Forum regionale permanente per i Cambiamenti Climatici
GLI STRUMENTI A DISPOSIZIONE DEGLI ENTI LOCALI - I SERVIZI CLIMATICI

Il servizio climatico per la valutazione del rischio di allagamento in ambito urbano: progetto SAFERPLACES

Stefano Bagli - GECOsistema srl

Regione Emilia-Romagna · UNDER 2° · cambiailclima · eit Climate-KIC

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Webinar 9 Luglio 2020

geco sistema Geographic Environmental COnsulting · cmcc Centro Euro-Mediterraneo sui Cambiamenti Climatici · GFZ Helmholtz Centre Potsdam · MEEO Meteorological Environmental Earth Observation · Politécnica · Alma Mater Studiorum Università di Bologna · IBH

SaferPLACES Climate-KIC EIT Consortium

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Politécnica

SME's

MEEO Meteorological Environmental Earth Observation

geco

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Insurances

UnipolSai Assicurazioni

Leitha

AXA

Local Admin and Cities

Comune di Rimini

Comune di Milano

Resilient Cities

Comune di Bologna

Multi-utility

Gruppo HERA

Emergency

510 An initiative of the Netherlands Red Cross

Dirección General de Protección Civil y Emergencias

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SaferPLACES – **PERCHE'**

LE CITTA' SI ALLAGANO

- **Urbanizzazione, impermeabilizzazione, subsidenza**
- **Cambiamenti climatici e aumento nella frequenza di eventi estremi (mareggiate e "bombe d'acqua")**
- **3 sorgenti di Rischio di allagamento- FLUVIALE, COSTIERO e PLUVIALE**

SAFERPLACES VUOLE CONTRIBURE ALLO SVILUPPO DI STRUMENTI INNOVATIVI PER LA VALUTAZIONE, GESTIONE E MITIGAZIONE DEL RISCHIO IDRAULICO NELLE AREE URBANE

DEMOCRATIZZARE: I dati e gli strumenti modellistici disponibili devono essere estesi ad una platea di potenziali utenti più ampia al fine di supportare le decisioni in materia di resilienza climatica urbana.

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SaferPLACES's– **COME**

Sviluppo di un servizio/piattaforma Cloud-web dedicate per la mappatura del pericolo e del rischio idraulico in aree urbane

1. RICERCA e INNOVAZIONE - Nuovi modelli per la mappatura del rischio allagamento (fluviale, pluviale e costiero) specifici per le aree urbane :
   - Fast Dem-based flood hazard models
   - New Bayesians Damage assessment models
2. Open Data: Geospatial and Climate projections (sea levels, extreme rainfalls, river flowrate) – Copernicus C3S
3. CO-DESIGN and CO-DEVELOPMENT con gli End-Users
   - 3 CITTA' PILOTA (Rimini, Pamplona and Cologne)
   - MILANO, BOLOGNA, CESENATICO

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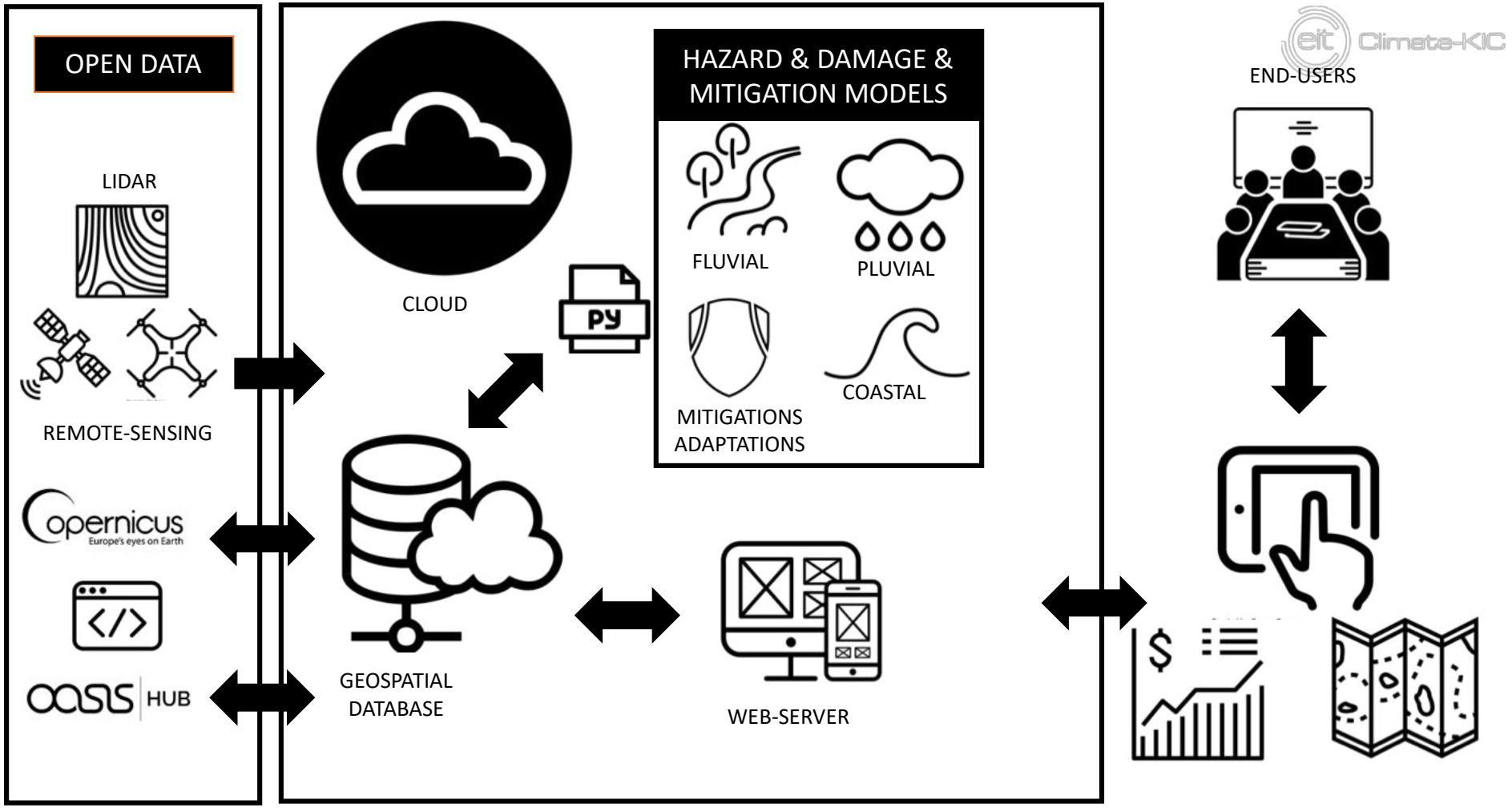
SaferPLACES – Cloud Web Platform



