CLIMAAX Project

CLIMAAX Methodological Framework
CLIMAAX Toolbox

Michaela Bachmann, IIASA
Milana Vučković, ECMWF

ClimateEurope2
Venice, 11 March 2024

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CLIMAAX
climate ready regions

The CLIMAAX Project

Regional and local Climate Risk Assessments
→ Financial, analytical and practical support

Framework, Toolbox, Pilots
→ testing data needs and diversity of requests

Cascading fund
→ Financial support for >50 regions

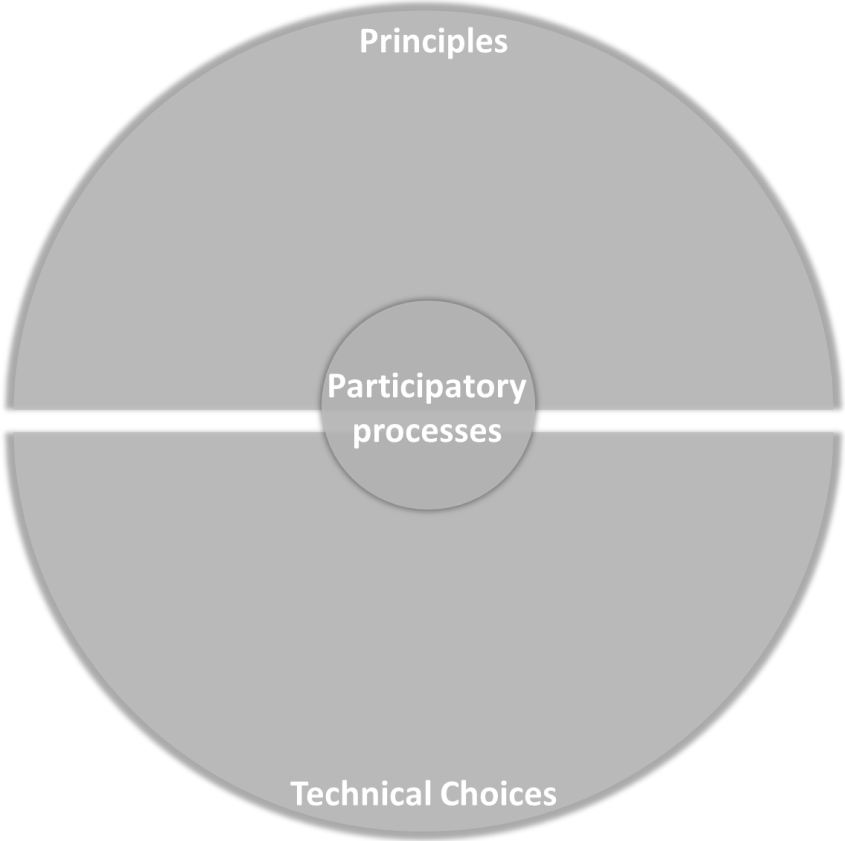
CLIMAAX

Climate ready regions

Part I:
CLIMAAX Methodological Framework

Michaela Bachmann, IIASA

Framework based on three pillars forming the conceptual background.



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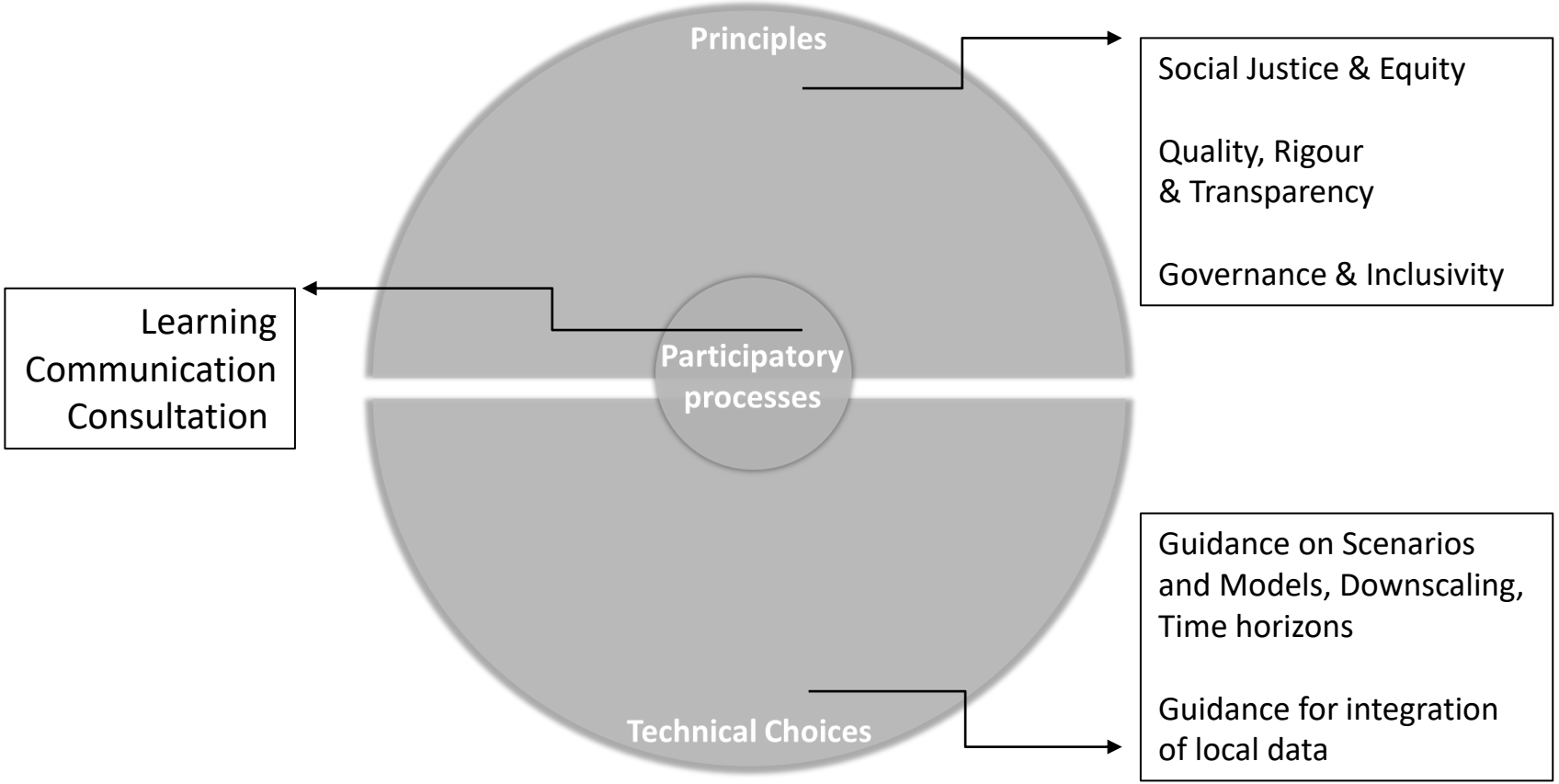
Conceptual background



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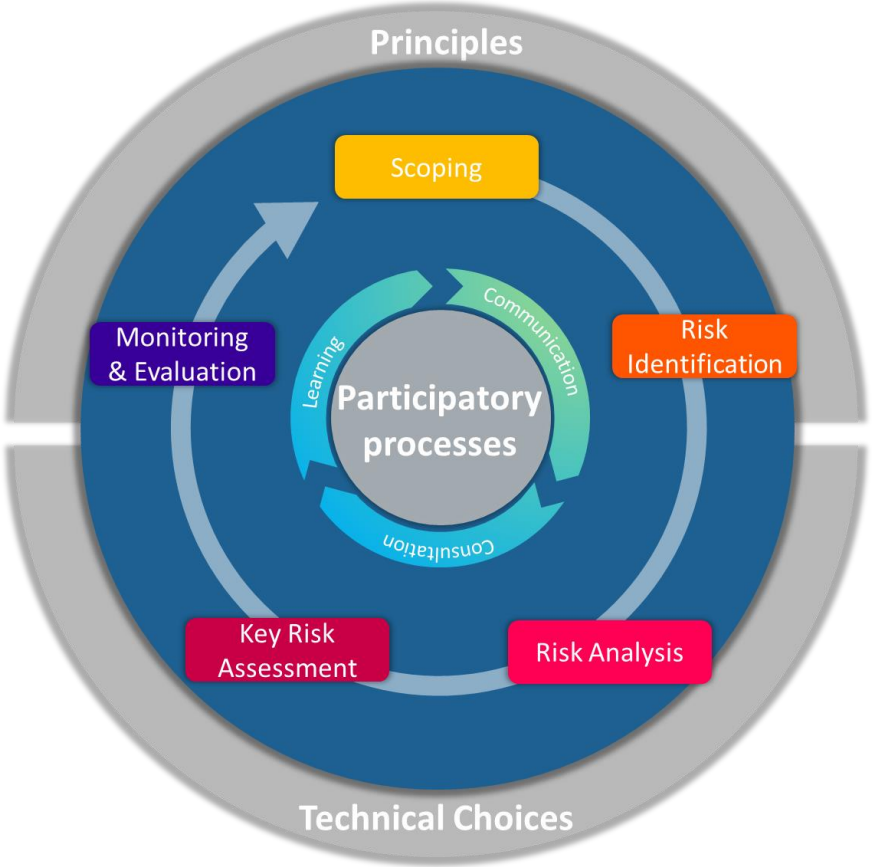
Background fosters operational steps that guide through **iterative** climate risk assessment.



