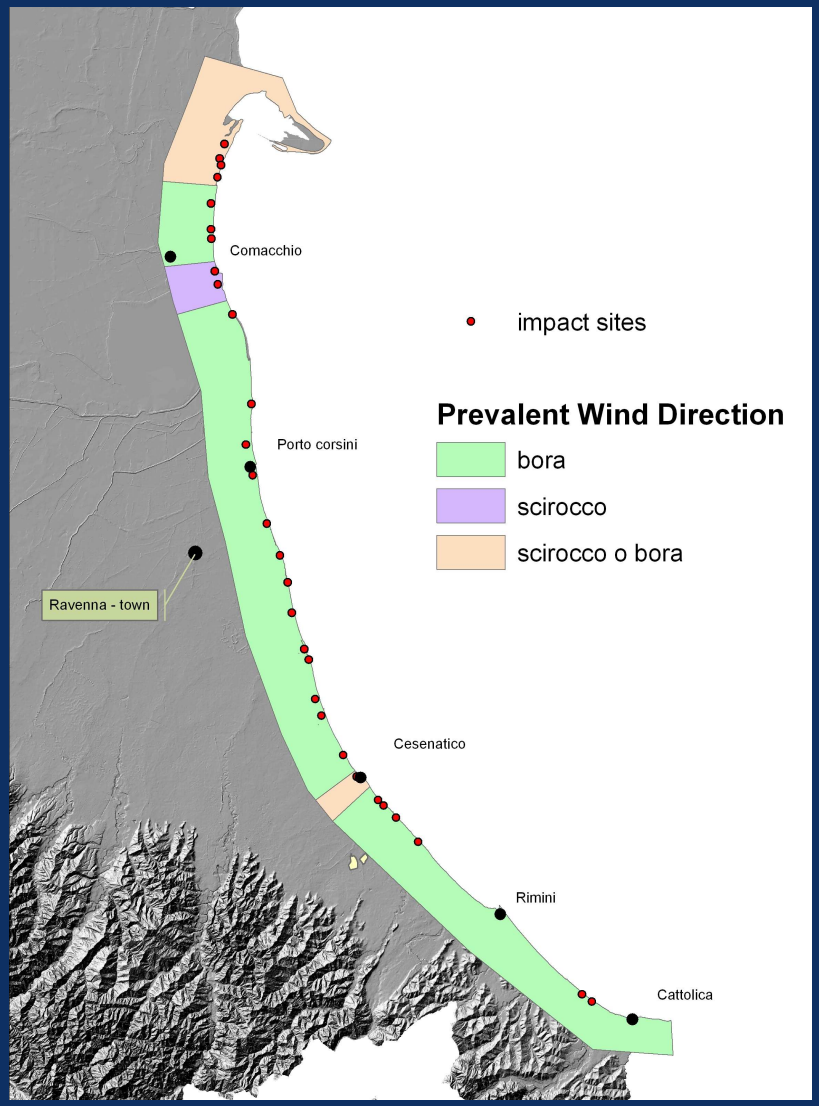




from MICORE project

3. Historical damage map: prevalent wind-storm direction from catalogue

developed within WP1



from MICORE project

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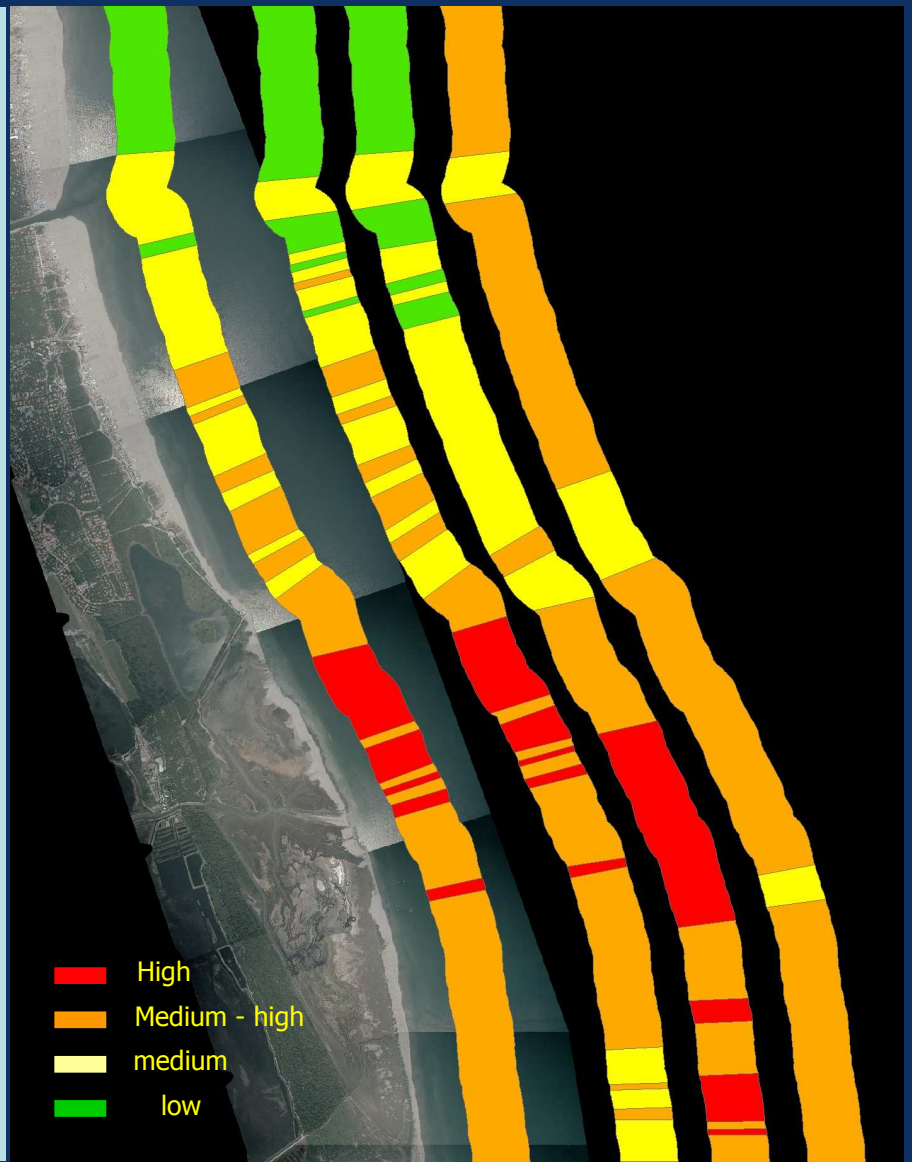