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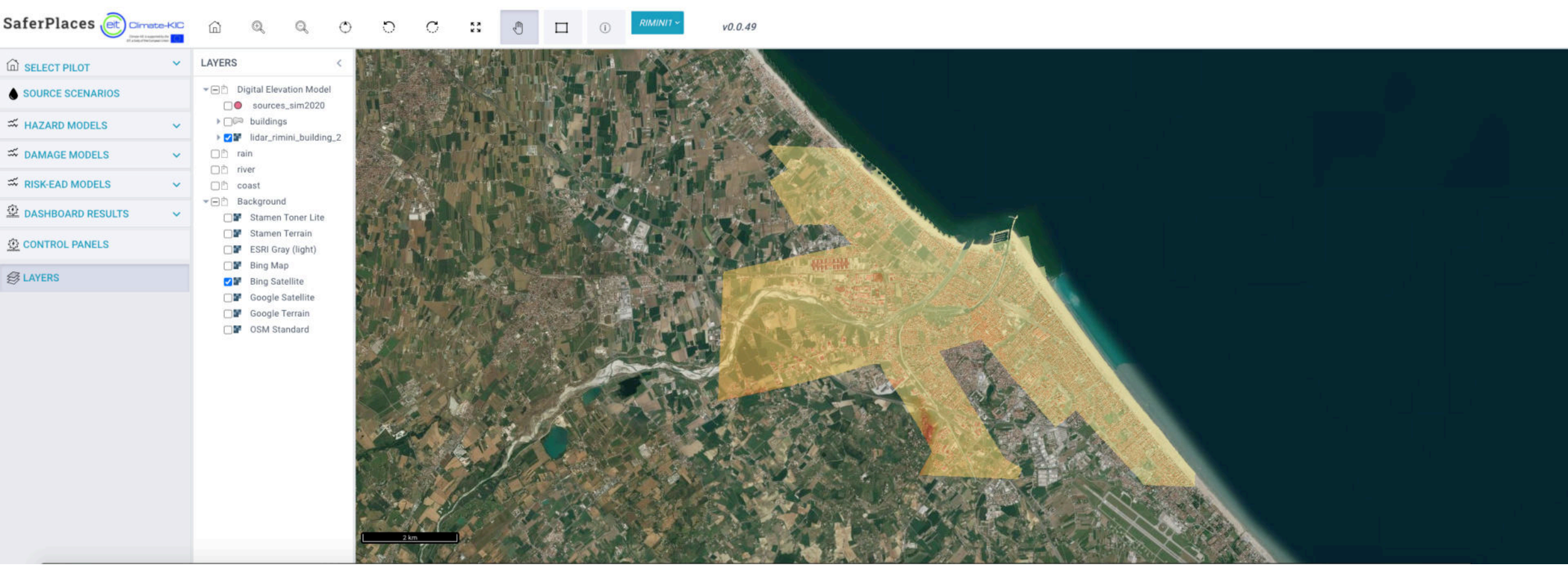
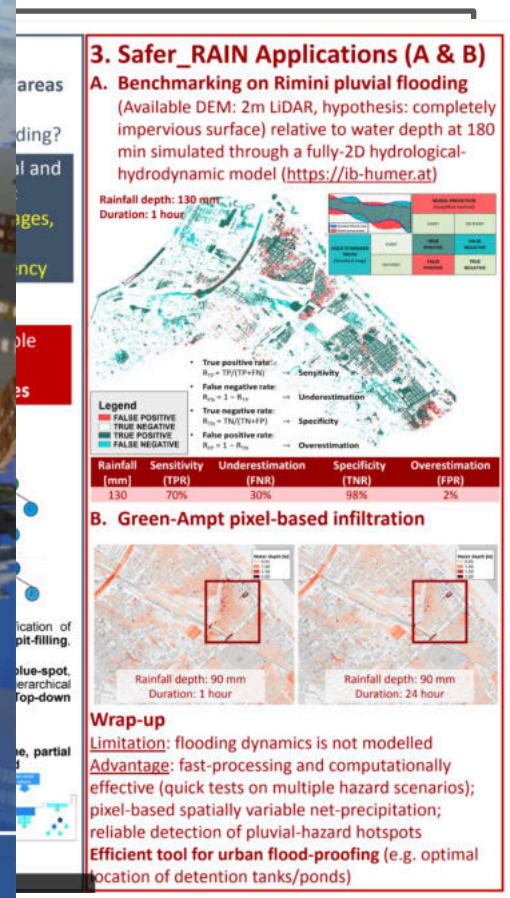
SaferPLACES PLATFORM – Beta Version ONLINE