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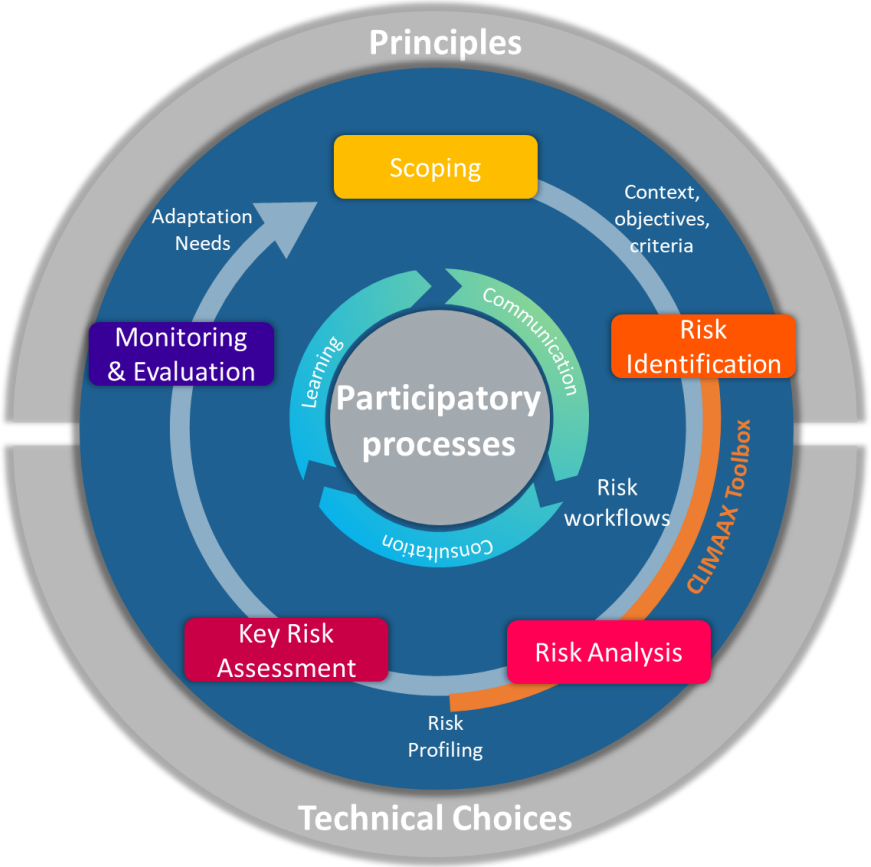
Framework steps introduce **Climate Risk Analysis Tool** (Toolbox).



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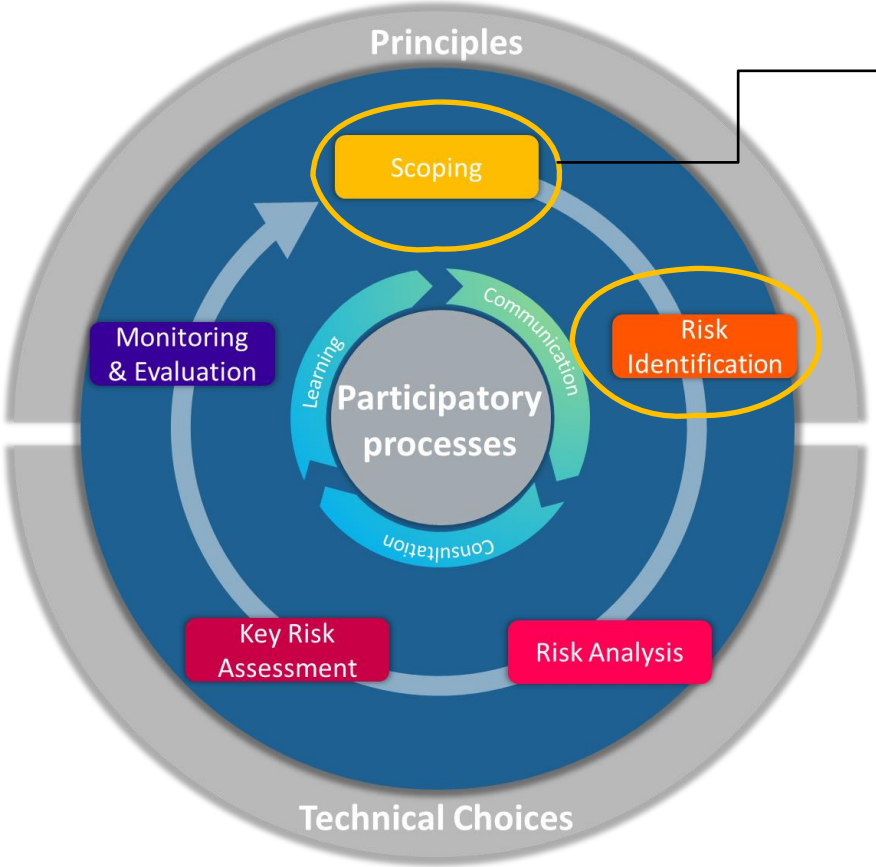
Scoping



