



**SERN**

# **General Assembly 2024**

**23-24 MAY 2024  
Lulea**



COMUNE  
DI CERVIA

***UNDERSTANDING THE CHALLENGING  
WATER MANAGEMENT IN A CHANGING CLIMATE***

**Resilience Planning  
Strategies  
in a changing climate**

**Simona Melchiorri  
Municipality of  
Cervia**

# Cervia



**tourism destination**



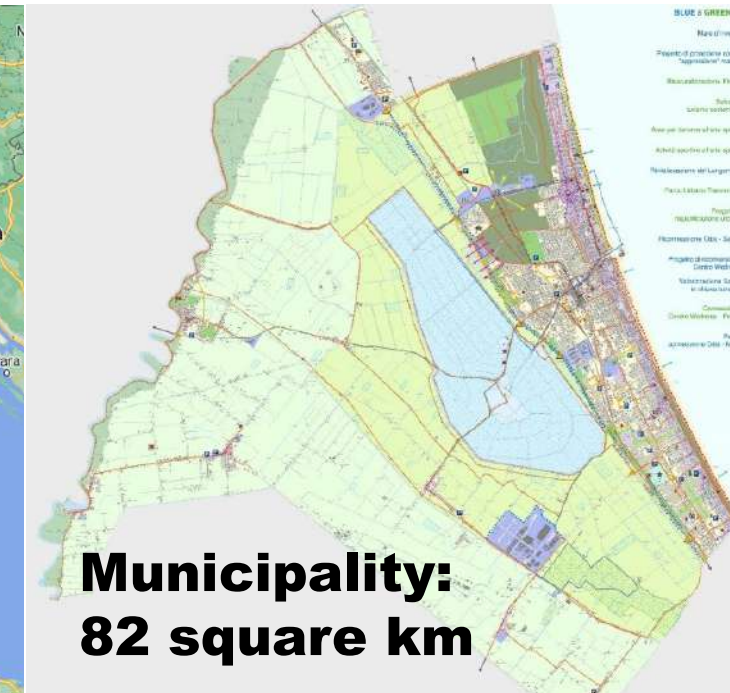
**9 km of sandy beach**



**variety of hotels, restaurants, seaside resorts, etc.**



**30.000 to 4 millions people**



**Environment and landscape:**

- **Cervia pinewood (SCI), included in Po Delta Park, and coastal pinewood of Pinarella-Tagliata;**
- **Saltpan (SCI and SPA), included in Po Delta Park, Ramsar zone for the protection of wild birds and Natural Reserve**

# The strategy

**re-orientation of spatial planning in the direction of environmental, economic and social sustainability**

**1st in Emilia-Romagna region**

**Plan monitoring**

**Focus on Sustainable Mobility**

**PSC - RUE**

**PUG**

**SECAP MONITORING: ACTION REPORT**

**SUMP**

2017

2017

2017

2018

2019

2019

2021

2024

**COVENANT OF MAYORS**

**SECAP**

**ADRIADAPT**

**SECAP MONITORING: FULL REPORT**

- **Baseline Emission Inventory**
- **Risk Assessment and Vulnerability to Climate Change**

**2nd in Emilia-Romagna region**

- Interreg Project Italy-Croatia:**
- **Resilience of the territory**
  - **Adaptation to Climate Change**

- **Emission Inventory**
- **Plan update**

# The strategy – General Urban Plan

The most important aspects are...

## SOIL PROTECTION

- Reduce the consumption of the soil
- Increase the permeability of the soil
- Increase the fertility of the soil



## ATTENTION TO VARIOUS RISKS

- Attention to seismic risk
- Attention to climate change
- Mitigation and Adaptation solutions



## RAISING URBAN QUALITY

- Improve the quality of urban systems: Public City qualification (ex. ecological networks, ecosystem services...)
- Qualification of Private City
- Qualification of Urban mobility towards a sustainable model

**A NEW SENSITIVITY IN URBAN TRANSFORMATION...  
TO BUILD CLIMATE PROOF CITIES**

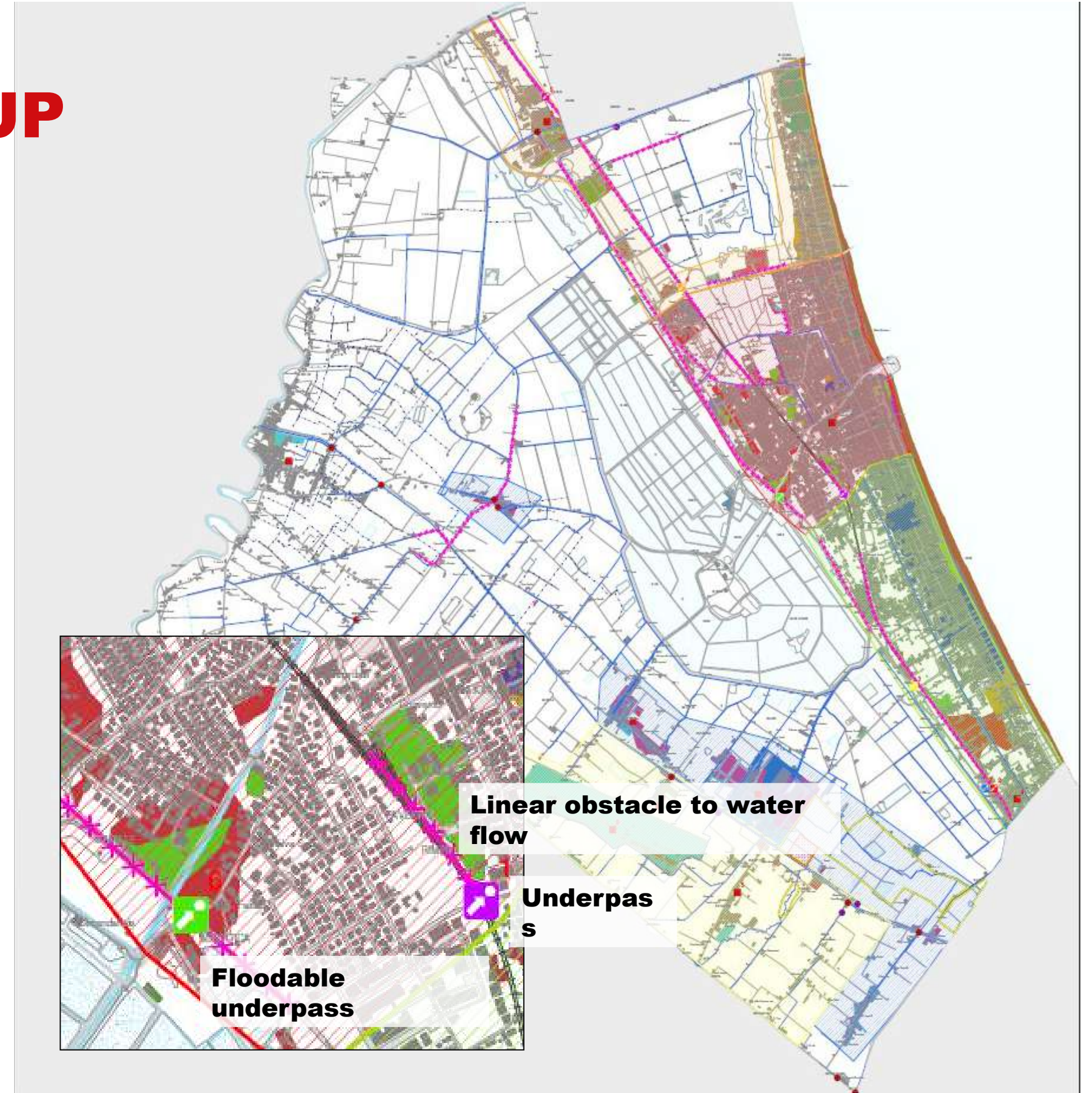
# The knowledge framework-GUP

- **areas subject to hydrogeological constraints**
- **morphologically depressed areas as a result of urbanisations around**
- **Height differentiation of hydraulic head**
- **Analysis results from the Hydrogeological Risk Plan: frequency of floods, distances from water bodies, areas of potential flooding and areas with different probability of flooding**
- **Protection of public waters**



# The knowledge framework – GUP

- Existing and planned mitigation actions
- Identify homogeneous areas that requires hydraulic risk analysis
- Underpass localization
- Localization of critical areas
- Localization of point criticalities
- Identification of areas subject to hydraulic risk



# The strategy – SECAP

## Risk and vulnerability assessment of the Municipality of Cervia

Tipo di pericolo climatico	Current risk	Expected risk		
	level of danger	Intensity variation	Frequency variation	Time period
Caldo estremo	Alto	Aumento	Aumento	Medio termine
Freddo estremo	Moderato	Diminuzione	Diminuzione	Medio termine
<b>extreme rainfall</b>	<b>medium</b>	<b>increase</b>	<b>increase</b>	<b>medium term</b>
<b>floods</b>	<b>medium</b>	<b>increase</b>	<b>increase</b>	<b>medium term</b>
<b>sea level rise</b>	<b>low</b>	<b>increase</b>		<b>long term</b>
Siccità	Basso	Aumento	Aumento	Medio termine
Tempeste	Basso	Aumento	Aumento	Medio termine
Frane	Non presente			
Incendi forestali	Sconosciuto	Aumento	Aumento	Breve termine

Tabella 36 Pericoli climatici di particolare rilevanza per il comune di Cervia



# The strategy – SECAP- mitigation actions

SETTORE	CODICE ID	TITOLO	
EDIFICI COMUNALI	EC01	CLIMATIZZARE MEGLIO	★
	EC02	ILLUMINARE MEGLIO	★
	EC03	PILOTA NZEB	★
	EC04	SPENDIAMO VERDE	★
	PIAN01	SGA, EMAS e....	★
	PIAN02	VOCE DI BILANCIO "RISPARMIO ENERGETICO"	★
	PIAN03	SISTEMA DI GESTIONE DELL'ENERGIA	★
PARCO AUTO COMUNALE	TRACOM01	RAZIONALIZZARE I TRASPORTI	★
	TRACOM02	AUTO MENO INQUINANTI	★
ILLUMINAZIONE PUBBLICA	IP01	ILLUMINAZIONE UTILE	★
EDIFICI RESIDENZIALI	RES01	RI-QUALIFICATI!	★

SETTORE	CODICE ID	TITOLO	
	RES02	SCOPRIAMO L'ACQUA CALDA	
	RES03	CERVESI SMART!	
TERZIARIO	TER01	DECALOGO DEGLI ECO-EVENTI	★
	TER02	OSPEDALE EFFICIENTE	★
	TER03	E-CENSIMENTO	
	TER04	NEGOZI E UFFICI A LED	
	TER05	PORTO PULITO	★
	TER06	SMART BEACH	★
	TER07	SMART RECEPTION	★
INDUSTRIA	PRO01	DIAGNOSI ENERGETICHE E SGE	
TRASPORTI	TRA 01	CERVIA IN MOVIMENTO	★
	TRA 02	CERVIA PEDALA	★
	TRA 03	A SCUOLA... SENZA INQUINARE	★

SETTORE	CODICE ID	TITOLO	
	TRA 04	MUOVERSI PIÙ LEGGERI	★
	TRA 05	AL MARE SENZ'AUTO	★
PRODUZIONE LOCALE DI ENERGIA	FER 01	FOTOVOLTAICO SU EDIFICI COMUNALI	★
	FER 02	USIAMO IL SOLE	★
ALTRO	INF01	SPORTELLI ENERGIA	
	INF02	BATTI IL CHiodo	★
	INF03	IMPARARE LE ALTERNATIVE	★
	INF04	CLIMA-L-CINEMA	★