SaferPLACES - Flood Hazard Models

- Simplified Raster-based static (not numerical hydrodynamic) flood hazard mapping tools
- Computationally efficient methods
- Exploiting High Resolution DEM (@1-2m) LIDAR
- **Safer_RAIN-** Hierarchical Filling-&-Spilling)
  - Samela et al. 2020 **https://doi.org/10.3390/w12061514**
- **Safer_COAST** - Fast Region Growing Algorithm (Python Numba)
- **Safer_RIVER-** AI-based binary classification of Flood prone-areas from GFI (Geomorphic Flood Index)
  - https://gecosistema.com/cloud-web-modeling-tools/smartflood/
  - Samela et al. (Adv. Water Resour., 2017)
  - Tavares da Costa et al., https://doi.org/10.1016/j.envsoft.2019.04.010



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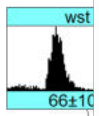
Flood Damage Assessment – Safer_DAMAGE

- Non-parametric Bayesian Network Model - probabilistic
- parameterize widely used depth-damage functions
- accounts for spatiotemporal heterogeneity in damage processes

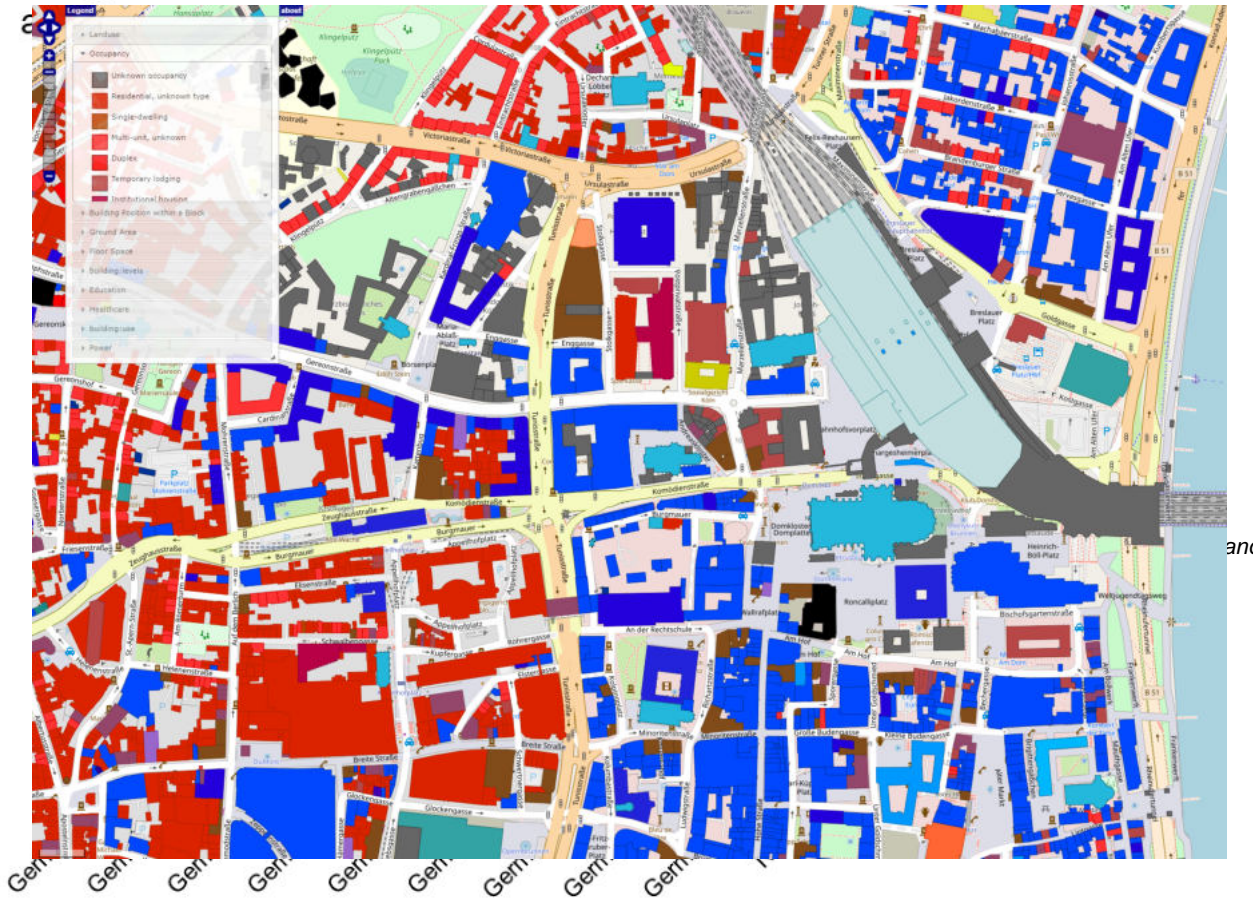
Water depth [cm]



Relative contents loss [0-1]