Objectives
Context
Participatory Processes

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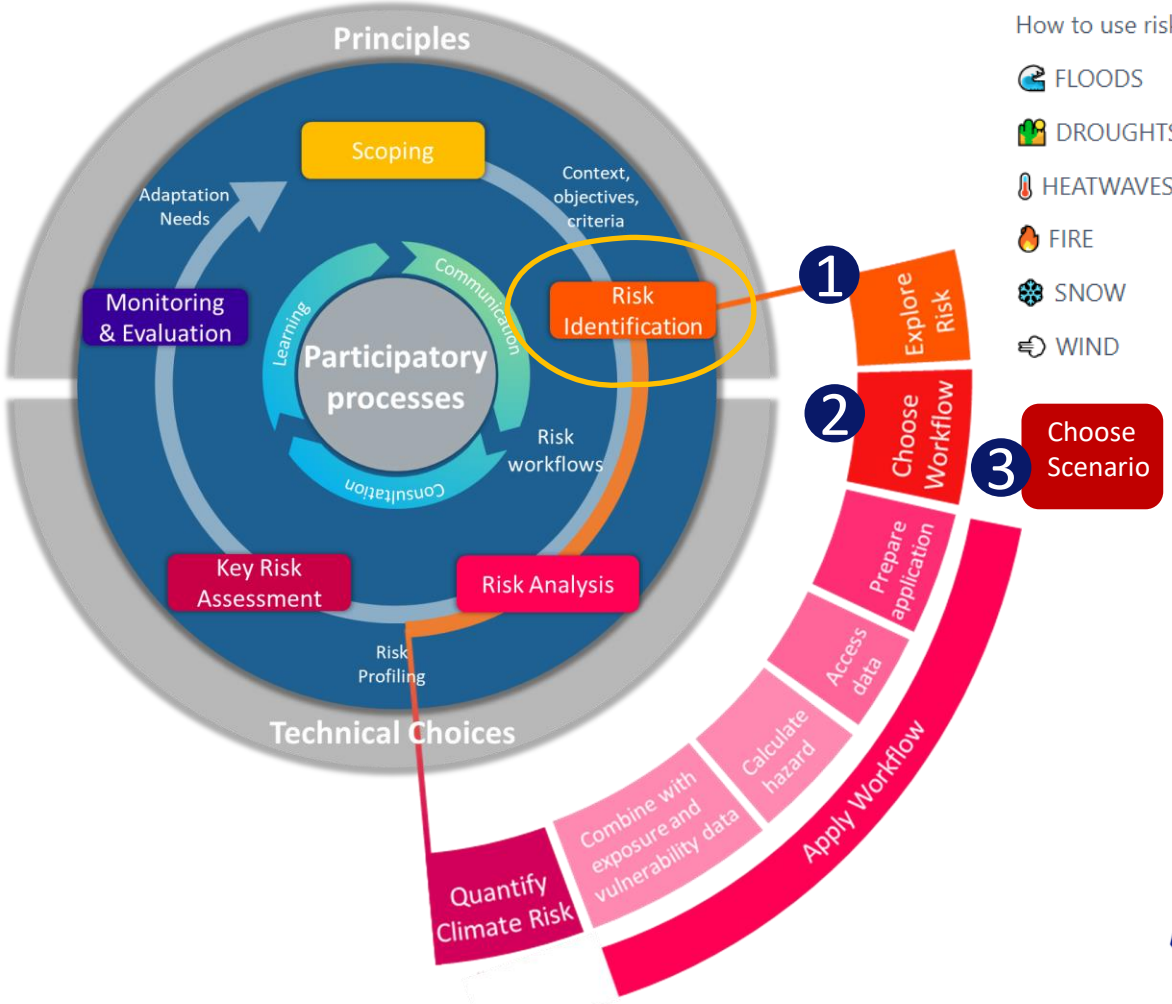
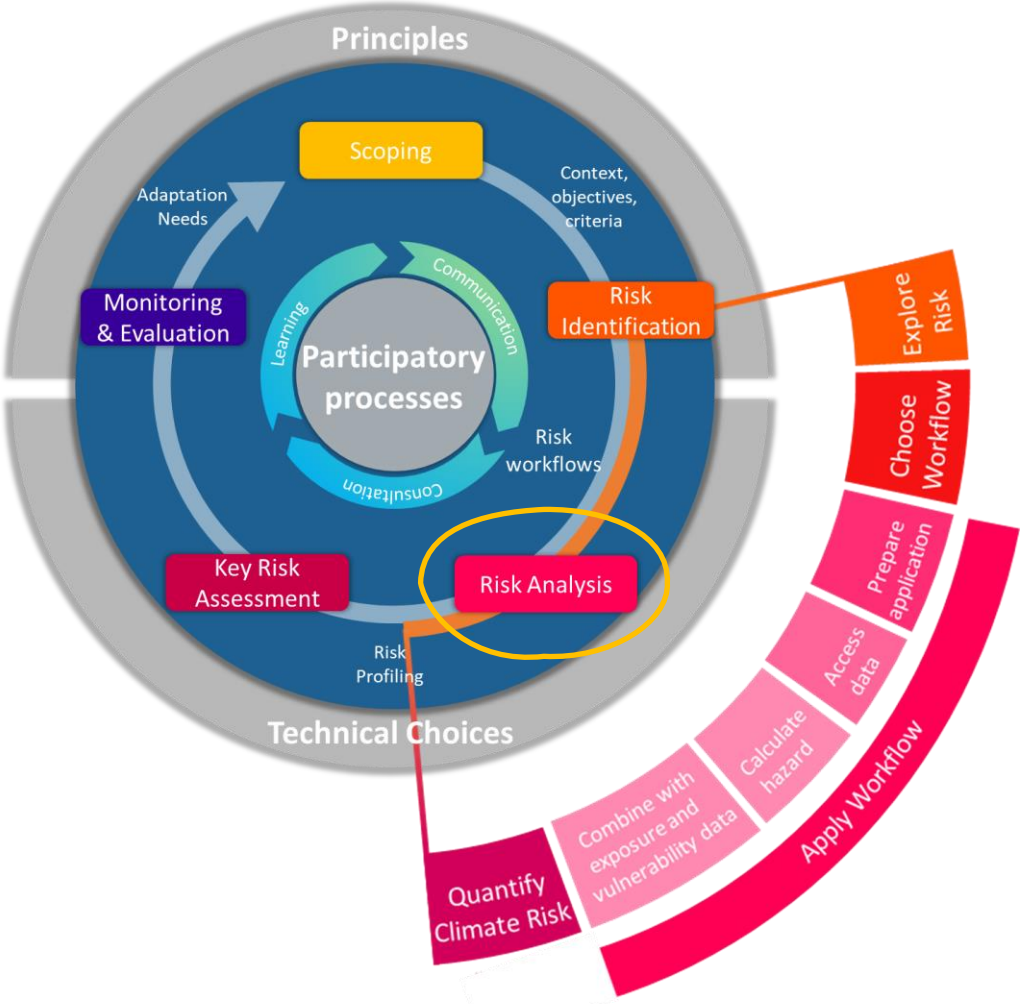
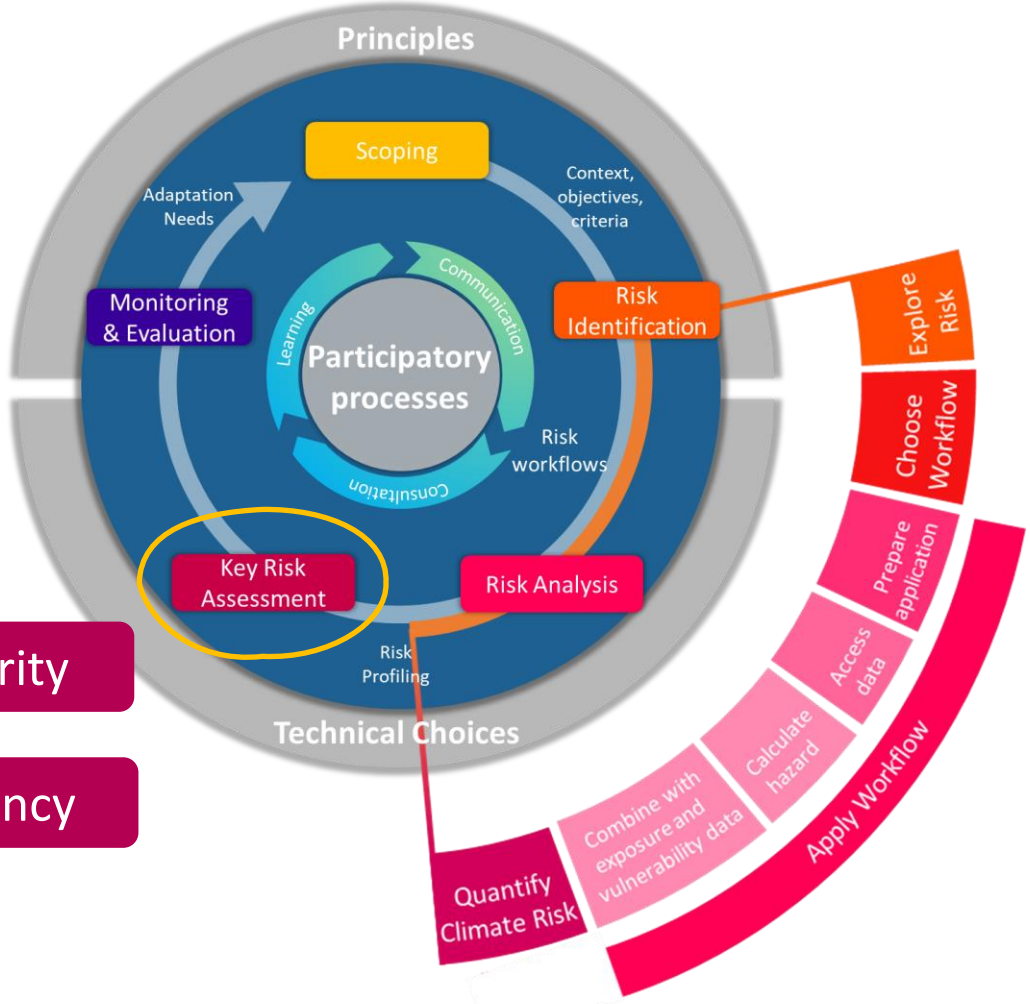
Risk Identification

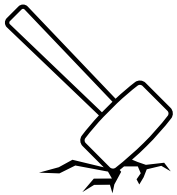


Risk Analysis



Key Risk Assessment

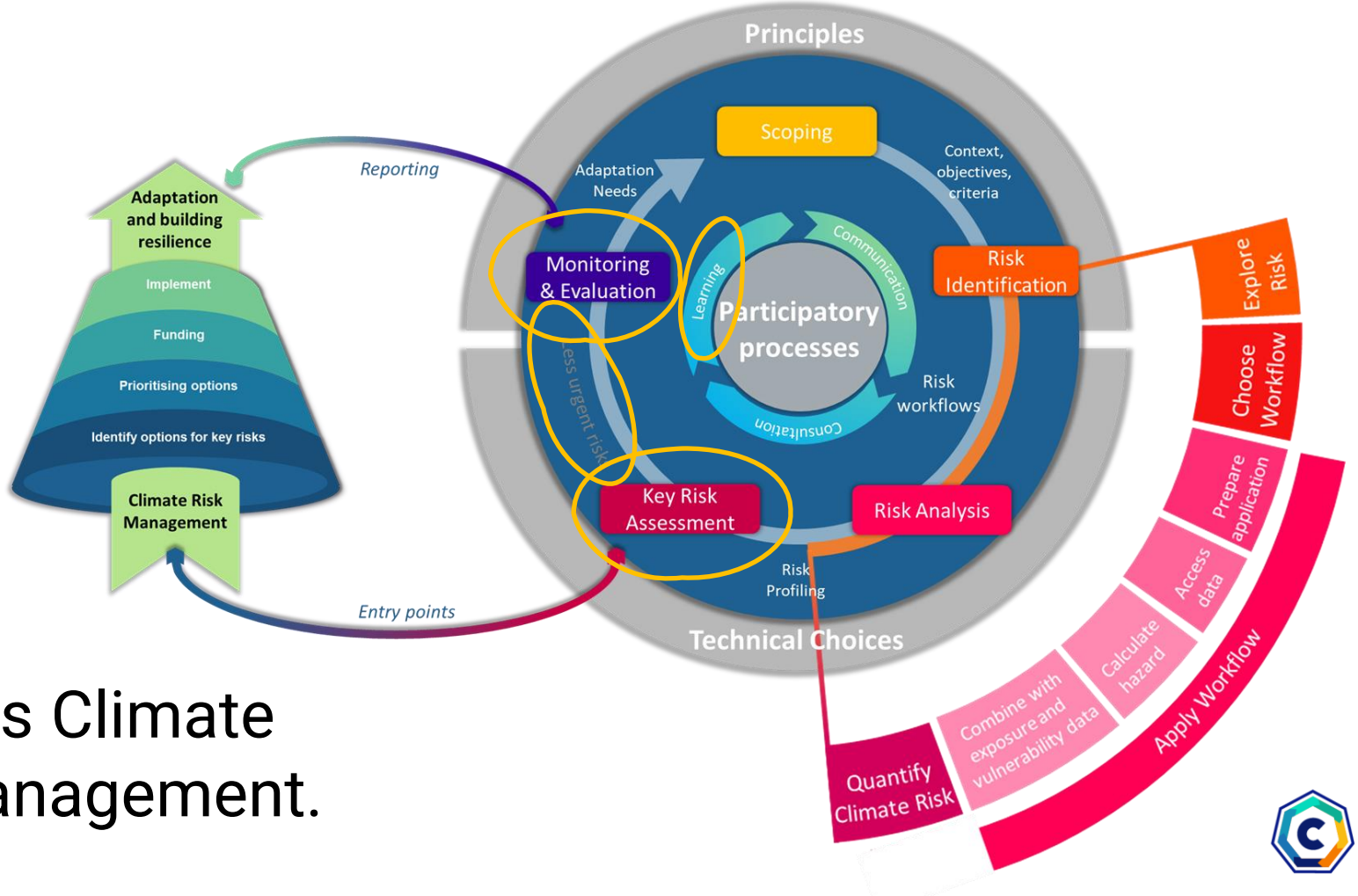




Risk Severity

Risk Urgency

Towards Climate Risk Management.