★ **Implemented Action**  
 ★ **Launched Action**

# The strategy – SECAP – adaptation actions

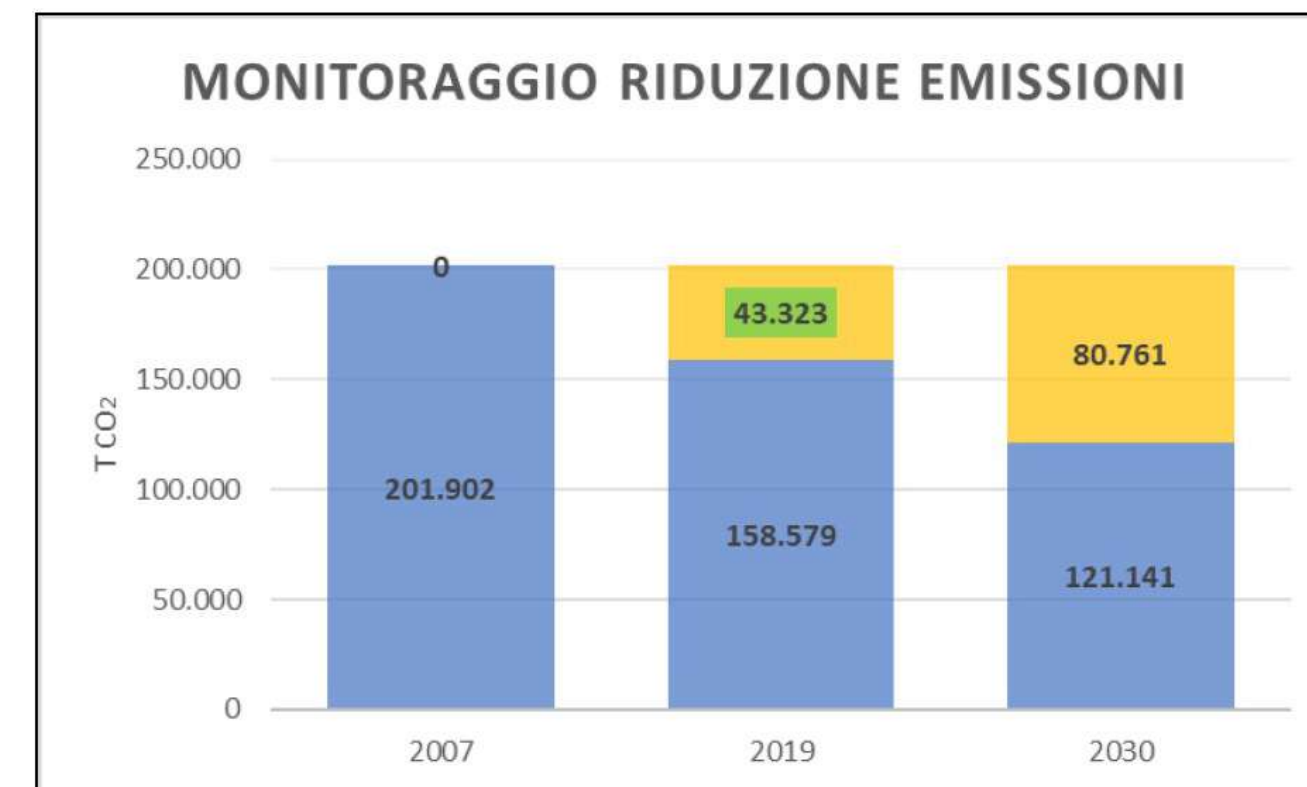
The SECAP provides mitigation and adaptation actions dealing with social, economic, environmental sustainability, production, tertiary, urban planning, to achieve these goals:

- strengthen the ability to adapt
- ensuring citizens access to safe, sustainable and affordable energy
- accelerate the decarbonisation of territories
- approach to climate neutrality

SETTORE	CODICE ID	TITOLO	
Turismo	ADAPT 01	CARTA DI CERVIA	★
Acqua	ADAPT 02	PIÙ PERMEABILITÀ	★
Protezione civile e Soccorso	ADAPT 03	ALLERTA METEO	★
Agricoltura e silvicoltura	ADAPT 04	LUNGA VITA ALLA PINETA	★
Agricoltura e silvicoltura	ADAPT 05	PRONTI AL FUOCO	★
Ambiente e biodiversità	ADAPT 06	PIANO DI GESTIONE SALINA DI CERVIA	★
Ambiente e biodiversità	ADAPT 07	CERVIA VEDE VERDE	★
Acqua	ADAPT 08	LITORALE PROTETTO	★
Acqua	ADAPT 09	NUOVO POTABILIZZATORE ROMAGNA ACQUE	★

★ Implemented Action      ★ Launched Action

The monitoring activity allows to quantify the decreasing emission



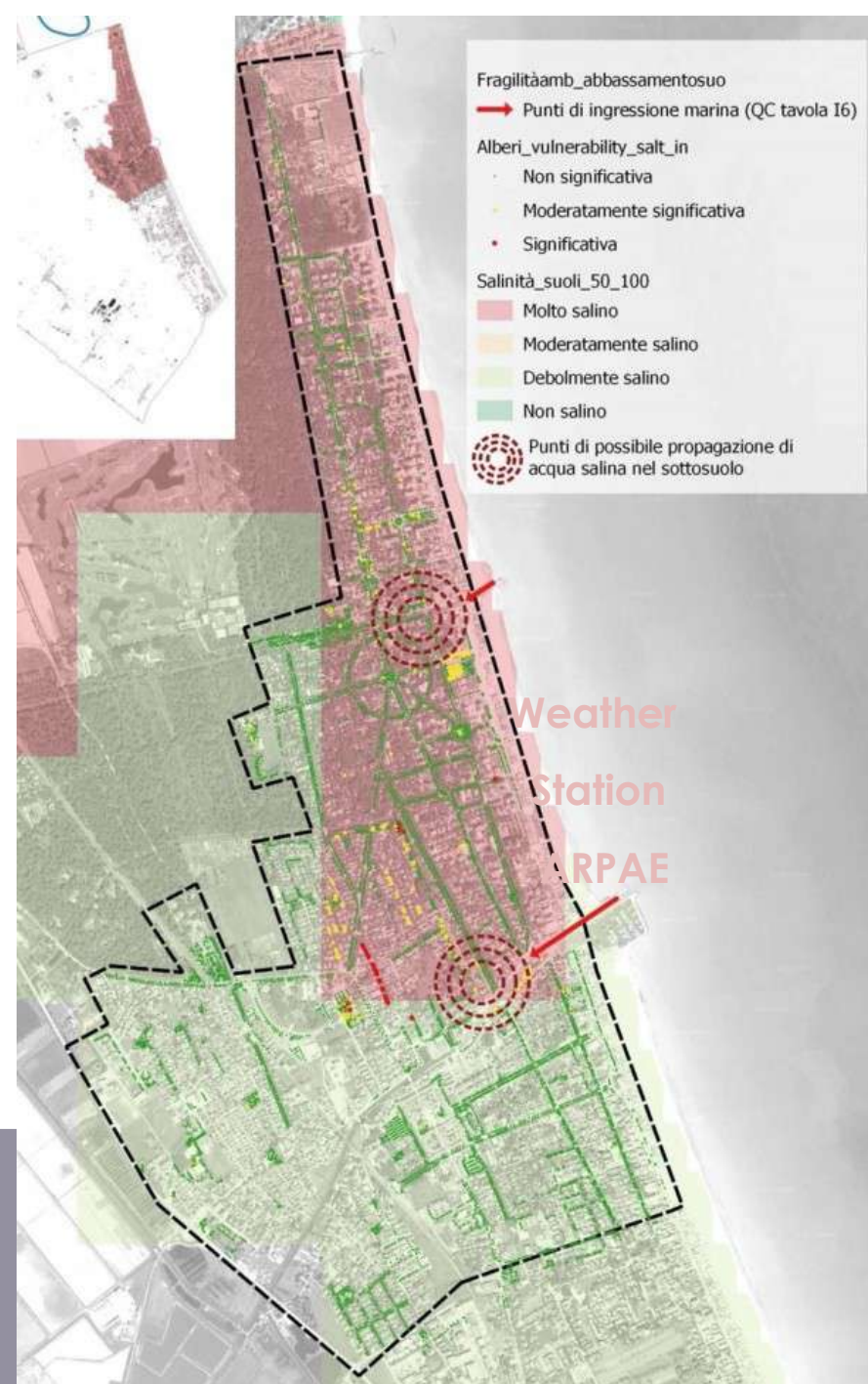
2007 → 2019 **GOAL** → 2030

CO2      - 43.323 t      - 37.438 t

# Analysis and monitoring activities

## Investigating impacts and making vulnerability analysis:

- **heat islands**
- **run-off**
- **sea level rise**
- **salt-intrusion**



**6 temporary weather stations, detecting:**

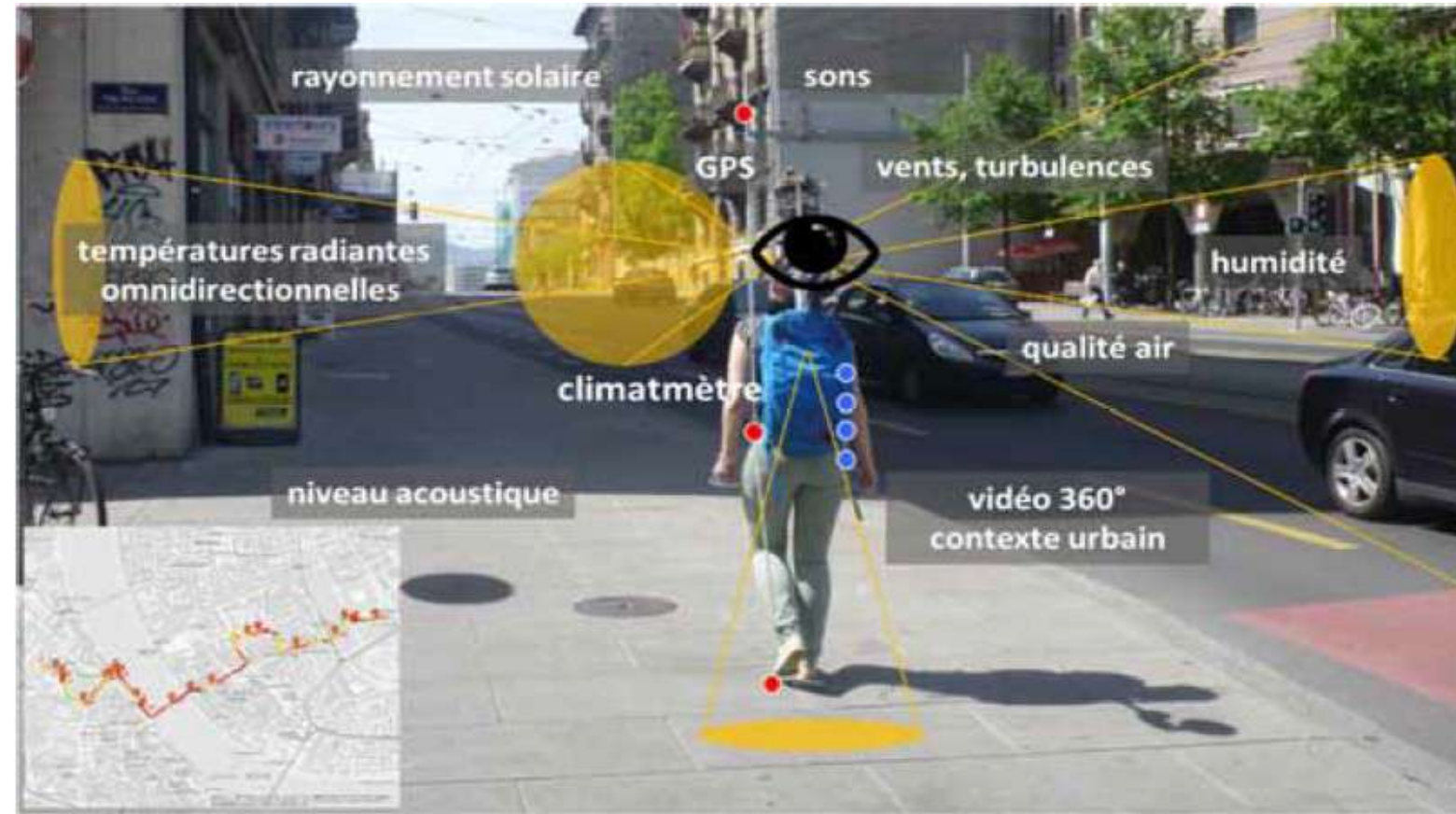
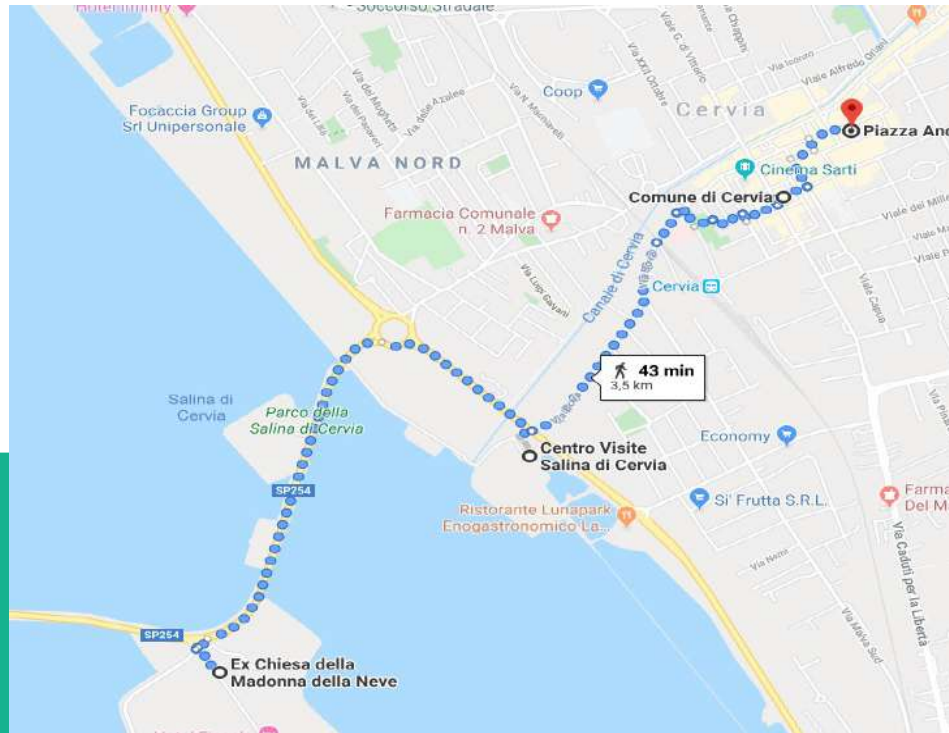
- **Temperature**
- **Relative Humidity**