GFZ Helmholtz Centre POTSDAM

Flow velocity [m/s]



https://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2019-313/

SaferPlaces

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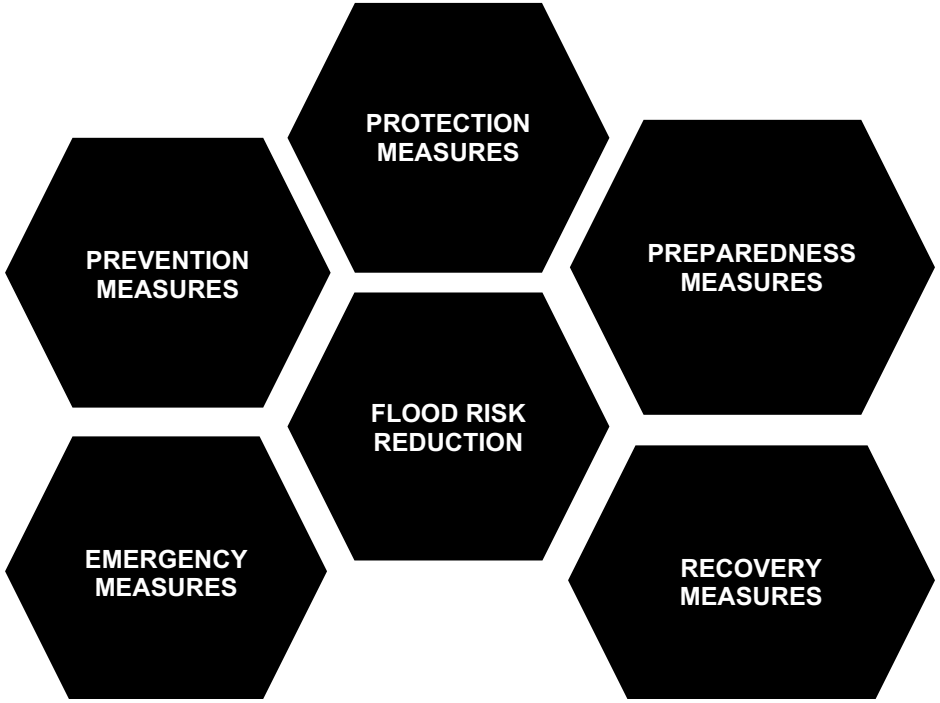
SaferPLACES – Le Misure di Mitigazione

- Mitigation measures have been classified into five groups.
- Measures that can be implemented in SAFERPLACES models have been identified, including five qualitative descriptors to characterise each flood mitigation measure



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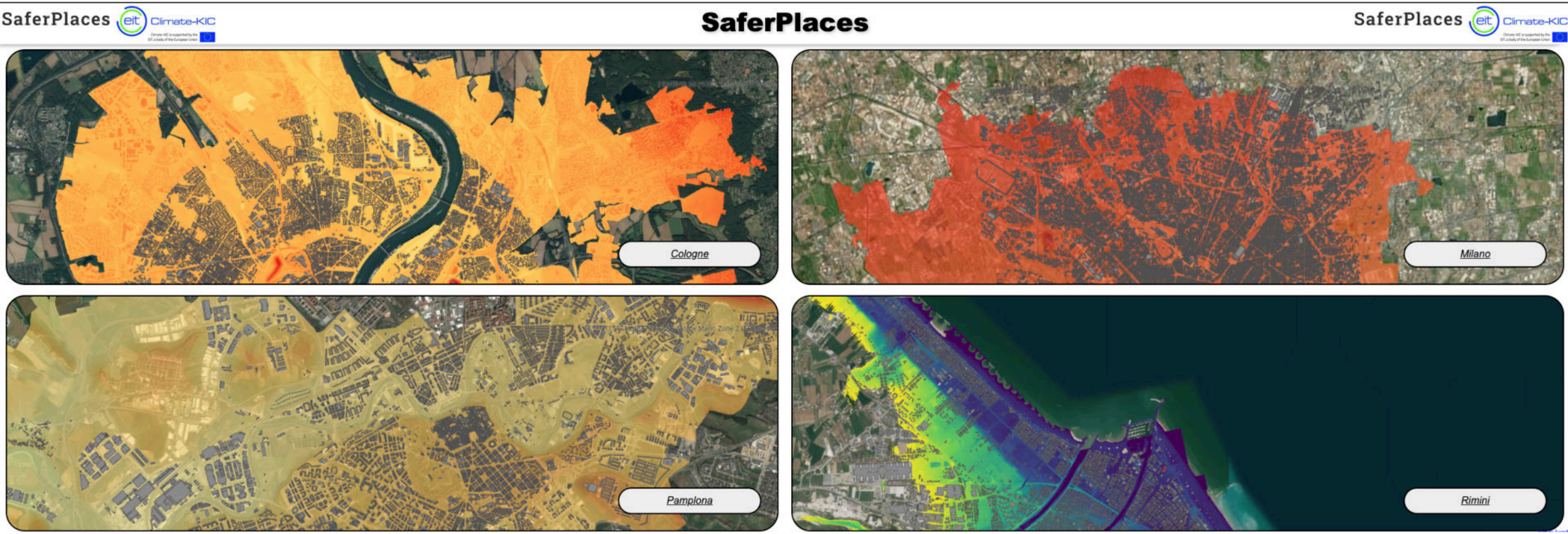
Le 4 città PILOTA



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SafeRIMINI: Rimini Pilot Case

- Supporto per la progettazione del Parco del Mare come misura di mitigazione per il rischio di allagamento
  - Proiezioni climatiche ESL
  - Altezza della Duna
  - Analisi Costi/Benefici
- Rischio da Nubifragi
  - Supporto a HERA per la definizione di misire di mitigazione del rischio