Part II:
CLIMAAX Toolbox

Milana Vučković, ECMWF

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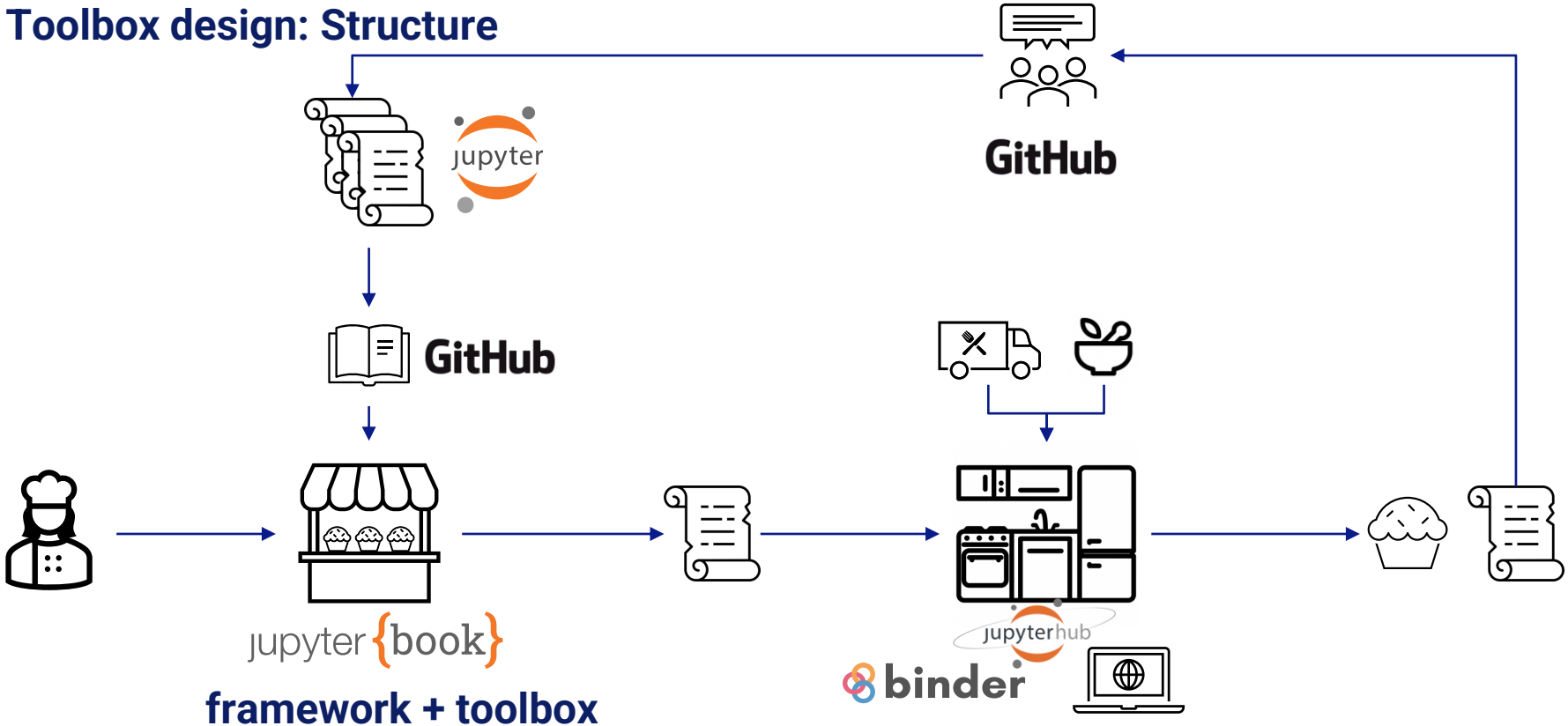
Toolbox design: Structure



framework + toolbox

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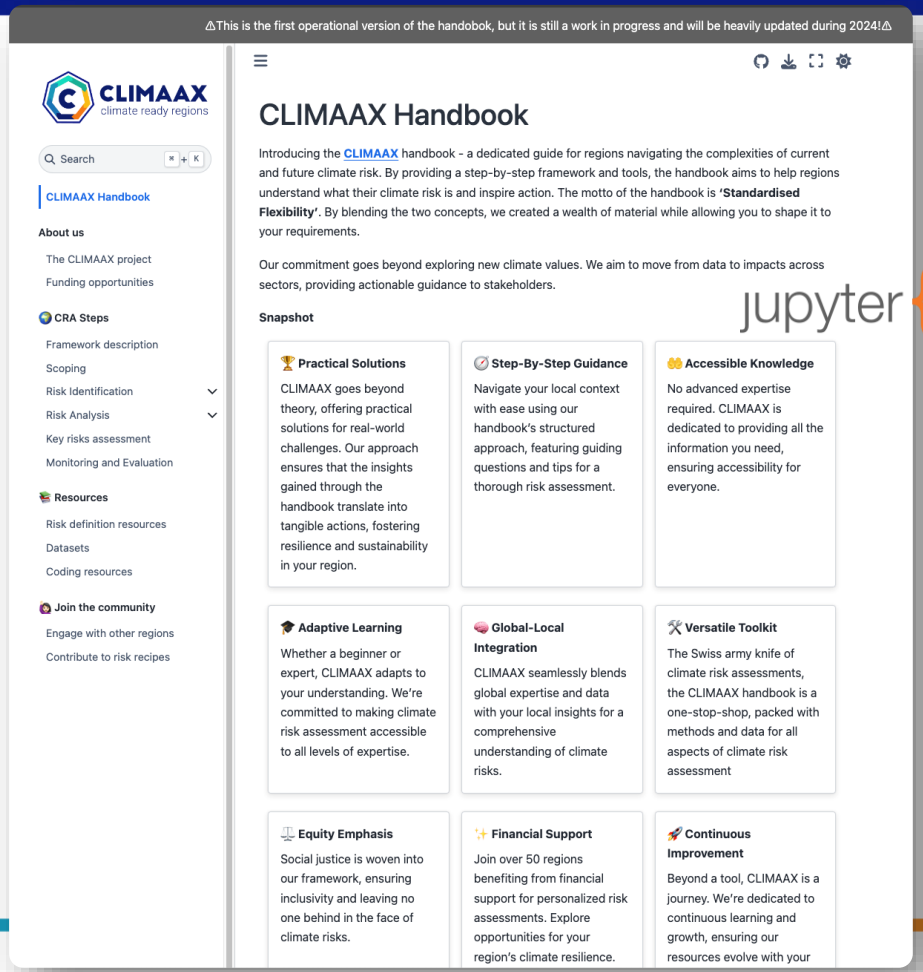
Bakery store

A **website** where all

- cookbooks
- recipes
- ingredients

are shown and explained

And where Framework lives



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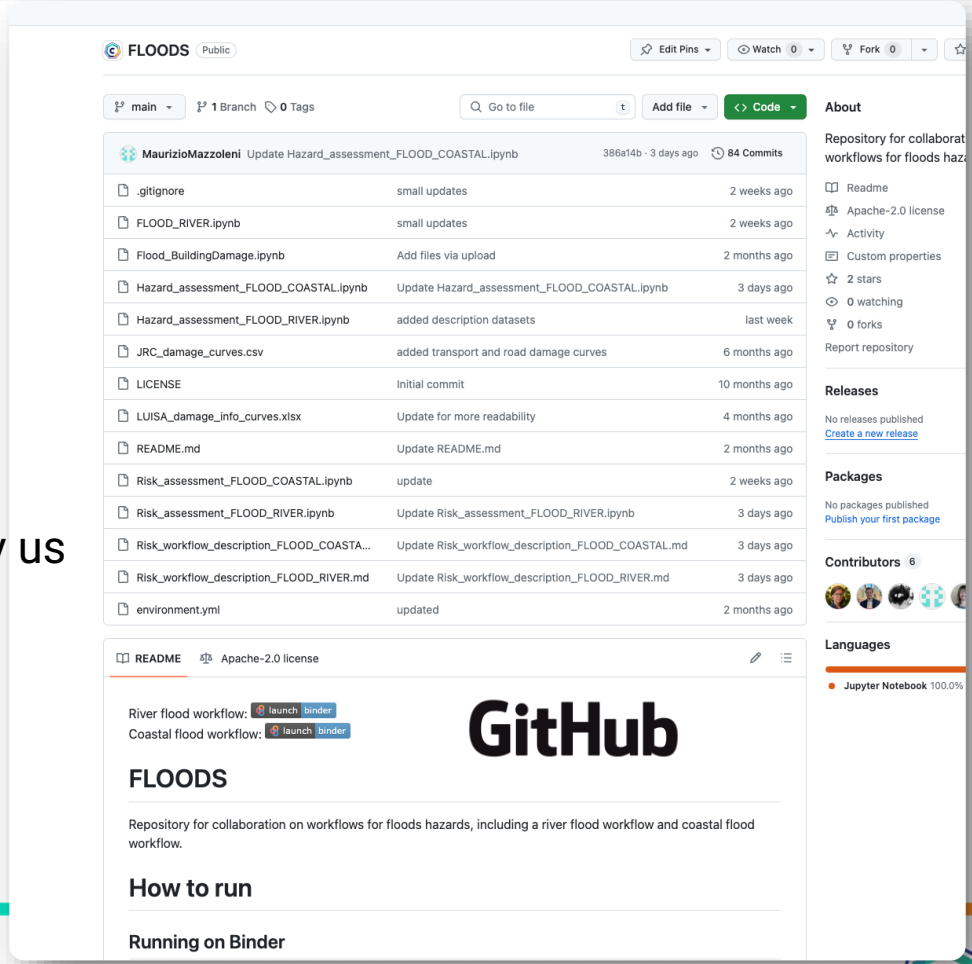
Risk cookbooks