**1 permanent weather station, detecting:**

- **Temperature**
- **Relative Humidity**
- **Wind speed**
- **Wind direction**
- **Pressure**
- **Rainfalls**
- **Sun radiation**

# Urban mesoclimate and microclimate monitoring

«Saltpan-City center» Path



MICROCLIMAMETRO

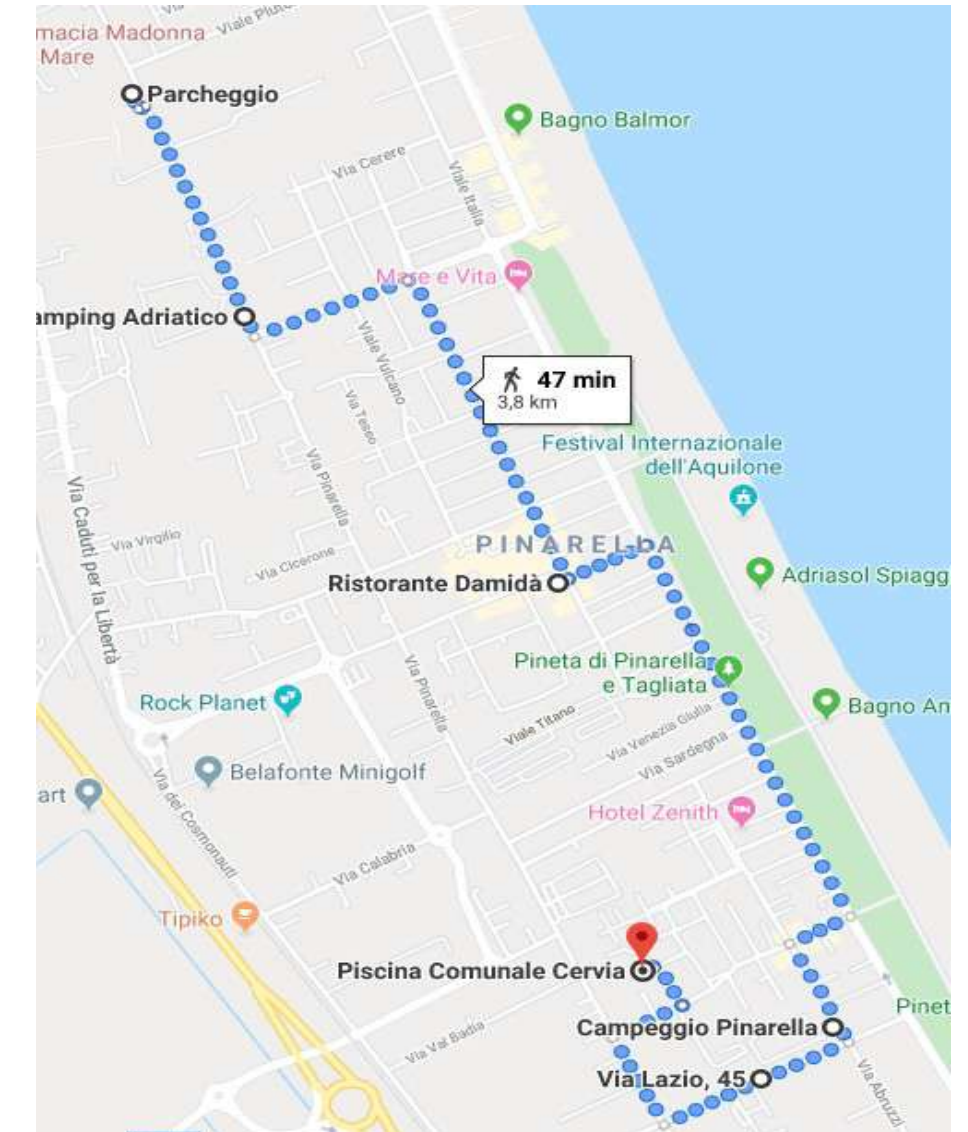
**Effect of floor or side coverings, the vegetation impact, the effectiveness of shading devices, etc.**