SaferPlaces

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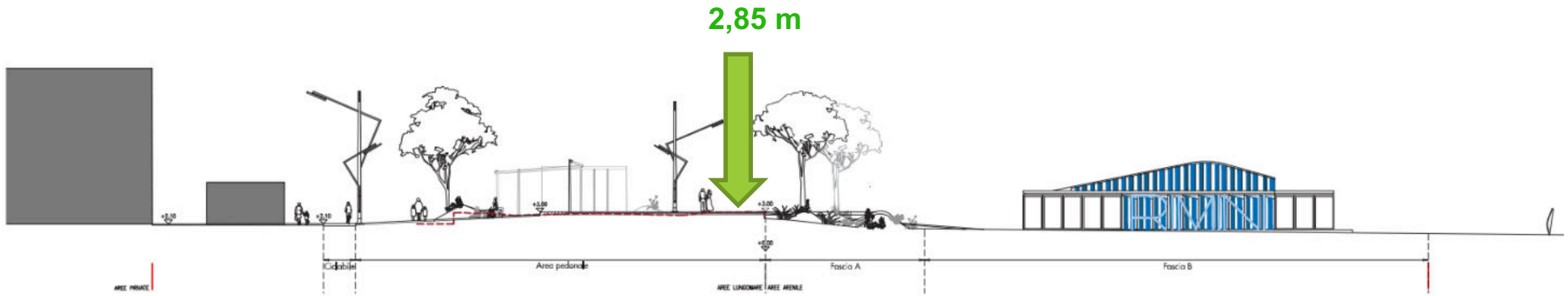
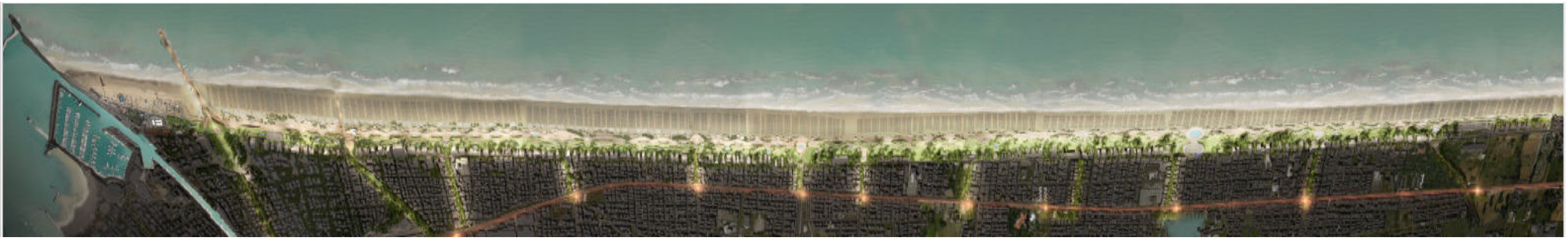
Parco del Mare – La Duna barriera

TRATTO 4





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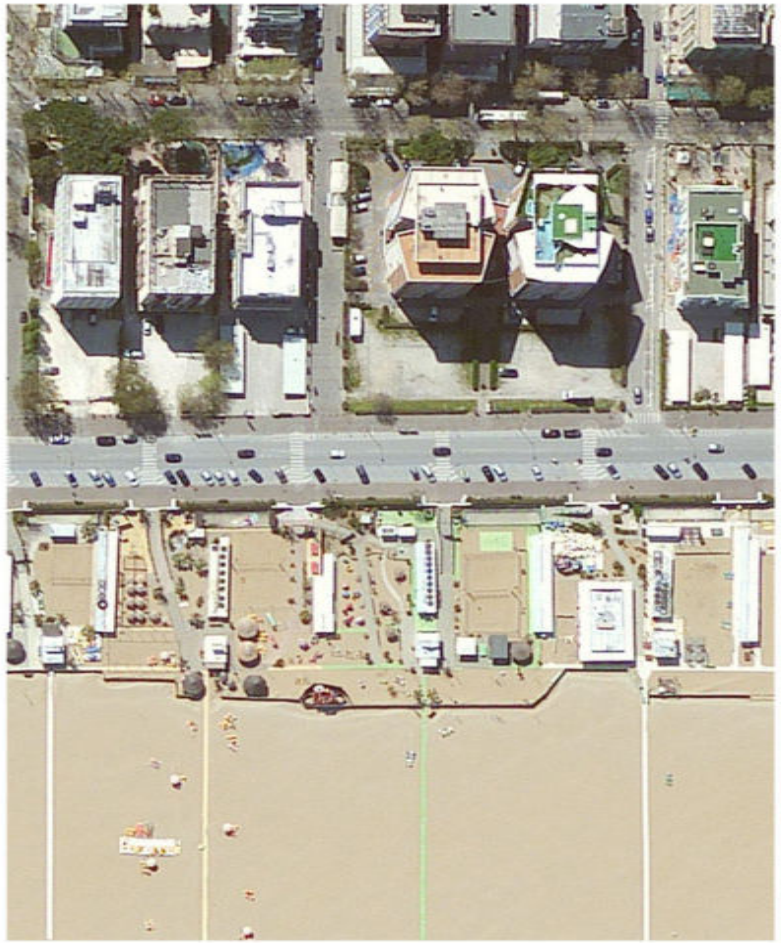
Parco del Mare – Rigenerazione Urbana NBS