Each cookbook contains:

- Various risk assessment **recipes**
- A supply closet for data supplied by us
- Files for installation



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Kitchen

Three levels of customisation:

binder No installation, small alterations, does not save work

jupyterhub Do alterations, save work, and upload local data but stay within a closed environment

Download and install on computer for complete flexibility and complexity

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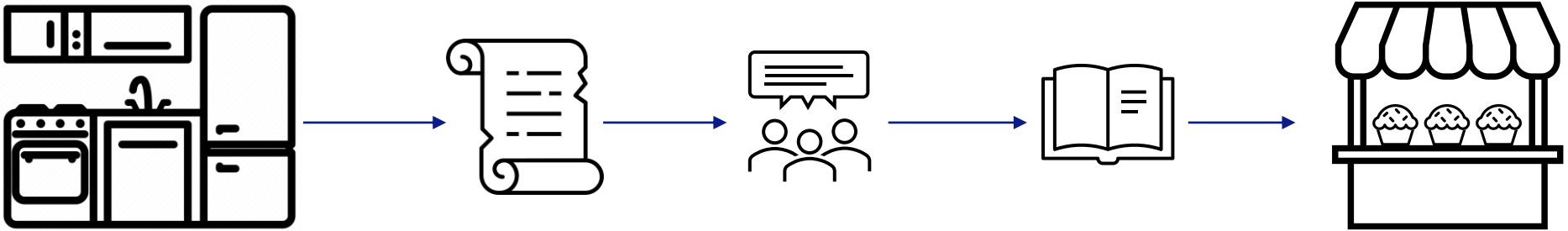
Co-create

From a chef’s kitchen to the bakery’s favourite



https://handbook.climaax.eu

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CLIMAAX
climate ready regions

www.climaax.eu

Thanks

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Project 101112737 — ARCADIA

Co-funded by the European Union

Project ARCADIA:

Which climate services to support the pathway to resilience through NBS of 8 European Regions?

Arianna Cecchi, ART-ER, Italy.

Climateurope2, Venezia Mestre. 11/03/2024

Co-funded by the European Union

ARCADIA

Transformative climate resilience by Nature-based Solutions in the continental bio-geographical region

HORIZON-MISS-2022-CLIMA-01-06
ID# 101112737

ARCADIA contributes to the
EU Mission on Adaptation to Climate Change

Co-funded by the European Union

Some figures

43 partners

30: public bodies & agencies

10: Research and accademia

3: companies

9 Countries

5 model regions
IT, AT, HR, SE, DK

3 fellow regions
BG, RO, SI

\+ NL

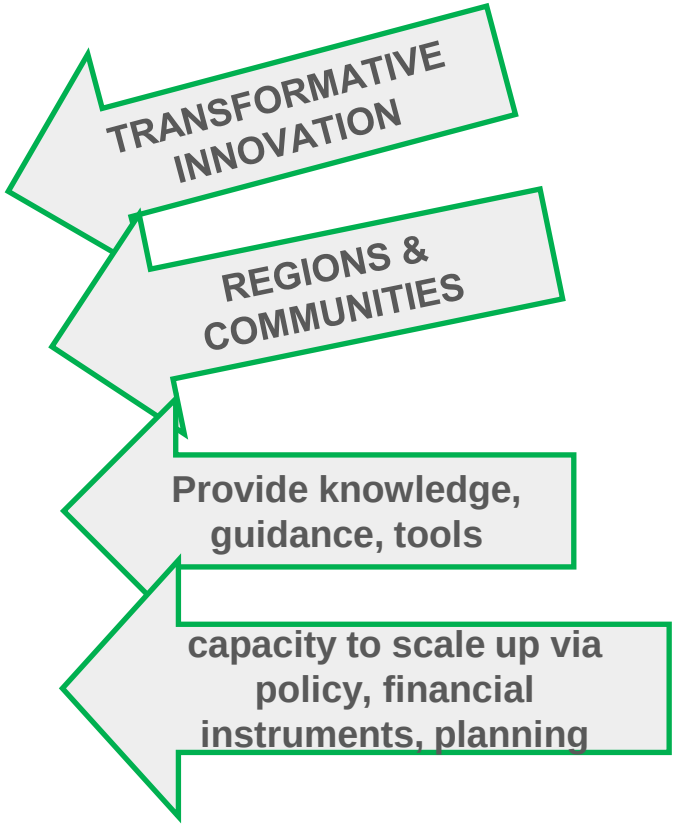
≅ 18,5M€ total value

≅ 17,5M€
EU contribution

Co-funded by the European Union

Main project goal

- Galvanise **transformative adaptation using nature-based solutions across European** regions and support them in designing consistent regional **blue-green infrastructure networks.**
- We will assist the **regions & communities** in **accessing up-to-date, evidence-, knowhow-based, actionable knowledge,** guidance, knowledge-intense tools and services.
- We will **foster enabling conditions and capabilities** for nature based leveraged transformation and green recovery, to perform tailored **risk** & performance **assessment**, mobilise sustainable **finance** & resources and close adaptation financial gap**, scale-up** solutions for larger impact and design adaptation services for transformative change to resilience.



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Map: excerpt from: https://op.europa.eu/s/zhss modified by the author of this presentation.
Author of theoriginal map: Commissione europea, Direzione generale della Comunicazione, *The European Union*, Ufficio delle pubblicazioni dell'Unione europea, 2023. https://data.europa.eu/doi/10.2775/003765

ARCADIA regions

MODEL REGIONS

- Emilia-Romagna, Italy
- Lower Austria, Austria
- Zagreb; Krapina-Zagorje, Croatia
- Skåne, Sweden
- Funen, Denmark

FELLOW REGIONS

- Plovdiv, Bulgaria
- Centru, Romania
- Podravje, Slovenia

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Emilia-Romagna

Map from: https://it.wikipedia.org/wiki/Emilia-Romagna
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Challenge:

Increase the territory resilience - esp. to exceptional rainfall flooding - through Sustainable and Active Forest Management

Areas of work *relevant to climate services*

Develop pilot Forest land use plans addressing:

- Erosion protection and hydrogeological safety
- Valorisation of forests natural capital (including PES)
- Enhancement of water-related ecosystem services

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Lower Austria

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Challenges:

HEAT-related stress in urban areas
DROUGHT in agriculture
TORRENTIAL RAIN (runoff erosion)

Areas of work *relevant to climate services*

- Water managemnet in urban areas
- Multifunctional shelterbelt (agriculture)
  - biodiversity / corridors
  - soil water retention
- Urban (community) green spaces
- Mainstream NBS solutions knowledge and practices to all the municipalities of the region

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Zagreb & Krapina-Zagorje

Map from:
https://commons.wikimedia.org/wiki/File:Location_of_Zagreb_in_Croatia.PNG
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Map from: https://en.wikipedia.org/wiki/Krapina-Zagorje_County
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Challenges:

Zagreb: urban heat island & urban flooding

KZ: Landslides; Biodiversity-agriculture

Areas of work *relevant to climate services*

- Spatial planning and implementation mechanism with synergistic approach to mitigation and adatpation
- Integration of climate-, adaptation-, mitigation–related data in a geo-spatial data system
- Modelling NBS solutions and assess their impact on climate risk.
- Portfolio of NBS / identification and prioritisation of key NBS measures with the support of the GIS tool

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Map from: https://en.wikipedia.org/wiki/Skåne_County
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Challenges:

- Floodings after intense rainfalls
- Drought across Skåne

Areas of work *relevant to climate services*

- Integrative Water Cycle Strategy
- Identify spaces for NBS (landscape – city trade off)
- Widen the knowledge about heat and climate change risks

Co-funded by the European Union

Funen

Map from: https://en.wikipedia.org/wiki/Funen
By Los688 - File:Denmark location map.svg, CC BY 3.0, https://commons.wikimedia.org/w/index.php?curid=8228962

Challenges:

- Cloudburst and heavy precipitation
- Shallow groundwater rising
- Flooding from streams and lakes
- Storm surges and rising sea level

Areas of work *relevant to climate services*

- Integrated water cycle strategy (improvement aquatic environment)
- Sustainable drainage system (also with citizen science)
- Streams overflow/flooding ptoection
- Blue-green infrastructure network

Co-funded by the European Union

Climate service case: the Parco del Mare, Rimini (IT)