**The results obtained offer valuable guidance for researching point-oriented solutions for the citizens' welfare**

«Pinewood» Path

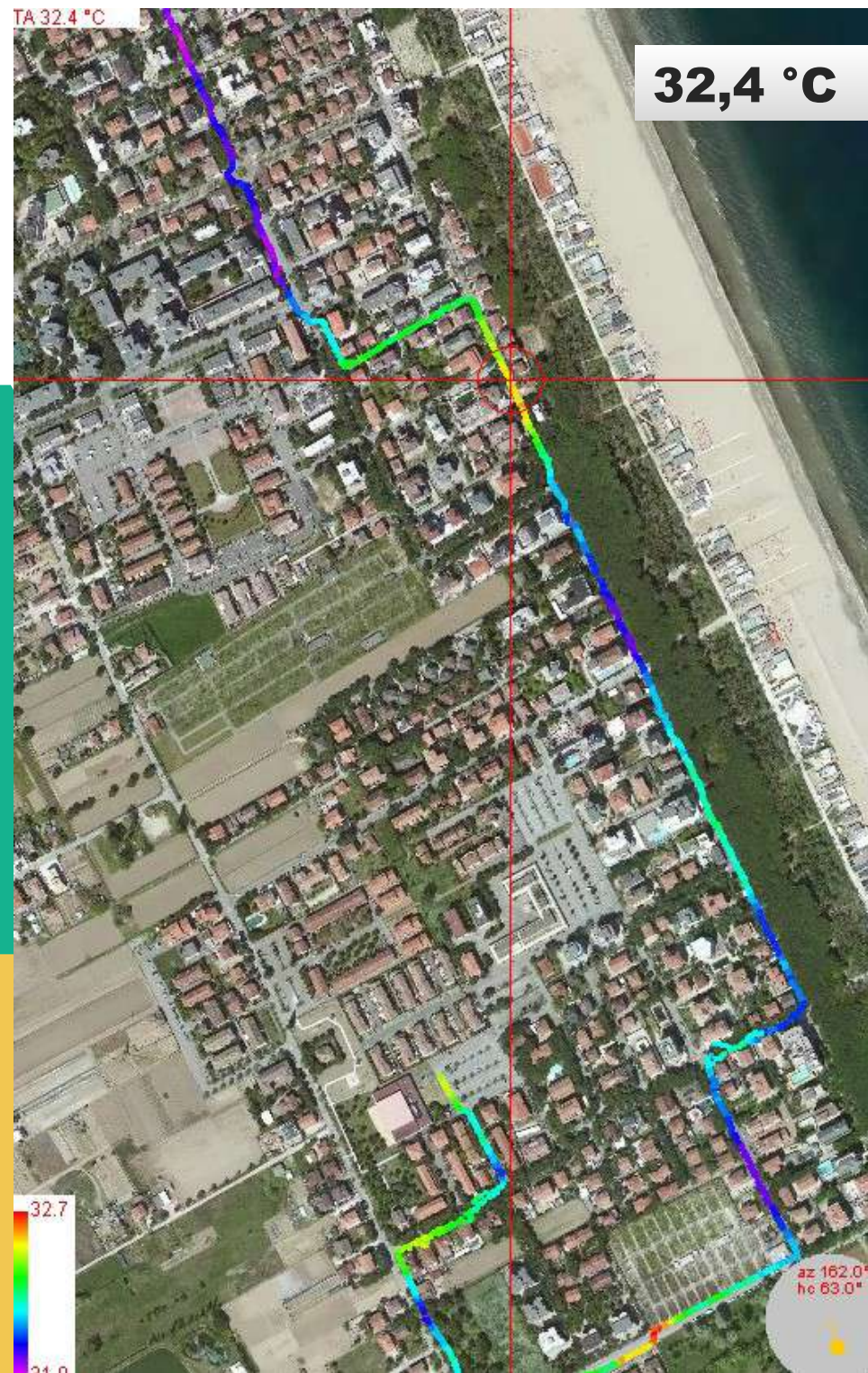


«Longitudinal» Path

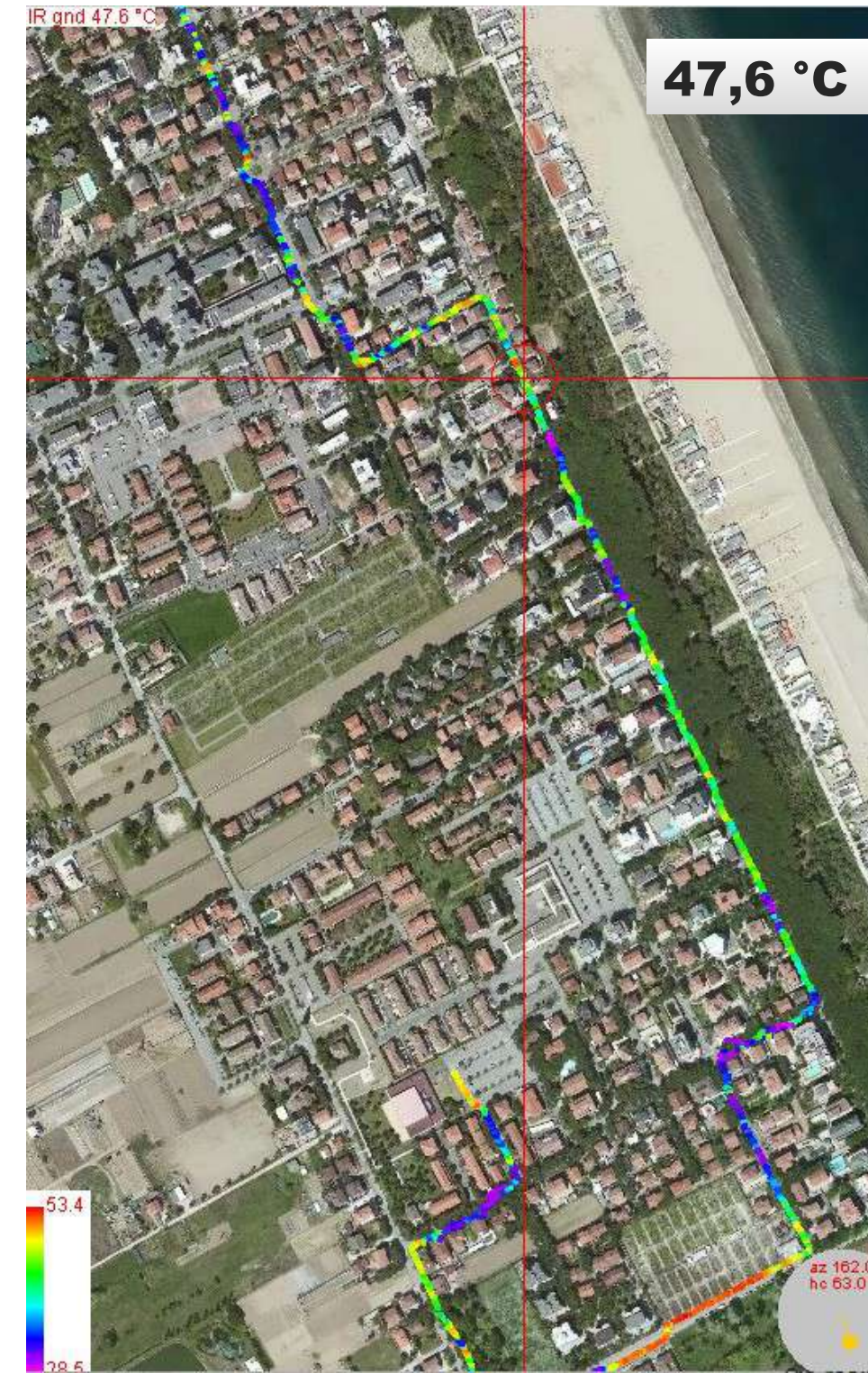


## Climate analysis

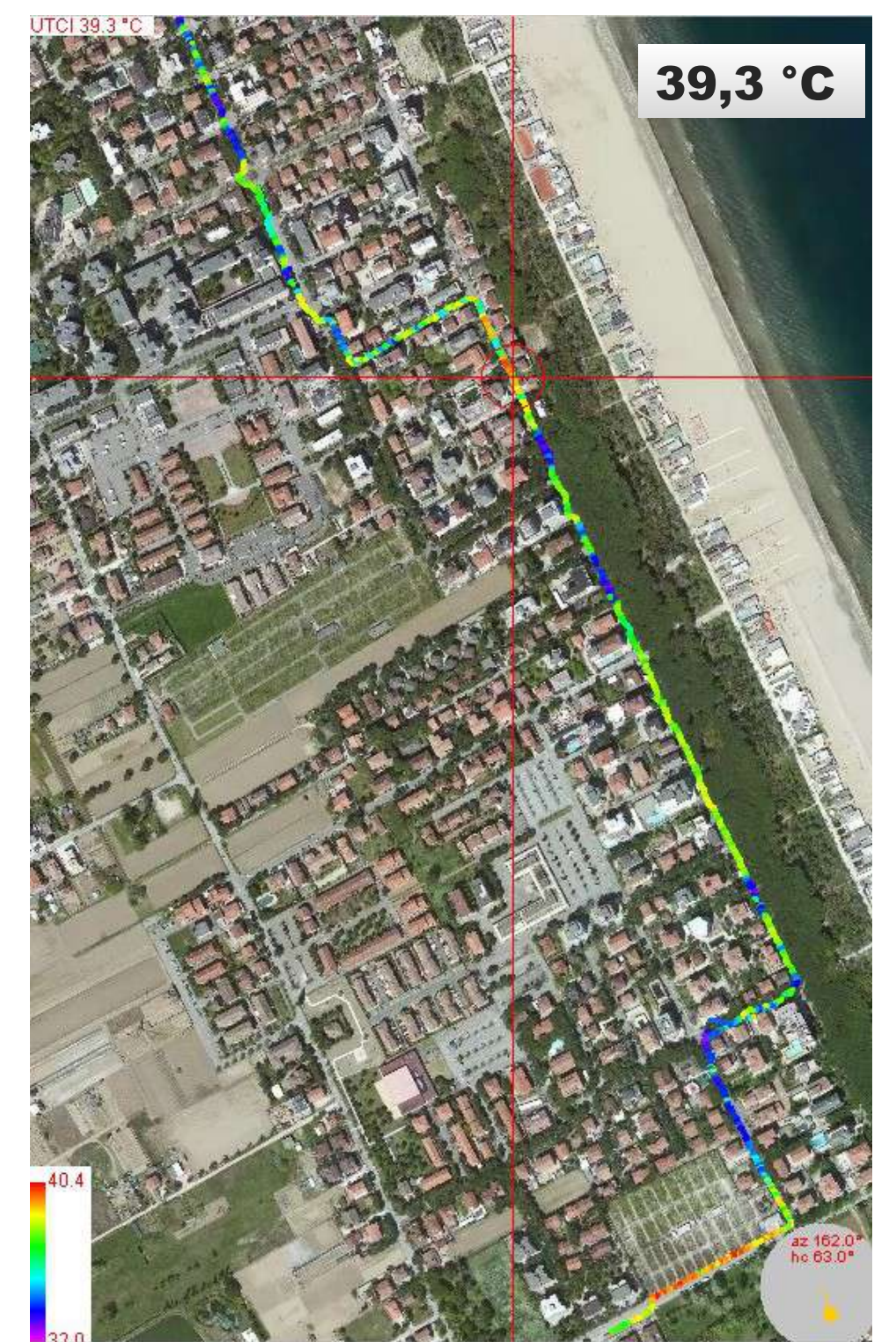
### AIR TEMPERATURE



### SOIL TEMPERATURE



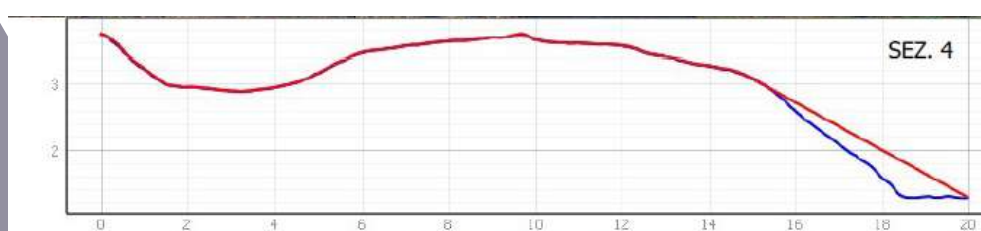
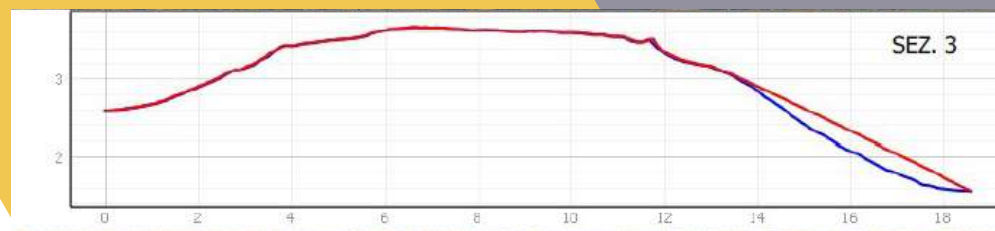
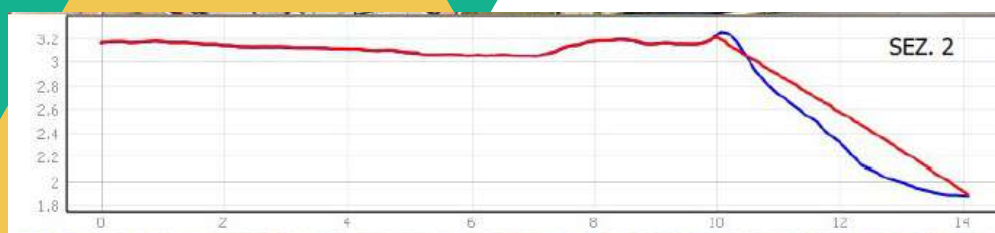
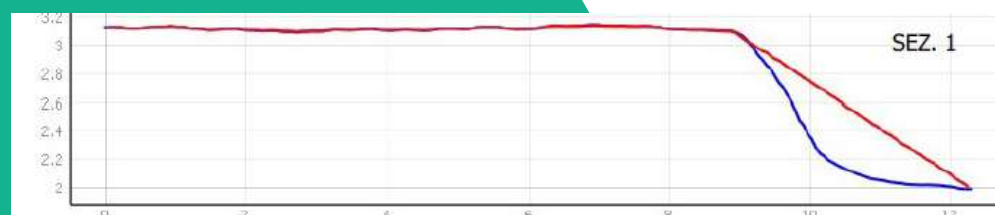
### PERCEIVED TEMPERATURE



## Marine ingression

**Pilot project: reconstruction of the dune through naturalistic engineering intervention to defence against:**

- erosion
- marine ingression
- salinization of groundwater



## Salt intrusion

Collection of saline wedge data

**INSTALLATION OF A PIEZOMETER**

**MEASUREMENT CAMPAIGN**

Salinization



Soil Infertility



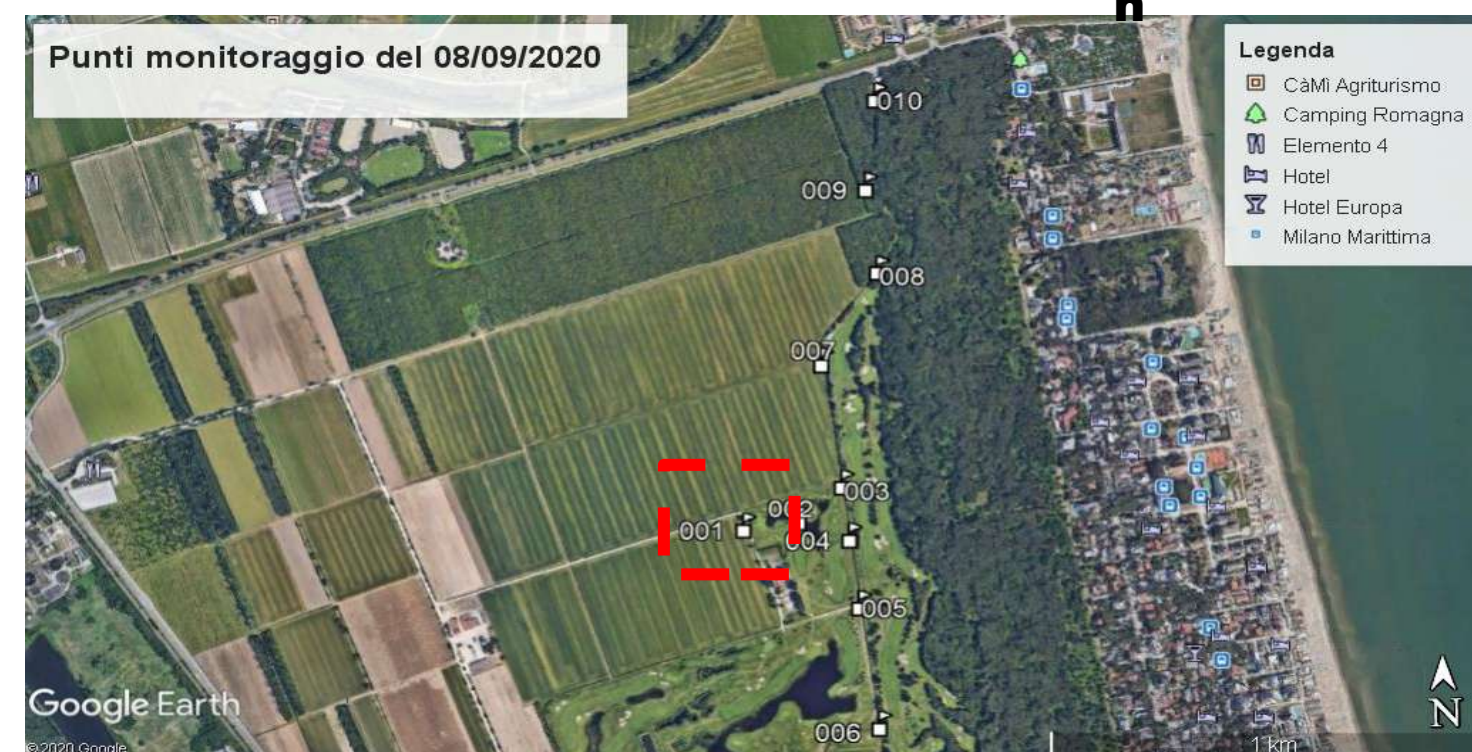
Analysis



Planting suitable species



Reforestation



## Urban floodings

**SEA FLOODING**  
**Waterfront, Cervia**

**CURRENT STATUS without a sand dune to protect the buildings**



**Coastal flood modeling**  
**(Safer\_COAST)**  
**200 years return period**  
**Extreme Sea Level = 2,5 m**

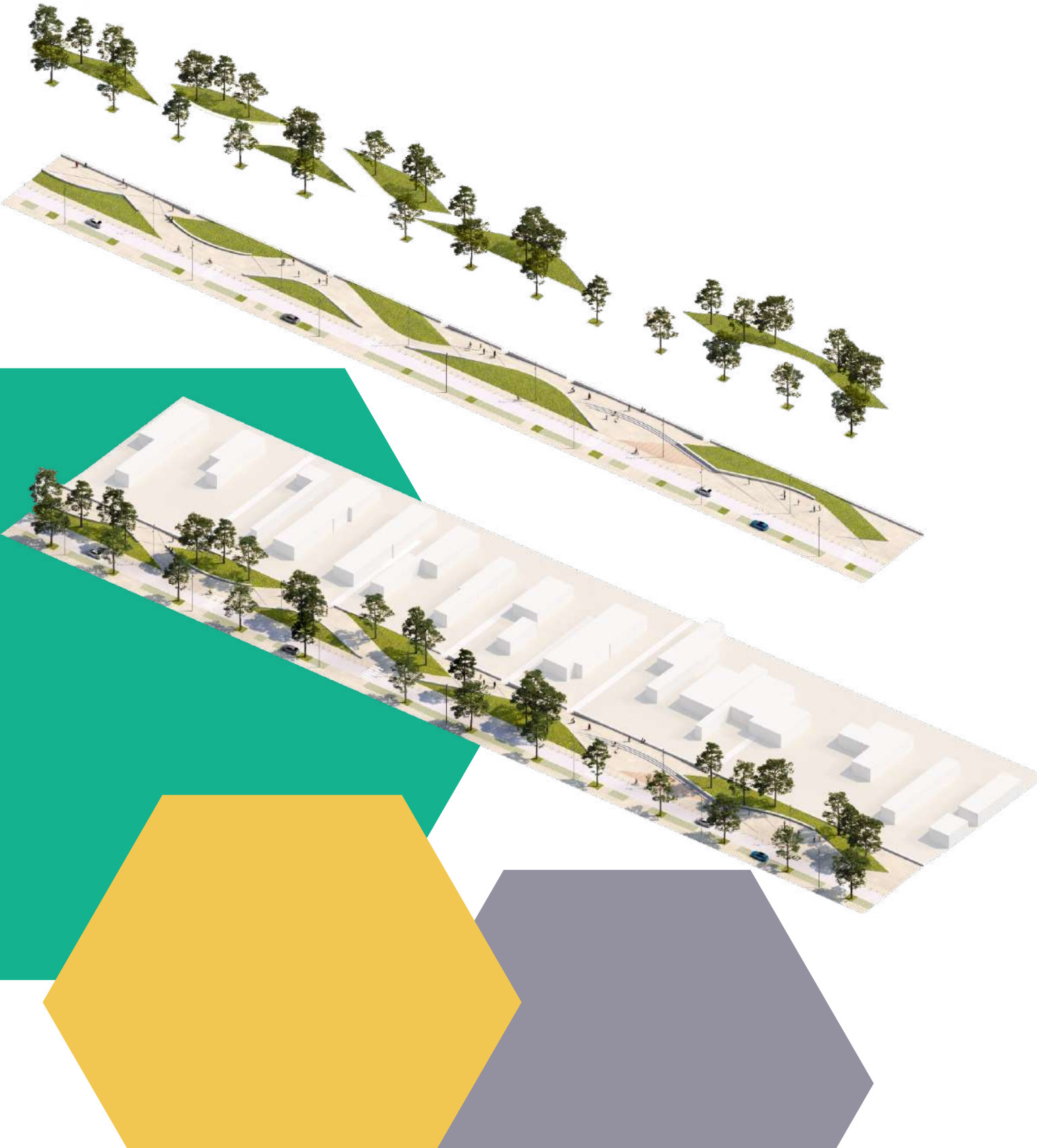


**New regeneration intervention  
planned**



**Need of a hydraulic hazard mapping**

**PROJECT with a sand dune to protect the buildings**



**Coastal flood modeling  
(Safer\_COAST)  
200 years return period  
Extreme Sea Level = 2,5 m**







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# General Assembly 2024 - 23 MAY