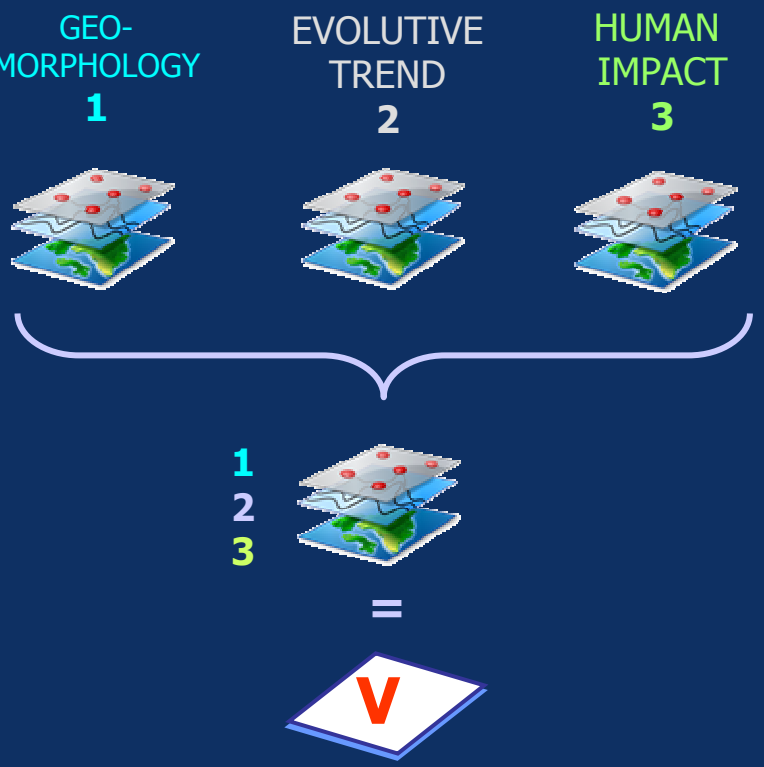
4. Erosion vulnerability map: classification

V 1 2 3

Reno river mouth north side – Lido degli Estensi



GIS BASED METHOD - WEIGHTED OVERLAY



from PLANCOAST project


http://geo.regione.emilia-romagna.it/costa/viewer.htm
Thanks for your attention