Performance Assessment of NbS and Green Infrastructure Networks

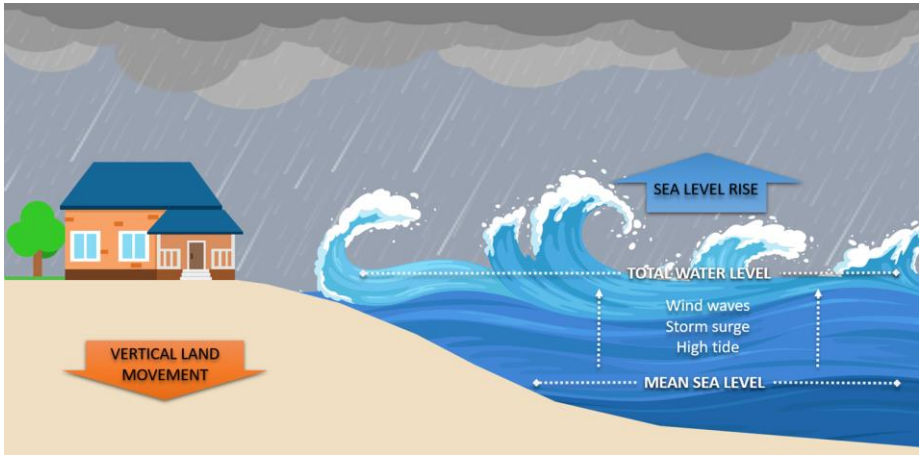
SaferPlaces and Parco del Mare - Scoping

- Green Urban/Sea Promenade Regeneration Plan
- Protecting the municipalities from Coastal Flooding

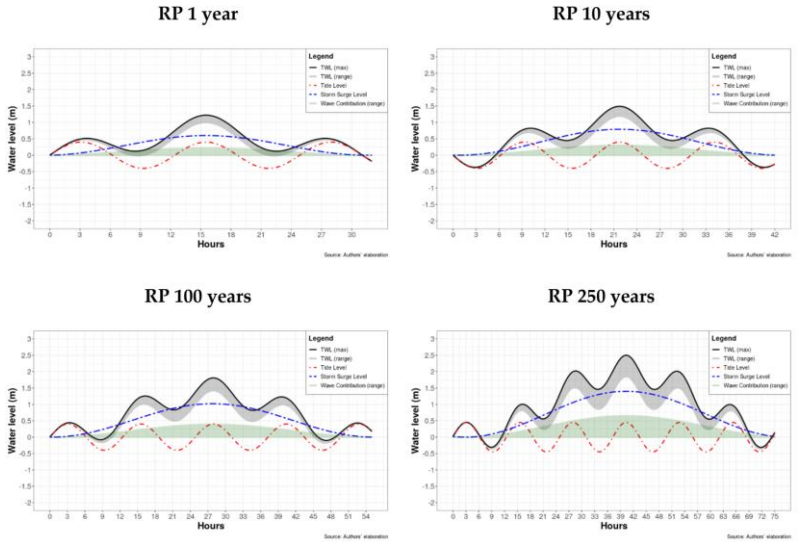
Co-funded by the European Union

Study case “Parco del Mare”/2

SaferPlaces and Parco del Mare – Hazard Selection and Data



https://nhess.copernicus.org/articles/22/265/2022/



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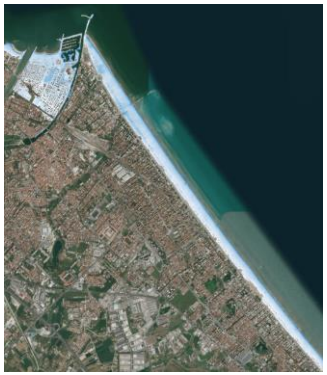
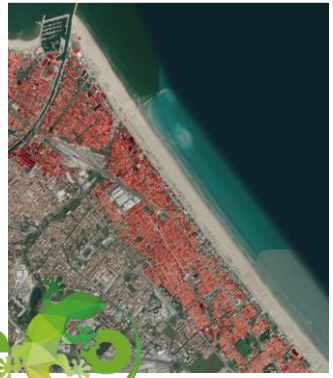
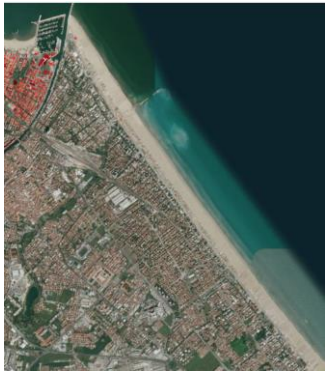
Study case “Parco del Mare”/3







Year 2050
Coastal Flooding Extension & Associated Damages

Without Parco del Mare (left) and with “Parco del Mare” (right)

Model – Hazard and Damage

Co-funded by the European Union

Arianna Cecchi, ART-ER

arianna.cecchi@art-er.it

ART-ER

ATTRACTIVENESS RESEARCH TERRITORY

EUROPEAN UNION

EU MISSIONS

ADAPTATION TO CLIMATE CHANGE

Climateurope2 Festival – 11 March 2024

Philippe Tulkens
European Commission
Head of unit RTD B3 "Climate and planetary boundaries" & Deputy Mission Manager

#EUmissions #HorizonEU #MissionClimate

EUROPEAN UNION

A priority in the policy agenda

Italy's Recovery and Resilience Plan: 194.4 billion €
39% of the available funds expected to go to climate objectives

At EU level

European Commission

EU Strategy on Adaptation to Climate Change
- Adopted in February 2021
→ A building block of the European Green Deal

At National level

MINISTERO DELL'AMBIENTE E DELLA SICUREZZA ENERGETICA

New National Plan on adaptation to climate change
- Adopted in December 2023

At Regional/local level

A recent example:

New Strategy on adaptation to climate change, Roma Capitale
- Adopted in January 2024

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EU MISSIONS
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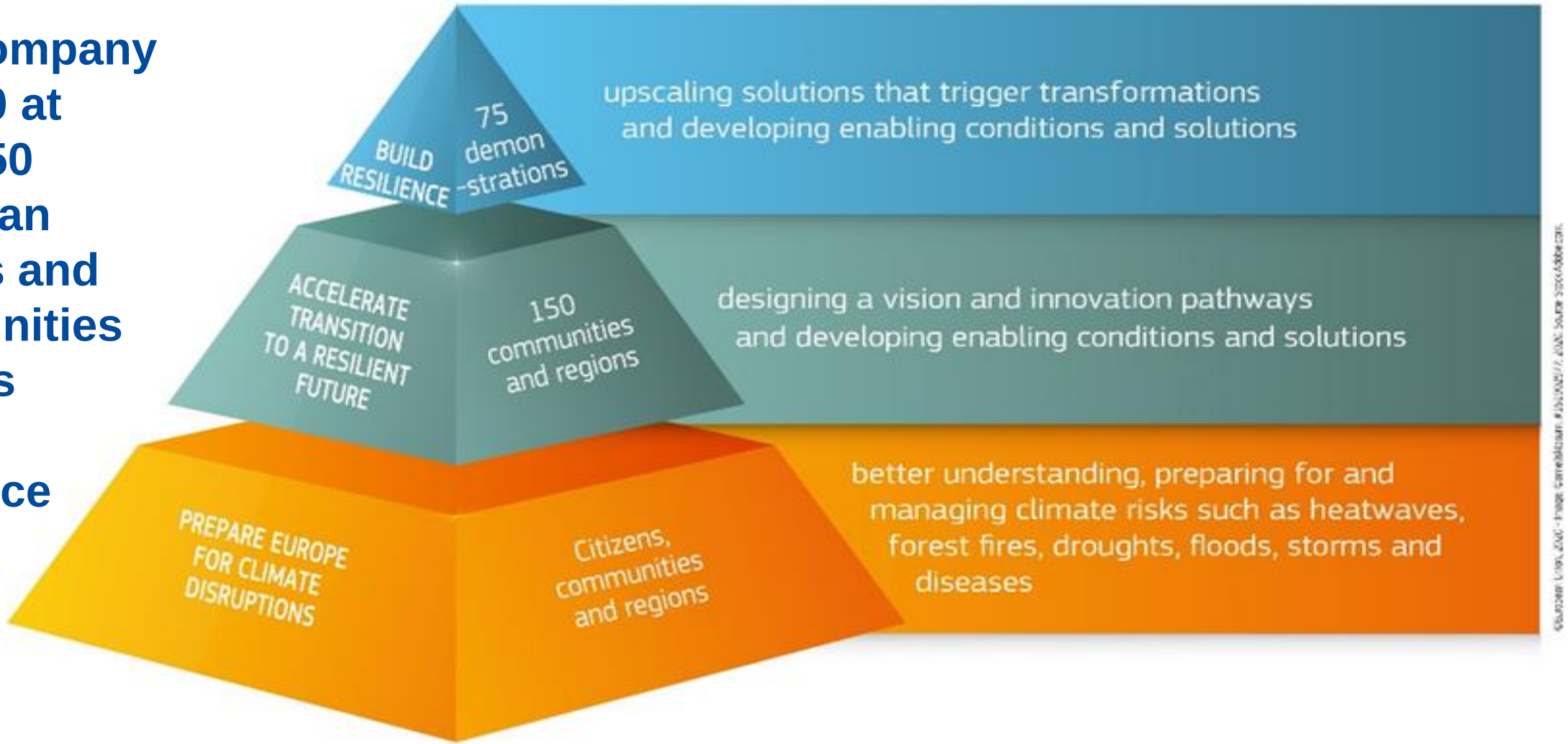
Mission objective

To accompany by 2030 at least 150 European regions and communities towards climate resilience