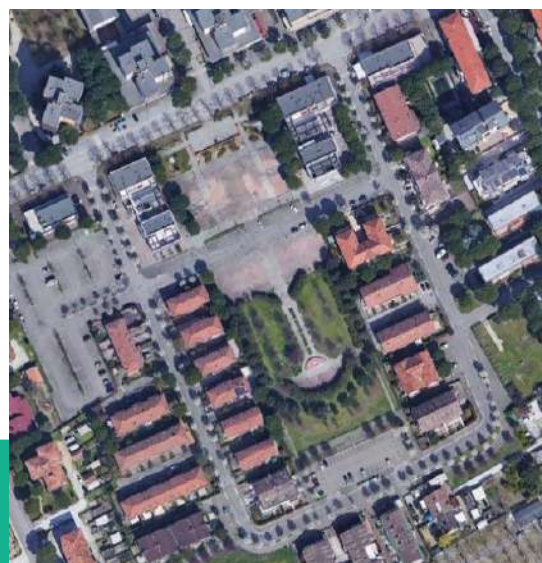
## LOCAL GREEN DEALS - CITY PLANNING AND CLIMATE ADAPTATION



**Rain 50 mm - 425 mc - duration 6h**

**RAIN FLOODING**  
**Premi Nobel Square,**  
**Pinarella**

**BEFORE**



**WATERPROOF GROUND**



**PERMEABLE GROUND**

**IN PROGRESS - 2023**

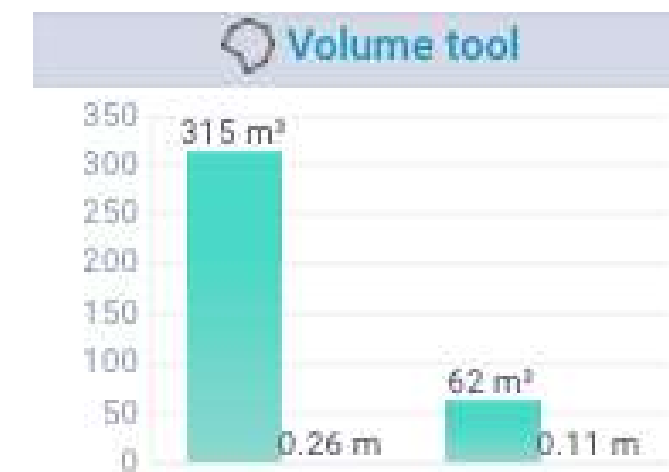


**NOW**



New Scenario

RAINFALL EVENTS						
Tag	Upload	D(h)	Vol(m³)	Draw	Inf	Add
RAIN_EVENT3		6	433	<input type="checkbox"/>	<input checked="" type="checkbox"/>	+
RAIN_EVENT4		6	419	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	+



# From words to action

**Pinarella – rolling tanks: a hydraulic study has been carried out on the section of Pinarella in sight of the increase of the urban agglomeration**



**The rolling tanks built alongside the state road are hydraulic defense works that drains the rainwater coming from the urban agglomeration of Pinarella pouring them into the Canale dei Prati. They also regulate the peak flow rates during exceptional weather events, so they constitute works of major public interest, as compensatory measures and environmental and territorial rebalancing aimed at improving and mitigating the negative effects of new settlements.**

# From words to action



# From words to action

**Milano Marittima - waterfront**

**Milano Marittima – city center**

**Cervia - Borgomarina**

2  
0  
1  
5



2  
0  
2  
2

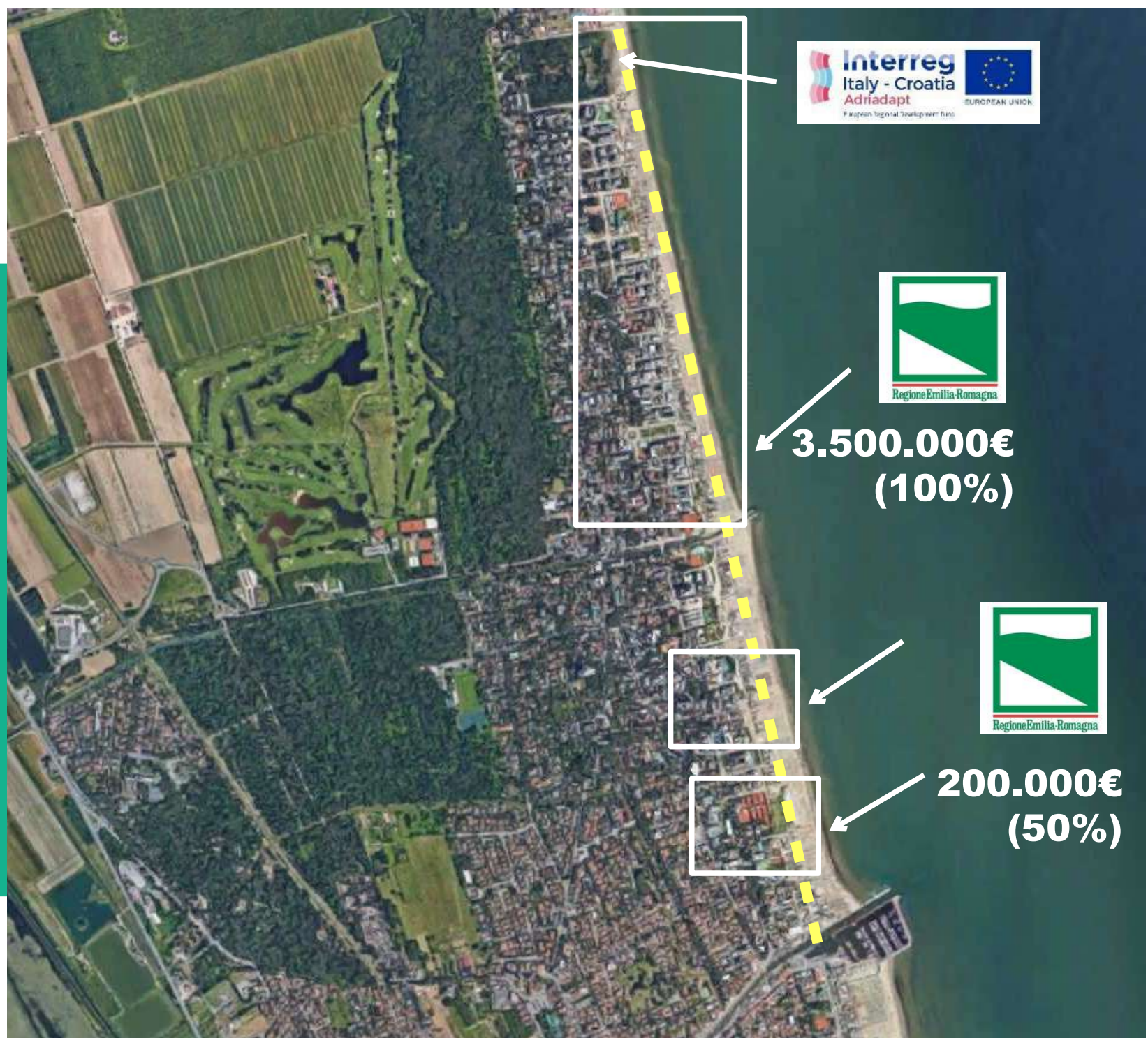


**The issue of safety covers the entire territory and requires the collaboration of public and private to be put in the foreground, ensuring solidity and resilience to the city through redevelopment and urban regeneration.**

**For example, the in-depth study on Hydraulic Risk focused on the design of the Public City and found confirmation in the redevelopment of the waterfronts of Milano Marittima, Cervia and Pinarella-Tagliata, Viale Matteotti and Borgo Marina urban regeneration, where urban furniture and the adoption of Nature Based Solutions act as a safety measure against floods, combining the aesthetic component with the functional one.**

**Fundings**

The strategy of the Municipality of Cervia for the regeneration of places of identity consists of funding as a vehicle for innovation and development



# General Assembly 2023 - 11 MAY

## LOCAL GREEN DEALS - CITY PLANNING AND CLIMATE ADATAPTION

**Development of a common tourist product, based on the recovery, conservation and enhancement of the rich cultural heritage linked to the sea and the small Adriatic harbours**



Regione Emilia-Romagna  
Direzione Generale Agricoltura, Caccia e Pesca  
Servizio Attività Faunistico-venatorie e pesca

Iniziativa finanziata dall'Unione Europea  
FEAMP 2014/2020

Misura 1.43  
"Porti, luoghi di sbarco, sale per la vendita all'asta e ripari di pesca"

Avviso pubblico annualità 2017



**700.000 – 100%**



Regione Emilia-Romagna  
Direzione Generale Agricoltura, Caccia e Pesca  
Servizio Programmazione e Sviluppo locale integrato

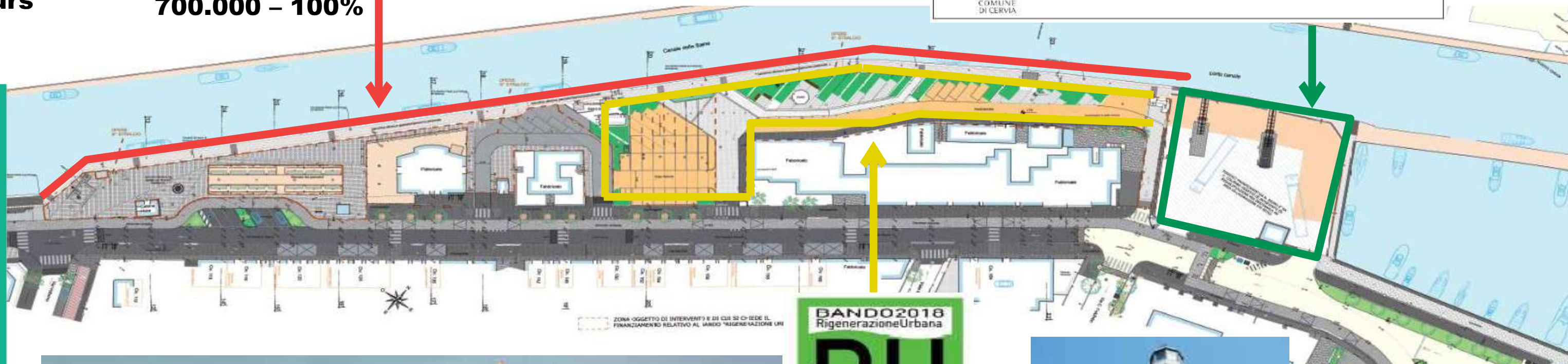
Iniziativa finanziata dall'Unione Europea  
FEAMP 2014/2020

Azione 1.B  
"Interventi di qualificazione luoghi di imbarco e sbarco"

