

## Dune habitats vulnerability to the climate change

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11.3 km long, about 109 ha, erosion 45m to about 300 m width/60 years





in Italy in 2018 more than one thousand (1,042) violent weather phenomena were detected against the 395 registered ten years earlier.

## Tuscany coasts

Growth rate in the average level estimated in the period 1993-2015 is  $2,85 \pm 0,01$  (max  $3,20\pm 0,51$ ; min  $2,59\pm 0,49$ ).



Figure 1 - Gridded maps of Sea Level Anomaly (SLA, henceforth) were used to estimate the SLR in the study area. Mean sea level change 1993-2015 and interpolation of the Mean sea level change 1993-2015.

	Range scenario			
	Yes 20 (2004)	Year 39 (2064)	Year 100 (2114)	
Minimum (cm)	3,79	14,29	28,50	
Average (cm)	\$,91+3,60	27,45+13,88	70,51+40,73	
Maximum (om)	12,81	42,10	199,83	

Table 2- Range of variation for three scenarios in the hundred years of reference



Figure 3 - Trend of the three scenarios in the hundred years of reference.



Figure 4 – Maps of the three scenarios in the hundred years of reference, zoom Marina di Pisa (Pisa, Italy) coast.

da: SEA LEVEL RISE VULNERABILITY ON COASTLINE. A GEOGRAPHICAL MULTICRITERIA ANALYSIS AS A SUPPORT TOOL FOR COASTLINE DEVELOP

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![](_page_5_Picture_0.jpeg)

Thinning and then reducing the number of dune habitats

![](_page_5_Picture_2.jpeg)

## adaptation, escape or extinction

![](_page_6_Picture_1.jpeg)

land plants do not adapt to the sea!

![](_page_6_Picture_3.jpeg)

..., but the escape, however, determines an adaptation sometimes impossible...

![](_page_6_Picture_5.jpeg)

![](_page_7_Picture_0.jpeg)

![](_page_8_Picture_0.jpeg)

![](_page_9_Picture_0.jpeg)