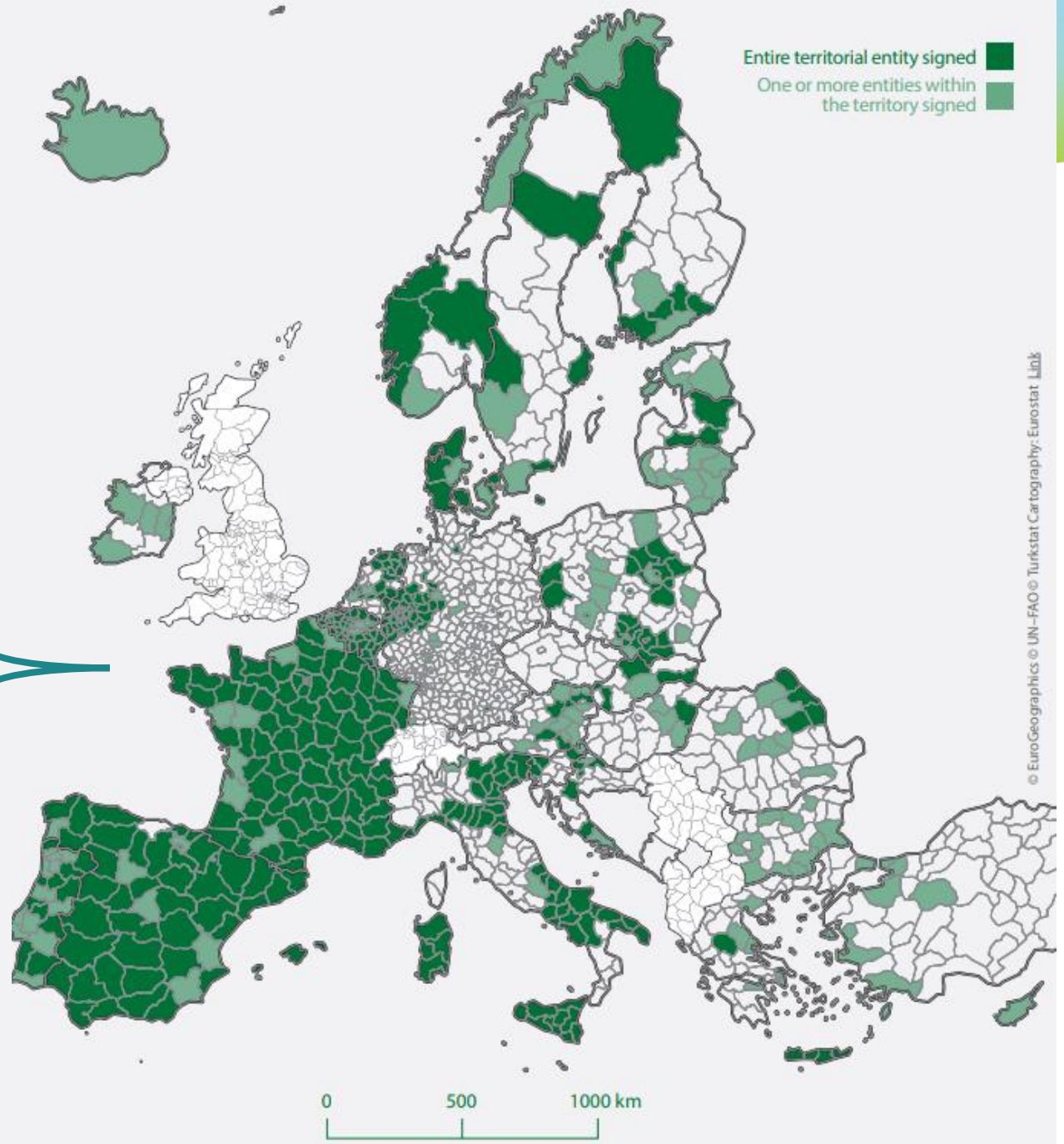


MAP OF EUROPEAN CHARTER SIGNATORIES

EU Mission on Adaptation to Climate Change

ITALY

- Abruzzo Region
- Arezzo City
- Autonomous Province of Trento
- Campania Region
- Cesano Maderno Municipality
- Sicily
- Emilia-Romagna Region
- Friuli Venezia Giulia Autonomous Region
- L'Aquila Municipality
- Liguria Region
- Molise Region
- Mountain Community of Valchiavenna
- Potenza Province
- Puglia Region
- Sardinia
- Veneto



EU MISSIONS
ADAPTATION TO CLIMATE CHANGE

311 Mission Charter Signatories

- ✓ *294 EU regions and local authorities, from 25 EU Member States*
- ✓ *17 regions and local authorities from countries associated to Horizon Europe*

Factsheets:

Meet the 311 signatories of the Mission Charter
(latest version, December 2023)

Analysis of information provided by the signatories of the charter of the Mission Adaptation to Climate Change
(EU 2023)

EUROPEAN UNION

EU MISSIONS
ADAPTATION TO CLIMATE CHANGE

Supporting Italy towards climate resilience

Top 3 beneficiary from Mission calls (EU contribution)

Spain	**48.4 m€**
The Netherlands	41.9 m€
Italy	31.8 m€

Out of 33 Member States + associated countries
Total: 293 million €

Member State with most demonstrators sites located in its territory

country	#
IT	16
ES	15
EL	9
RO	8
PT	8
FR	7
FI	6
HR	5
DK	5
BE	5
AT	5

Benefitting from technical assistance from MIP4Adapt (dedicated to Mission Charter Signatories):
Friuli Venezia Giulia
Potenza province
Veneto

And even more upcoming opportunities via the open calls from projects P2R, CLIMAAX

EUROPEAN UNION

EU MISSIONS
ADAPTATION TO CLIMATE CHANGE

Funding innovative solutions and supporting regional and local pathways towards climate resilience

objectives

2021 call – 9 running projects (LINK)

- (obj I) A climate risk assessment framework (20 M€)
- (obj II) Local climate resilience pathways (30 M€)
- (obj III) Large-scale demonstrator (50 M€)
- 2 Enabling conditions: engagement, asset-level modelling

2022 call – 16 projects (LINK), incl 4 under grant agreement

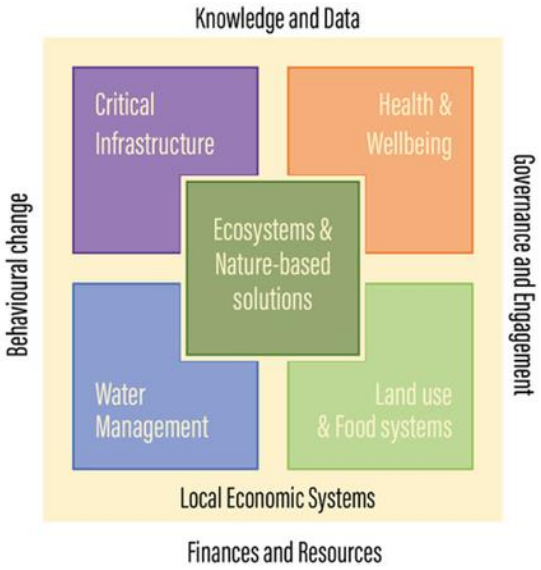
- 3 enabling conditions: finance, insurance, user-driven tools,
- 1 key system: local economic system
- (obj III) Test and **demonstrate** – NBS (+90 M€)

2023 call – under grant agreement

- (obj III) Test and **demonstrate** transformative solutions -- 5 key systems (138 M€)

2024 call – opens in Q1

Enabling conditions & key systems



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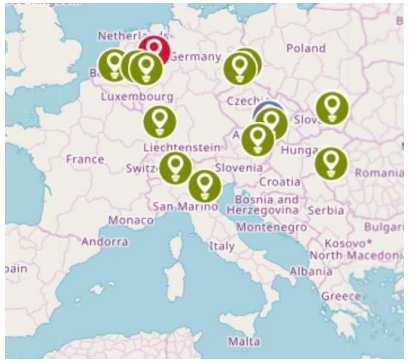
Testing and deploying solutions in Italy and in Europe

MountResilience → demonstrators, testing solutions for mountainous regions and communities
Total budget: 15.9 mln €
Start date: 09/2023 → End date: 02/2028

→ ***Demonstrator region in Italy: Piemonte Region***
Replicator region in Italy: Friuli Venezia Giulia



LAND4CLIMATE → increasing the resilience of landscapes and urban settlements via nature-based solutions (NBS)
Total budget: 12.9 mln €
Start date: 09/2023 → End date: 08/2027

→ ***Frontrunning region in Italy: Lower Po Delta***
Replicator region in Italy: Emilia Romagna

TransformAR →introduce large-scale solutions to address water-related risks
Total budget: 12.7 mln €
Start date: 10/2021 → End date: 09/2025

→ ***Demonstrator:***
Oristano, Sardinia

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EU MISSIONS
ADAPTATION TO CLIMATE CHANGE

- *EU Mission on Adaptation to Climate Change Portal (europa.eu)*
- *Thematic webpage Commission: Mission on Adaptation to climate change (europa.eu)*
- *You can follow us by subscribing to the monthly Mission Newsletter*

Thank you!

#EUmissions

#HorizonEU

#MissionClimate

Piloting Regional Climate Risk Assessment

Cristina Coelho, Setúbal Municipality

11 March 2024

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CLIMAAX
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The Pilot's Role on CLIMAAX Project

- CLIMAAX has 5 pilots - each pilot contributes to a specific workflow;

- Setúbal's pilot role - enriching the CLIMAAX workflow and toolbox development on fast floods;

- Open call until 22 march 2024: https://www.climaax.eu/fstp-open-call/

What will be available to applicants?

A robust Climate Risk Assessment:

- Climate Scenarios
- Risk Assessment;
- Real Examples - closing the gap between theory and practice;

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Flash Floods in Setúbal (Portugal)

The city is enclosed by natural protected area with mountains on the west, the Sado Estuary on the east, and the sea to the south.