Avviso pubblico annualità 2018



**300.000 – 100%**

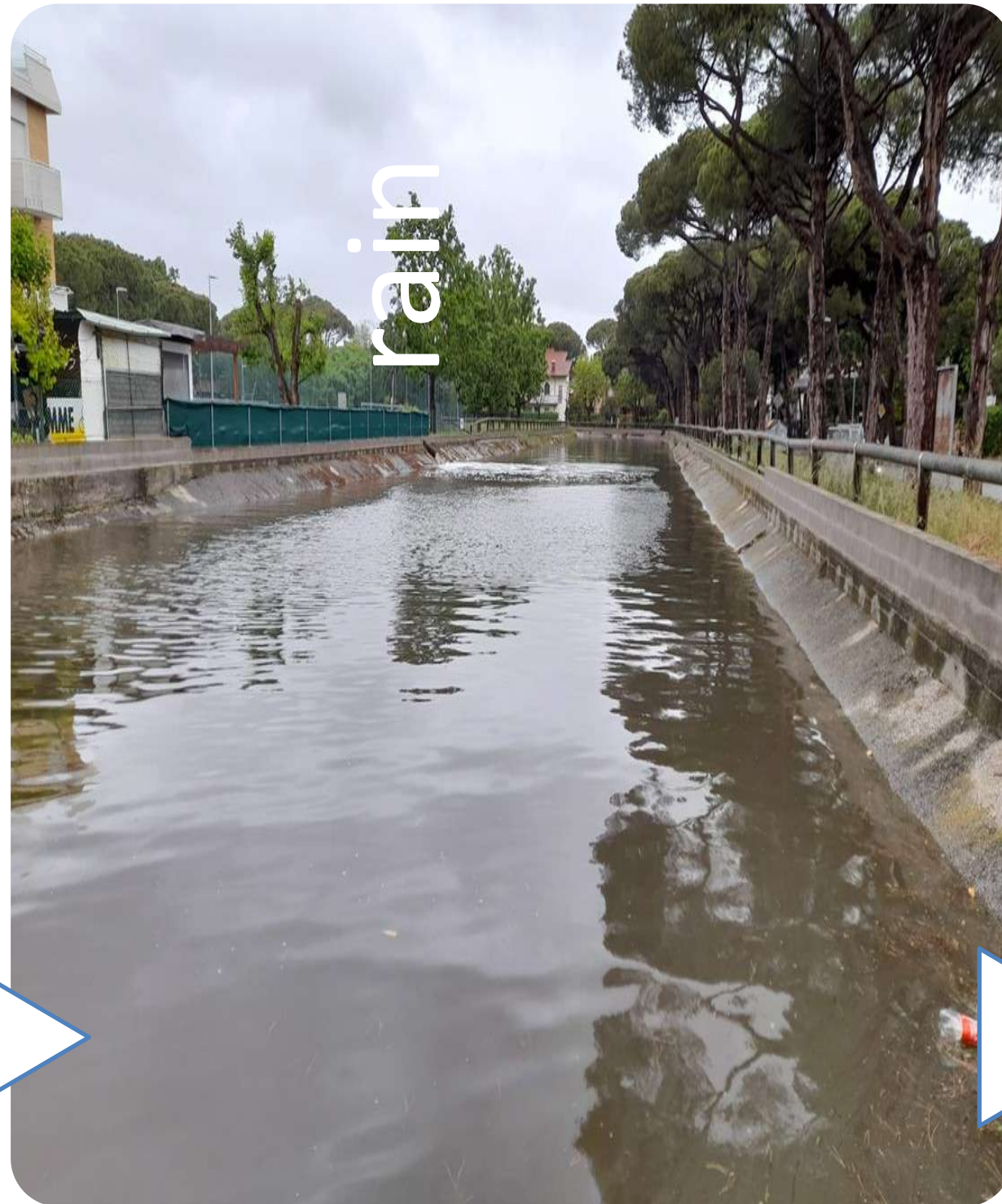
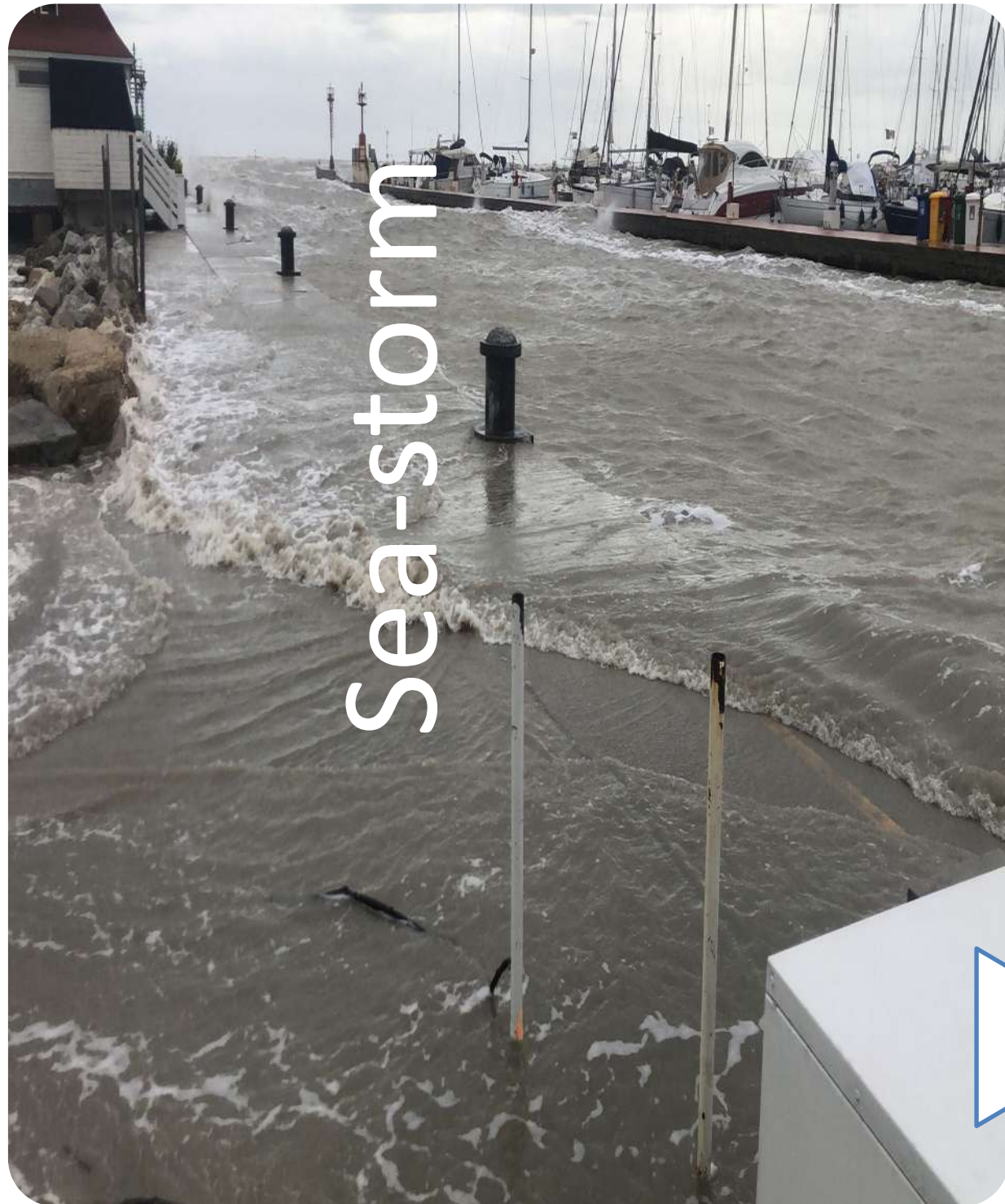


**1 Mil – 70%**



**recovery and enhancement of the historical-identity elements of the area, increasing its attractiveness from the tourist point of view and the social and economic value**

# Extreme climate event may 2023



Sea-storm: focusing on prevention









05-16-2023 Tue 17:57:01

MARE 180

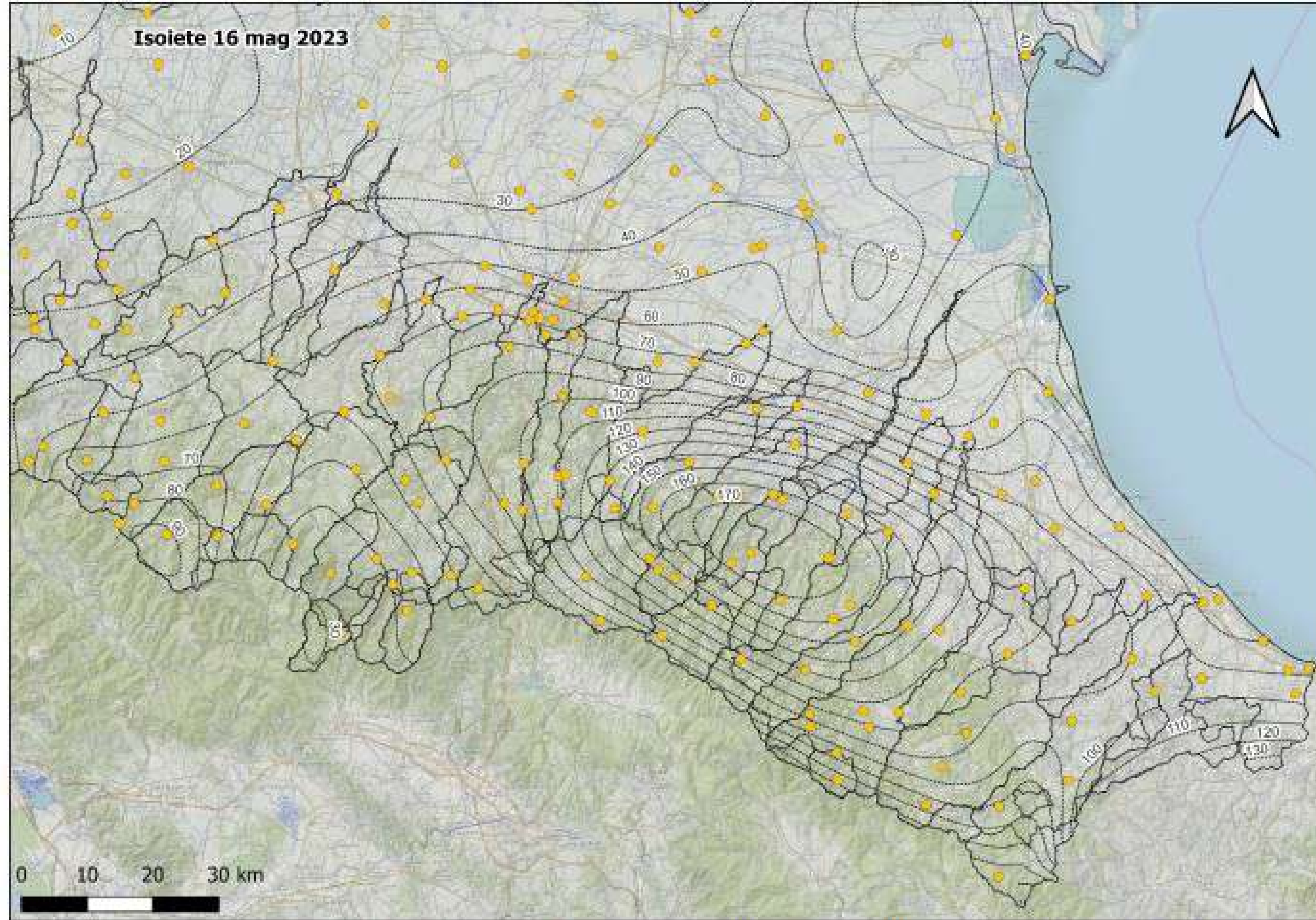
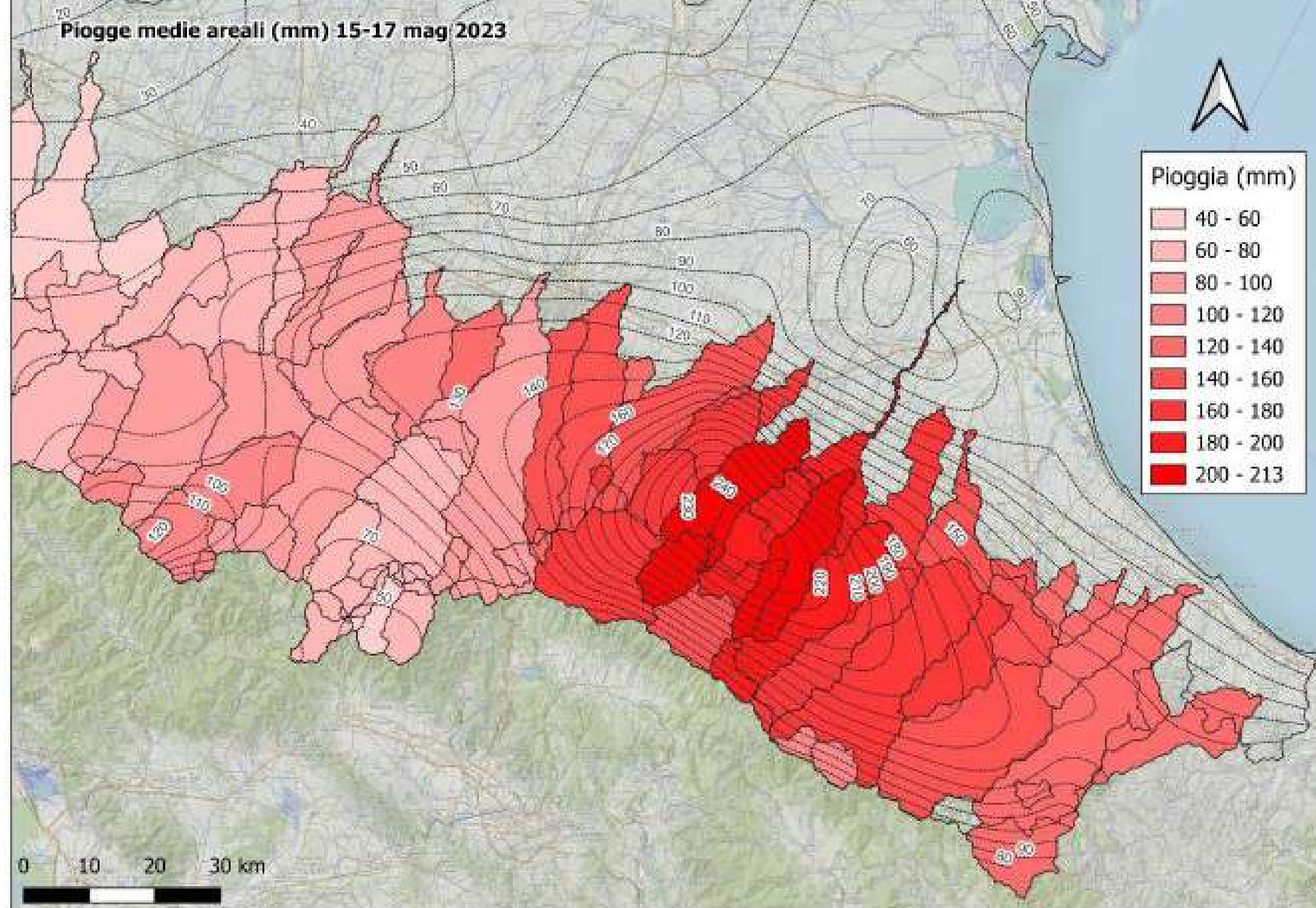