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ANUGA

LisCoast JRC RP 100 2050 RCP 45 – 2,84m

https://github.com/GeoscienceAustralia/anuga_core

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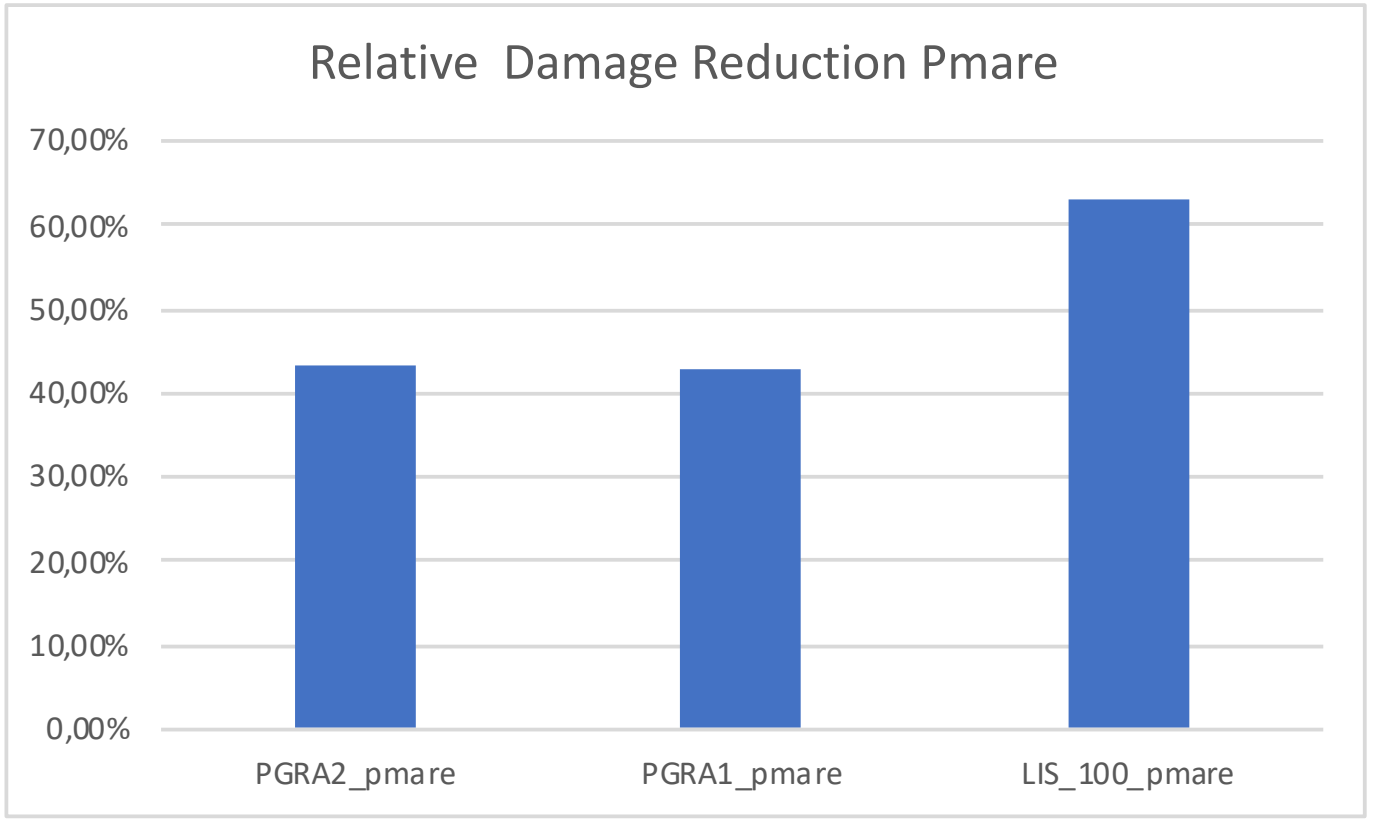
Safer_COAST

LisCoast JRC RP 100 2050 RCP 45 – 2,84 m ESL

Coastal Damage RIMINI – Pmare Mitigation Safer_DAMAGE (GFZ/CMCC)

- Bayesian Network damage estimation (GFZ) – Reduction in Economic Losses



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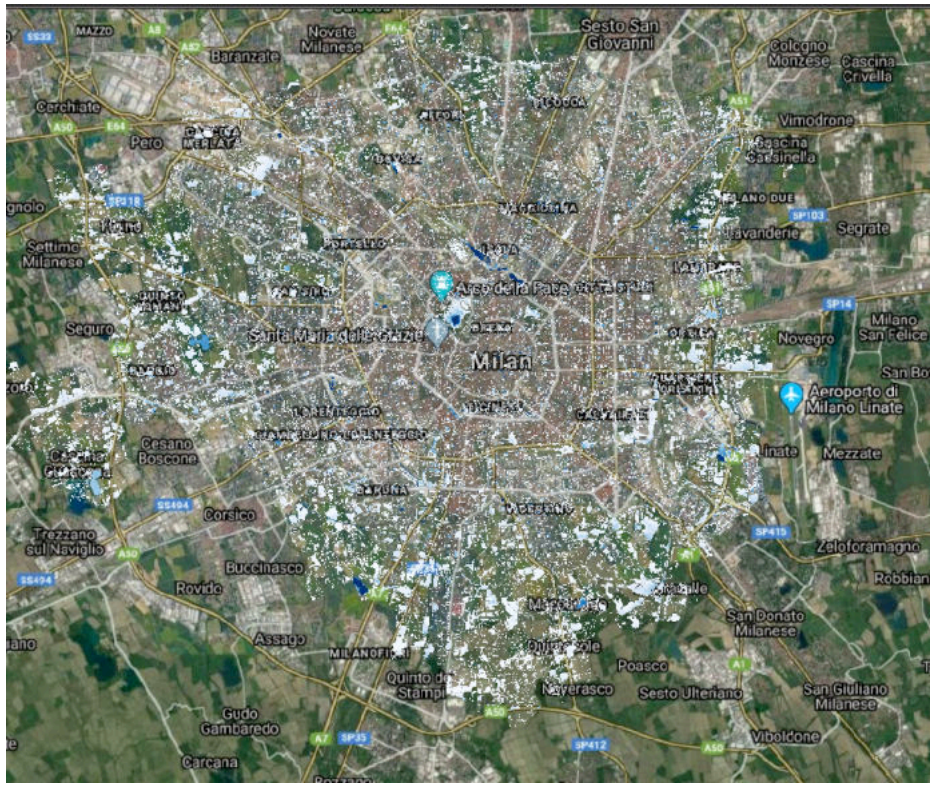
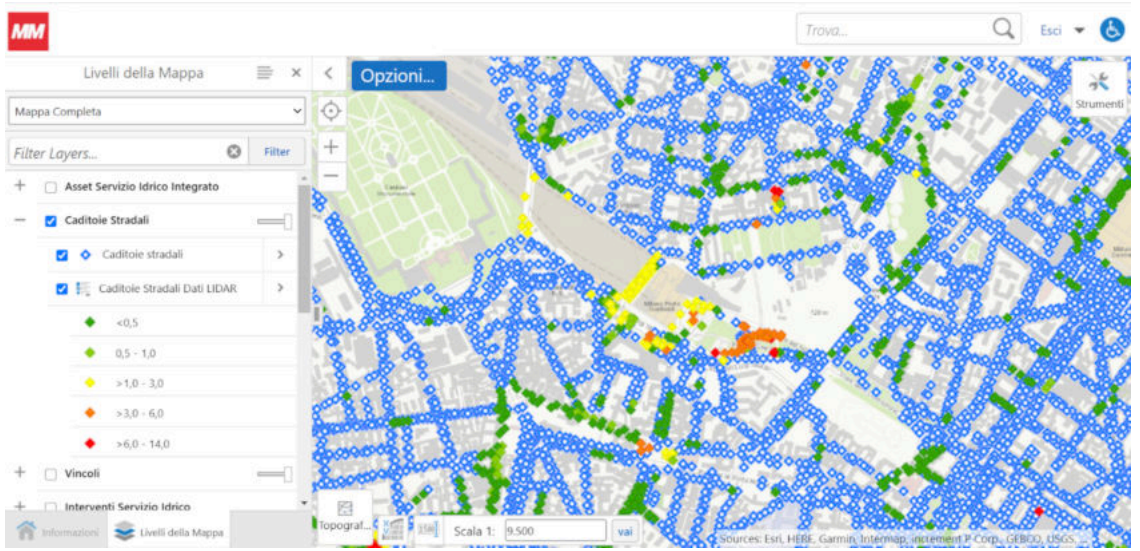
SaferMILANO