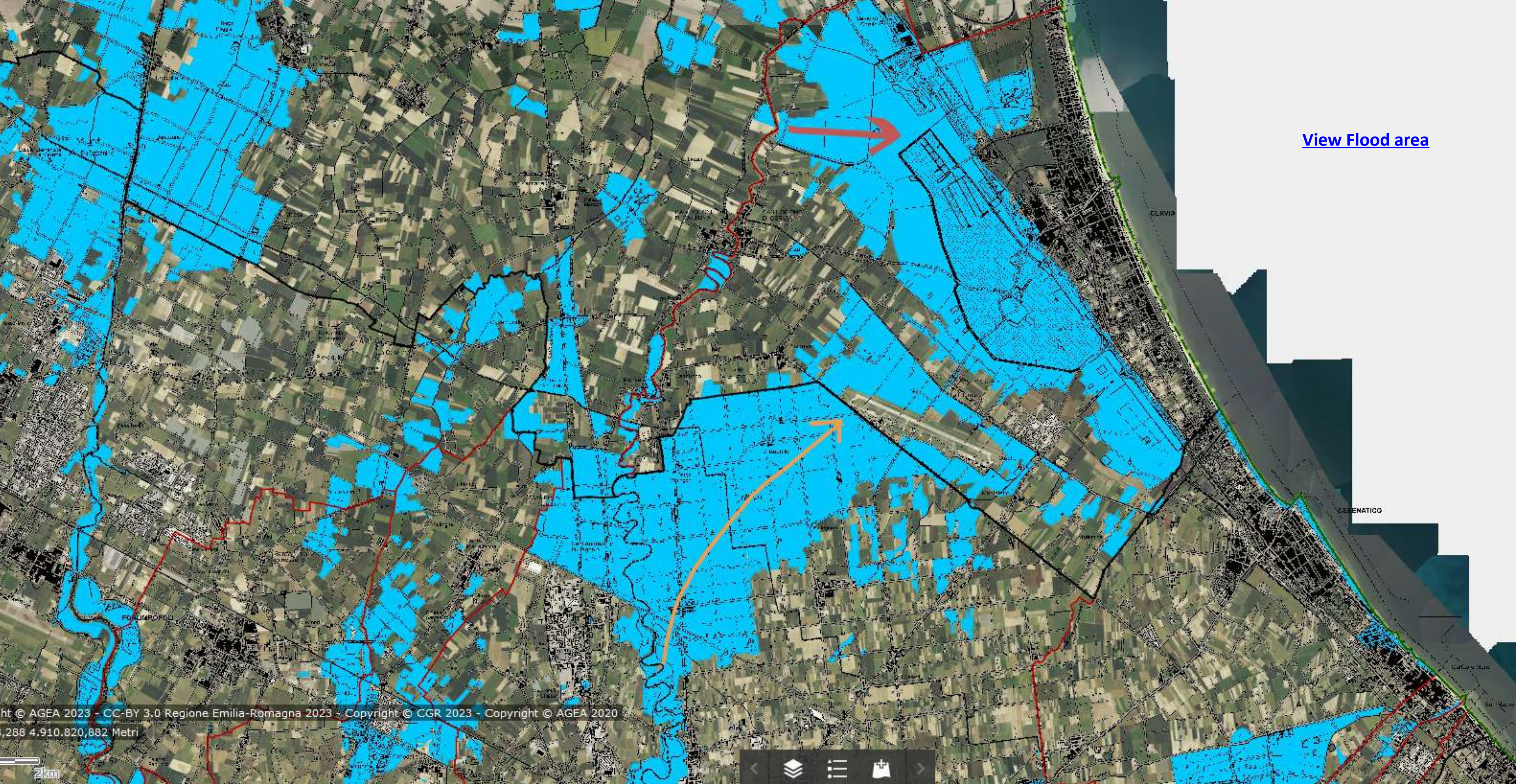
Figura 6 - Isoiete della massima precipitazione giornaliera del secondo evento (16 maggio 2023).







**Figura 9 - Pioggie medie areali complessivamente cadute sui bacini durante il secondo evento.**



[View Flood area](#)



















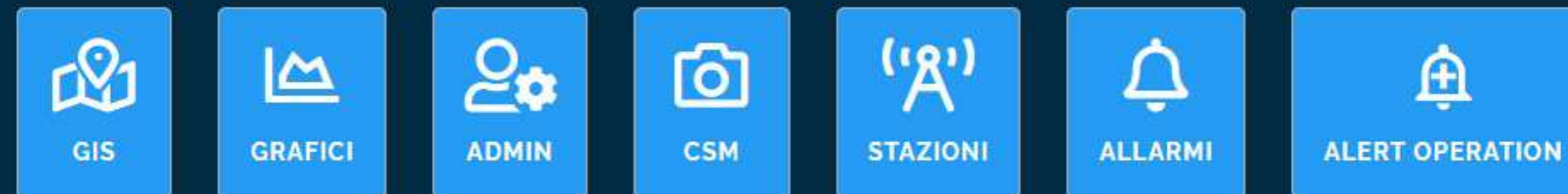
2023-05-21 11:13  
44.258423°N 12.335803°E 101.81  
ANG PO

Since 3 years the Municipality adopted this platform allowing to monitor the whole territory and to check any potential problem, with a warning system connected to sensors, surveillance cameras, meteo stations, etc. both of Municipal property rather than other Institutions' property – shared knowledge network

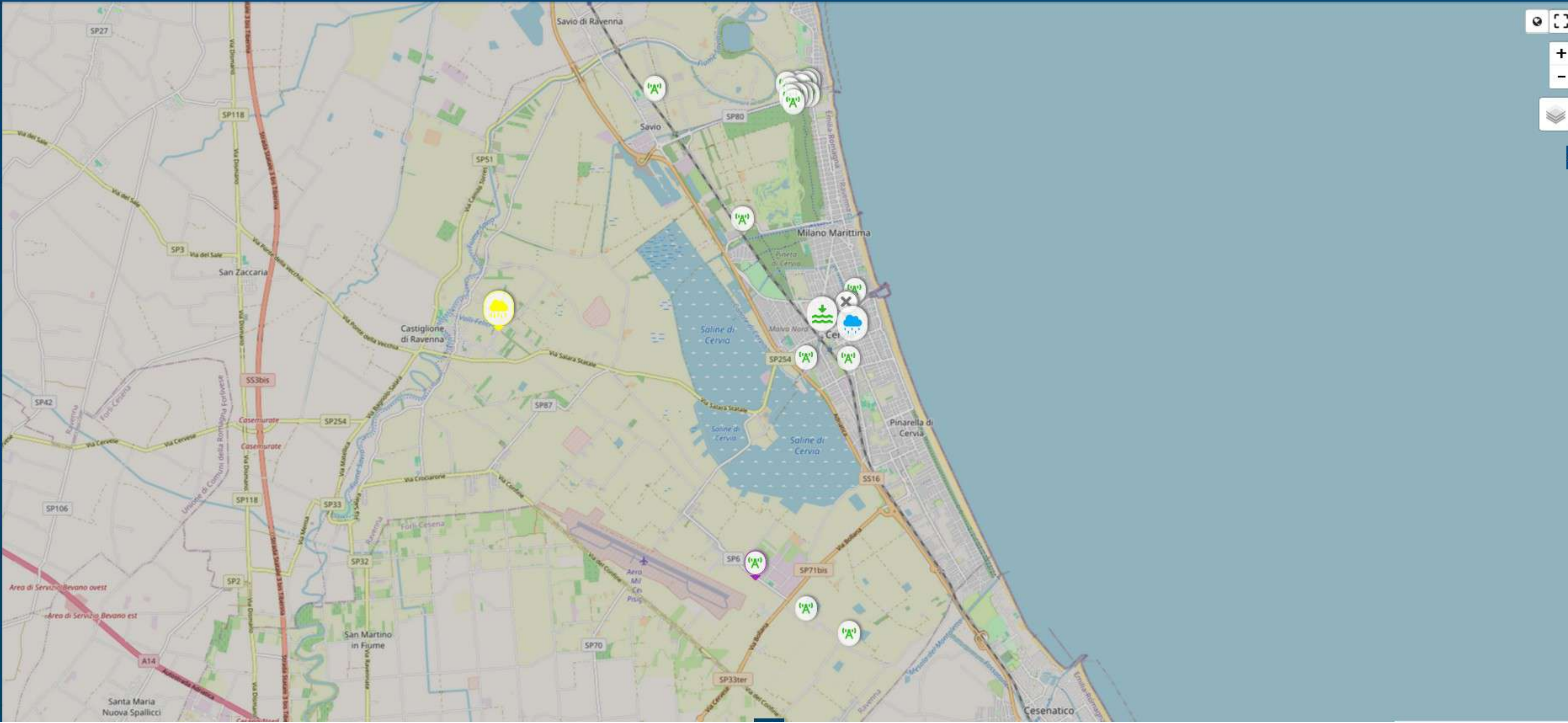
## THE SYSTEM ALLOWS REMOTE MANAGEMENT OF PROTECTION SYSTEMS IN CASE OF NEED AND/OR EMERGENCIES