- MM SPA Identificazione delle caditoie maggiormente a rischio da allagamento pluviale





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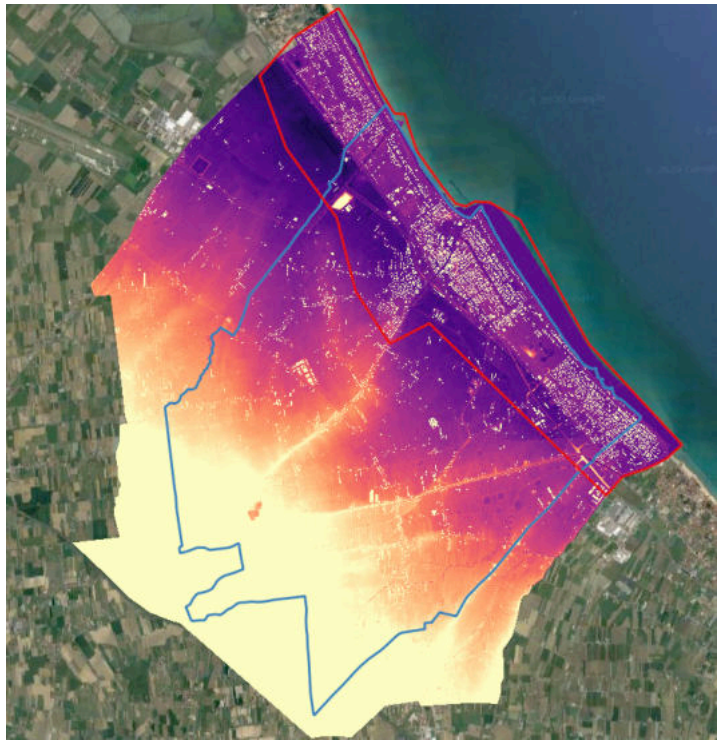
SaferCESENATICO

- Sviluppo del quadro conoscitivo del PUG per la parte relativa ai rischi idraulici
- Supporto decisionale per la definizione degli scenari di progetto
- Identificazione, localizzazione e supporto alla progettazione delle misure di mitigazione
- Dati
  - Orografia
    - Lidar DTM 2019 @1m
    - DTM RER @5m
    - Quote Vinciane e Canali
  - Sorgente Allagamento Costiero
    - Extreme Sea Level – Storici
    - Extreme Sea Level – Proiezioni 2050/2100
  - Sorgente Allagamento Pluviale
    - Scenari da Pioggie Sintetiche + Infiltrazione Naturale



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Scenari Costieri P3-P2-P1 RCP4.5 2050 – Lidar 2019

P1 -2.83m

P2 – 2.14 m

P3 – 1.82 m

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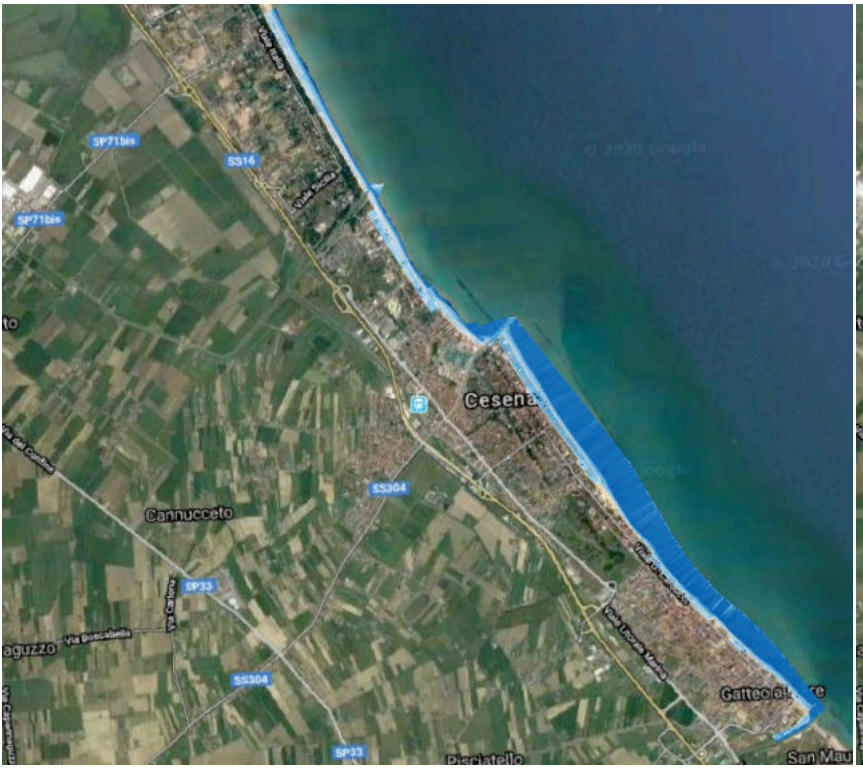
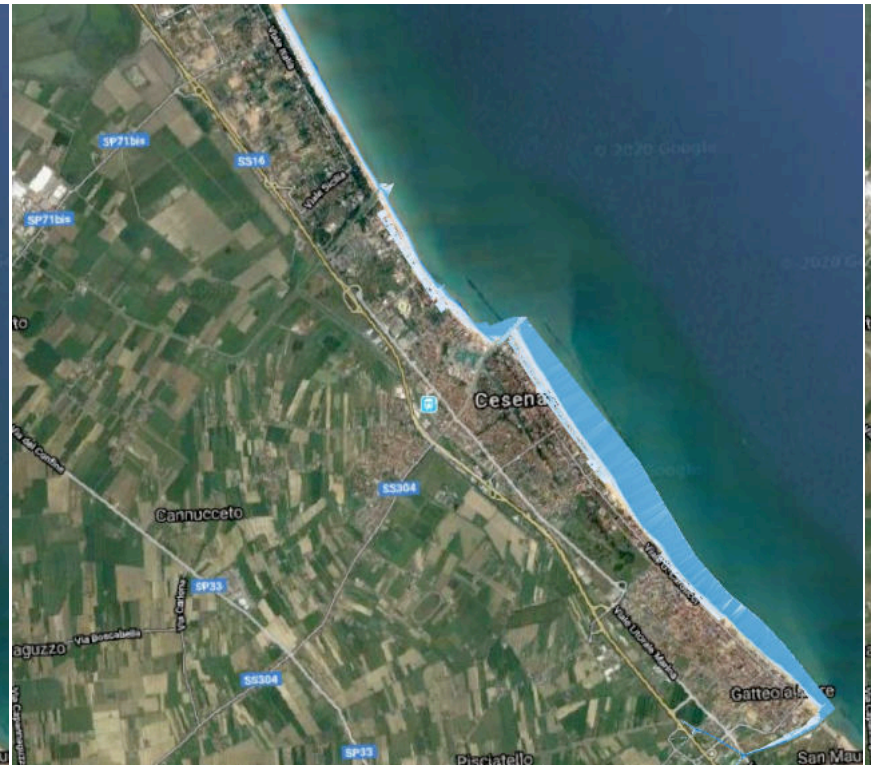
Scenari Costieri – RCP4.5_2050– Progetto

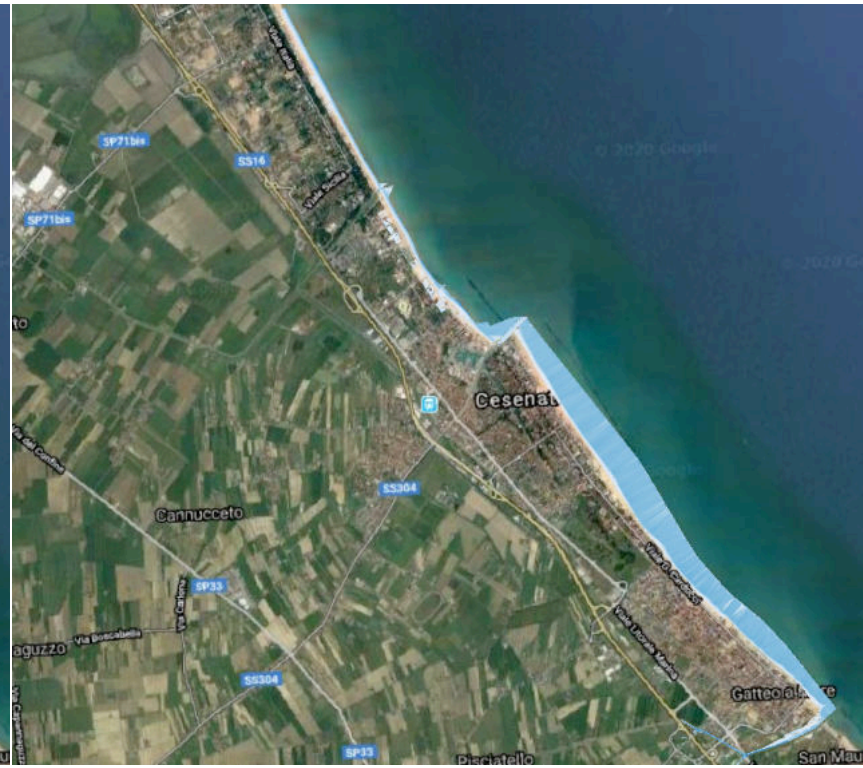
P1 -2.83m



P2 – 2.14 m



P3 – 1.82 m



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