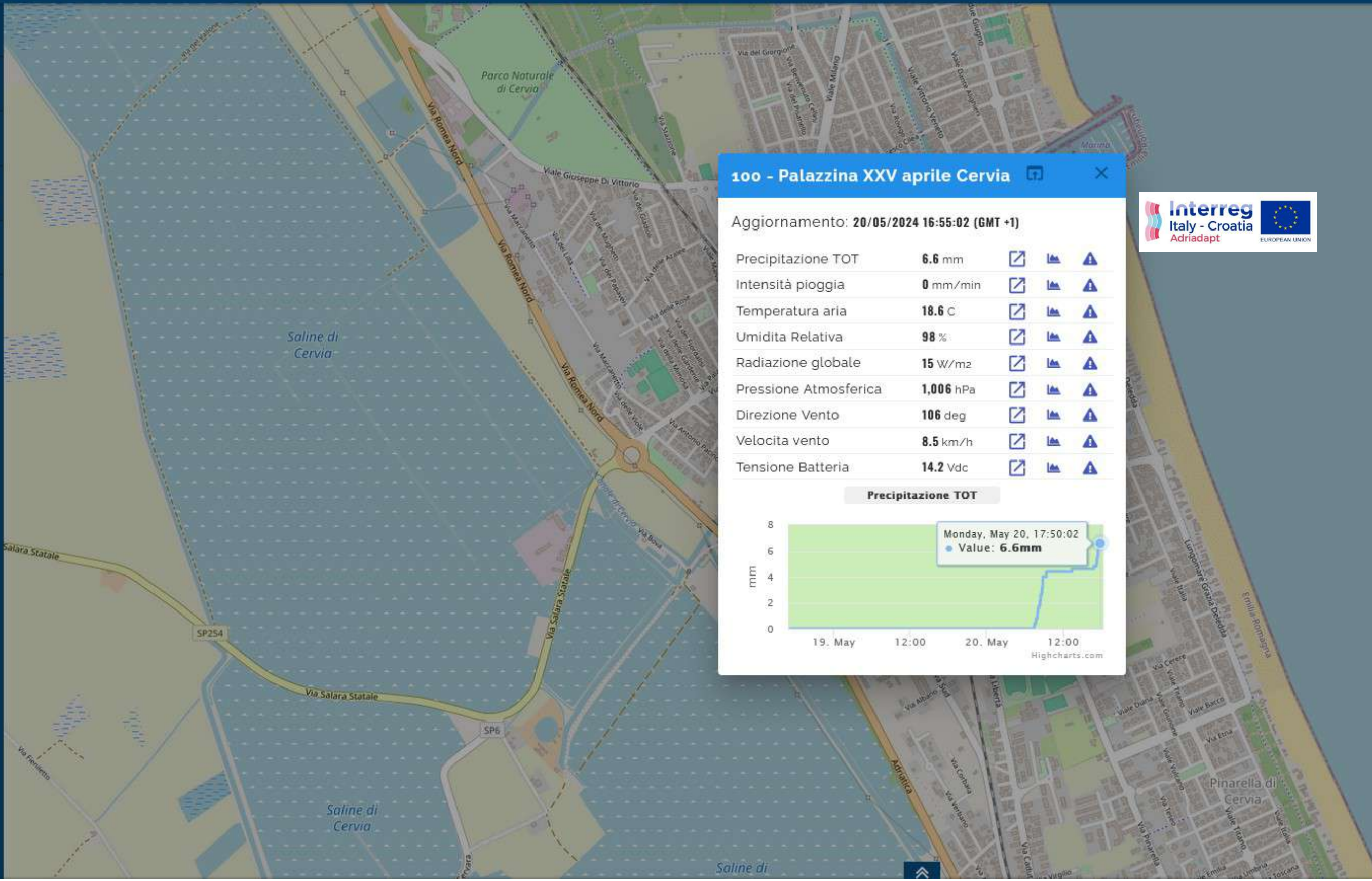
Administrators of the platform is Civil Protection Unit of the Municipality, involving multidisciplinary staff of the Municipality necessary to manage emergencies: public works, private housing, parks and green areas, services to citizens, veterinarian, healthcare

Administrators can give access to the platform with necessary restrictions/priorities to external voluntary groups of the territory committed in civil protection and meteorology, civil protection units









### 100 - Palazzina XXV aprile Cervia

Aggiornamento: 20/05/2024 16:55:02 (GMT +1)

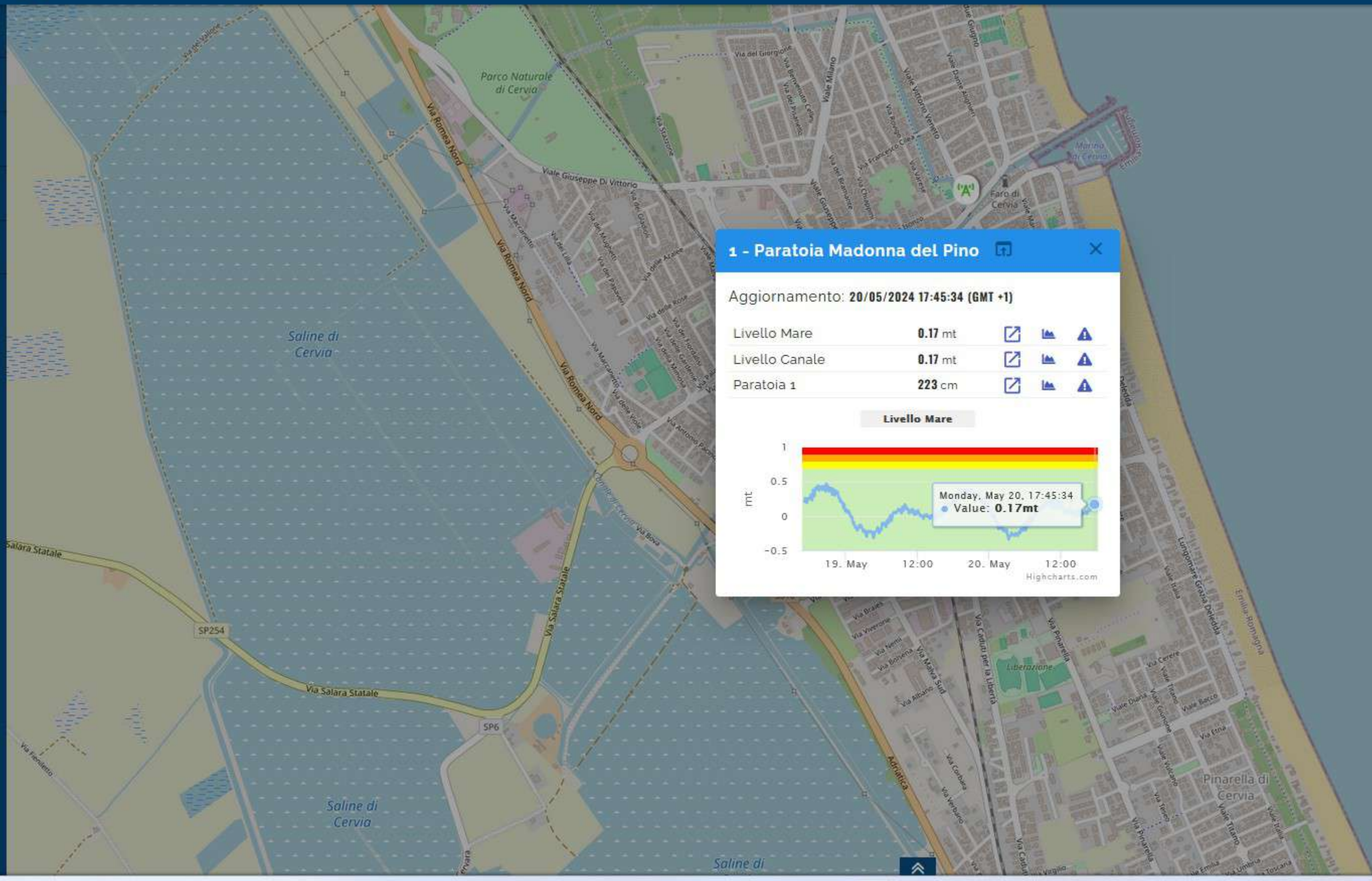
Precipitazione TOT	6.6 mm		
Intensità pioggia	0 mm/min		
Temperatura aria	18.6 C		
Umidità Relativa	98 %		
Radiazione globale	15 W/m2		
Pressione Atmosferica	1,006 hPa		
Direzione Vento	106 deg		
Velocità vento	8.5 km/h		
Tensione Batteria	14.2 Vdc		

#### Precipitazione TOT

Monday, May 20, 17:50:02  
Value: 6.6mm

Highcharts.com





### 1 - Paratoia Madonna del Pino

Aggiornamento: 20/05/2024 17:45:34 (GMT +1)

Livello Mare	0.17 mt	📍	📈	⚠️
Livello Canale	0.17 mt	📍	📈	⚠️
Paratoia 1	223 cm	📍	📈	⚠️

**Livello Mare**

Monday, May 20, 17:45:34  
Value: 0.17mt

Highcharts.com

**Paratoie a ventola**  
Paratoie Ventola - Ingresso



← 20/05/24 16:55 →

**Paratoie a ventola**  
Paratoie Ventola - Saline



← 20/05/24 16:55 →

**Paratoie a ventola**  
Paratoie Ventola - Accesso



← 20/05/24 16:55 →

**Paratoie a ventola**  
Paratoie Ventola - Paratoie



← 20/05/24 16:55 →

**Paratoie a ventola**  
Paratoie Ventola - Canale



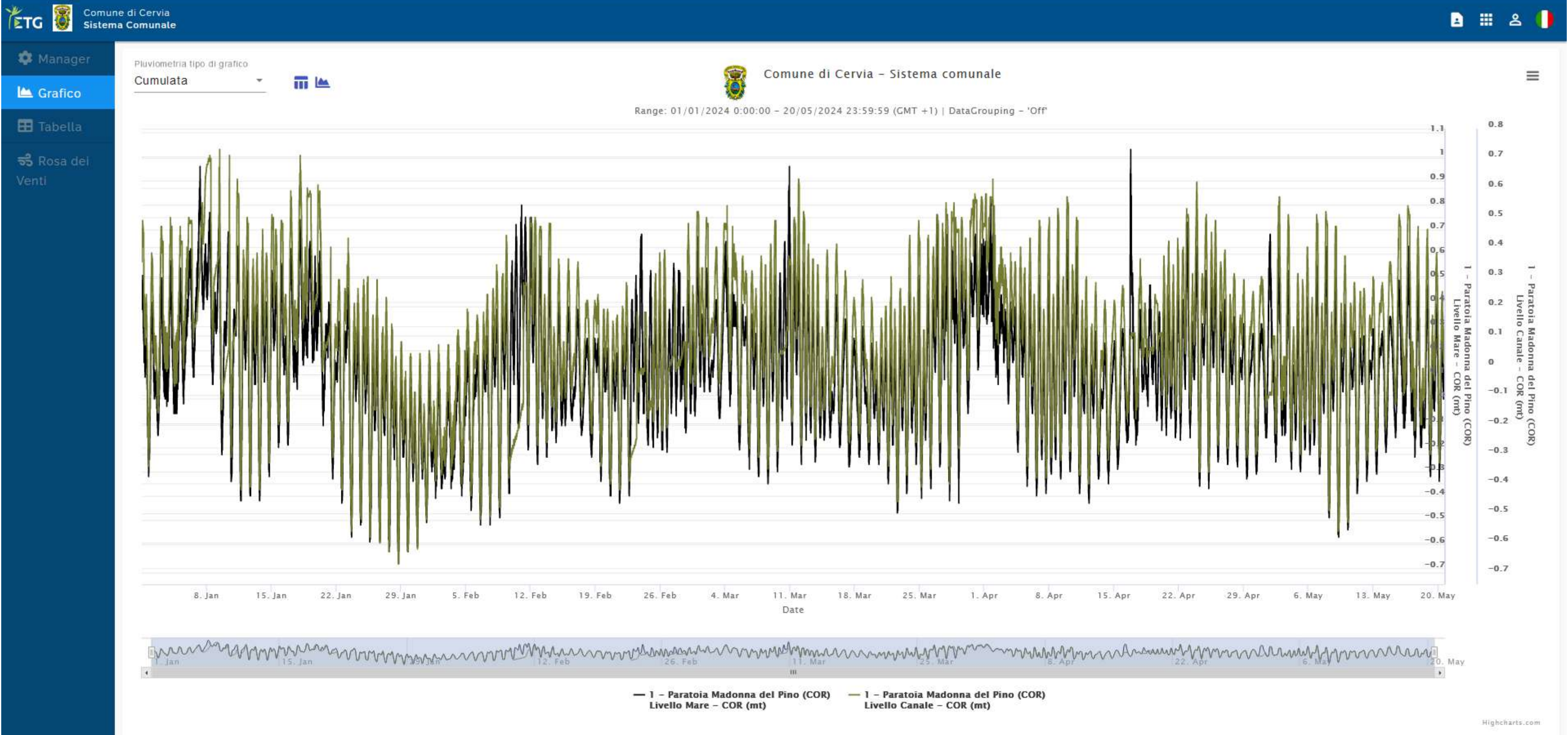
← 20/05/24 16:55 →

**Meteo Circolo Nautico**  
Comune Cervia



← 16/11/23 10:31 →

The platform is very useful also for **statistics** i.e. when we need to plan interventions, we can select data, elaborate on min and max levels in a defined period, and elaborate results about i.e. rain, wind, sea, CO2, temperature, etc. in order to evaluate the best solution → the knowledge of all these data collected thanks to **sensors** has to be shared and used for **planning and territory development purposes**, not only for civil protection emergencies → **IMPORTANCE OF MULTIDISCIPLINARY TEAMS** → **MANAGEMENT OF EMERGENCIES, PLANNING, IMPLEMENTATION OF PUBLIC WORKS ARE TIGHTLY CONNECTED**



## *What did we learn from this experience? What about the future?*

- How important were all the investments we implemented during last few years
- After the flood the relationship with all competent institutions were turned into a sort of working routine including monthly planned meetings
- efficacy of the synergy among institutions allowing prompt and efficient reaction to emergencies
- crucial importance of sharing data and access of sensors systems regardless property
- WE DIRECTLY EXPERIENCED HOW CRUCIAL ARE THE KNOWLEDGE OF THE TERRITORY AND DEFENSE INFRASTRUCTURES (WHICH ARE PRESENT!!), AS WELL AS THEIR MANAGEMENT (PLATFORM WAS ESSENTIAL) → FUTURE → KEEP WORKING TIGHTLY WITH ALL INSTITUTIONS + KEEP IMPLEMENTING “MANIACALLY” KNOWLEDGE OF THE TERRITORY AND DATA

***UNDERSTANDING THE CHALLENGING  
WATER MANAGEMENT IN A CHANGING CLIMATE***

**Thank you**

**Simona Melchiorri  
Municipality of  
Cervia**