The city is built closely to the shore with industrial areas stretching along the coast and the port for international cargo.

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Flash Flooding in the past

Setúbal has suffered from the impacts of flash floods many times in the past. Flash floods occurred almost once in 10 years between 1940s and 80s. Especially the flash flooding event in 1983 and a more recent one in 2008 generated strong disruptions and devastating damages in downtown Setúbal.

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Flash Flooding in the past

In Setúbal, flash floods have been triggered by intensive rainfall (>100mm) condensed to a few hours, mostly during the autumn and spring seasons.

The flash flood hazard is related to the short concentration time within small catchments, coupled with the typical occurrence of high peak discharge and a very high sediment load.

Imagem do Parque das Escolas, após o ciclone de 1941.

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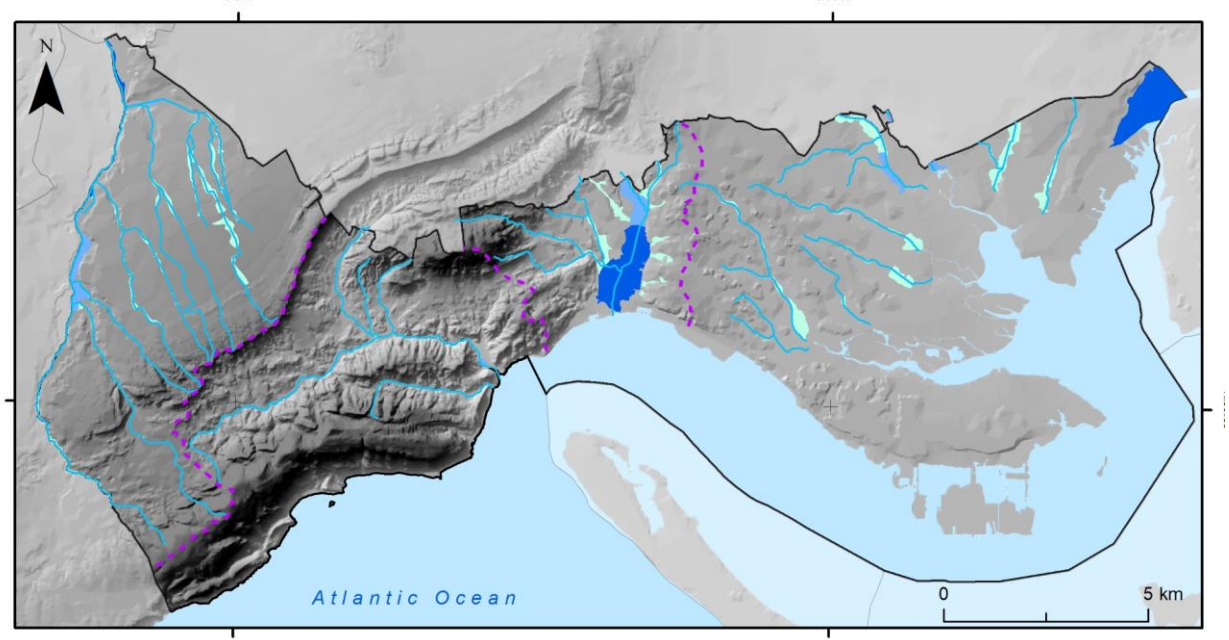
Flash flood susceptibility projection for Setúbal until 2100

Flash floods are expected to occur more often in Setúbal in the future. This map shows the expected change in intensive rainfall susceptibility of areas by 2100 (compared to current susceptibilities) considering the emission scenarios RCP 4.5 and 8.5.



Scenario	Return period (years)
Present-day	100
Future (RCP 4.5)	91.7
Future (RCP 8.5)	94.3

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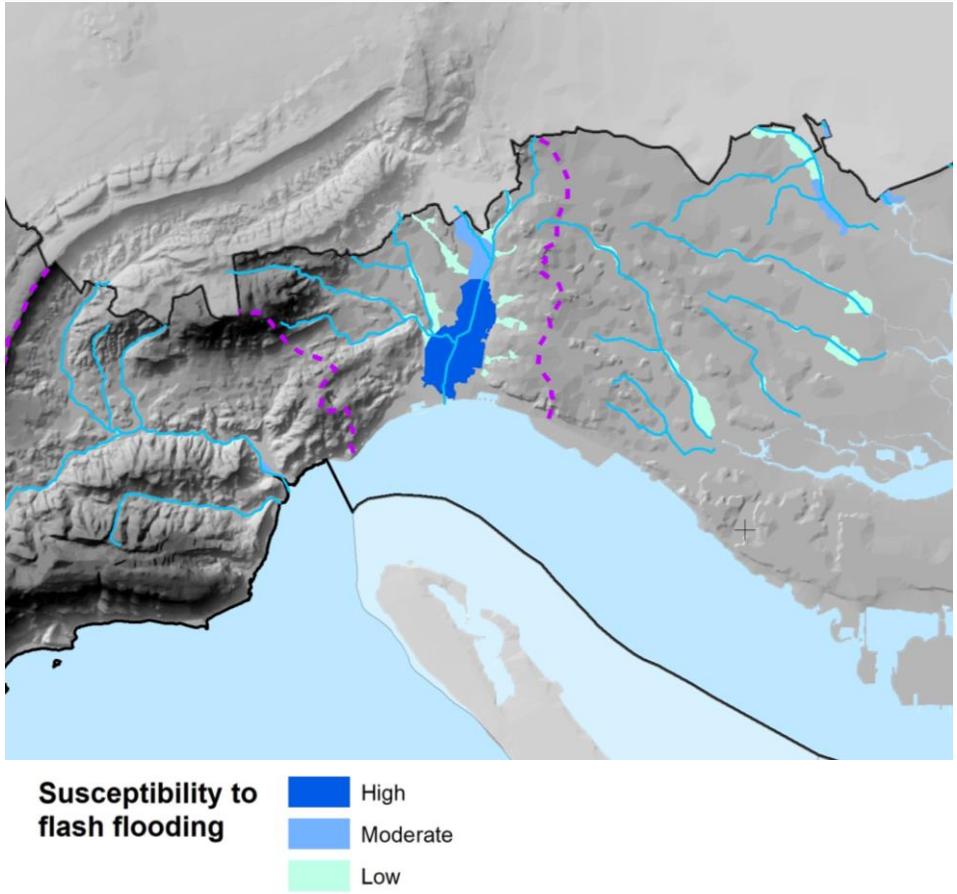
Hazard – Flash flood prone areas

Across the region of Setúbal, around 8.5 km2 of the area are susceptible to flash flooding. The densely built-up urban area of Setúbal shows the highest likelihood to be affected. Areas with low susceptibility are located along streams around the whole region.



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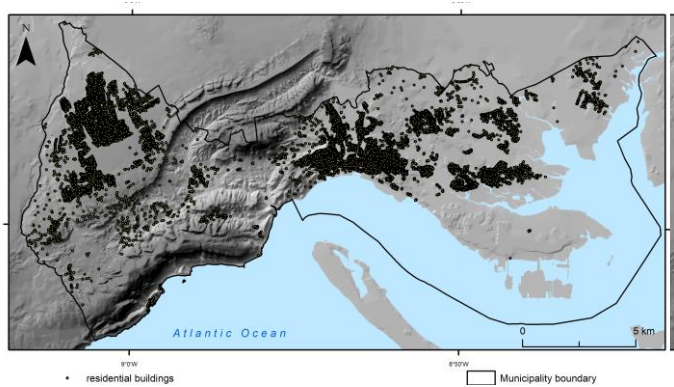
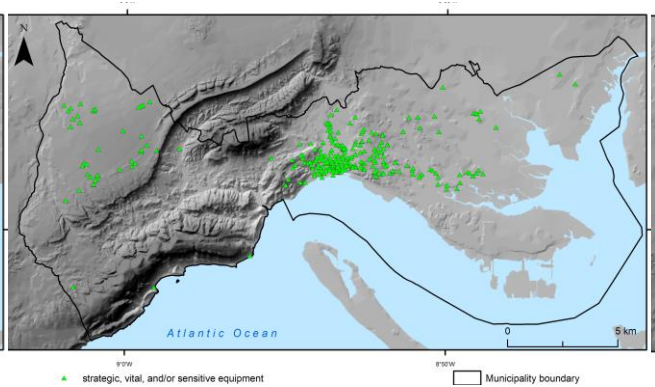
Assessment of (present-day) exposure

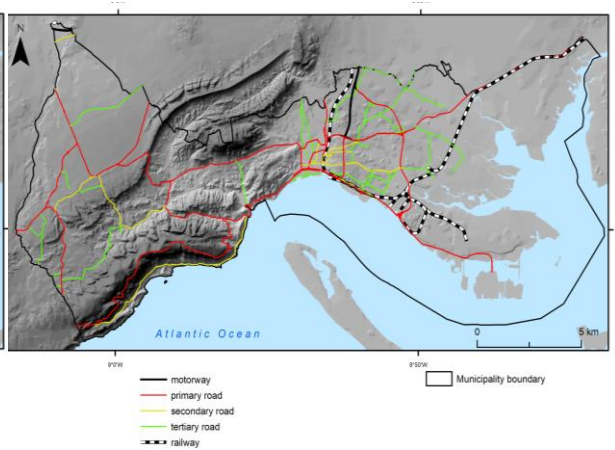
Residential Buildings



Strategic, Vital and/or Sensitive Equipment



Roads and Railway



Dasymetric distribution of population

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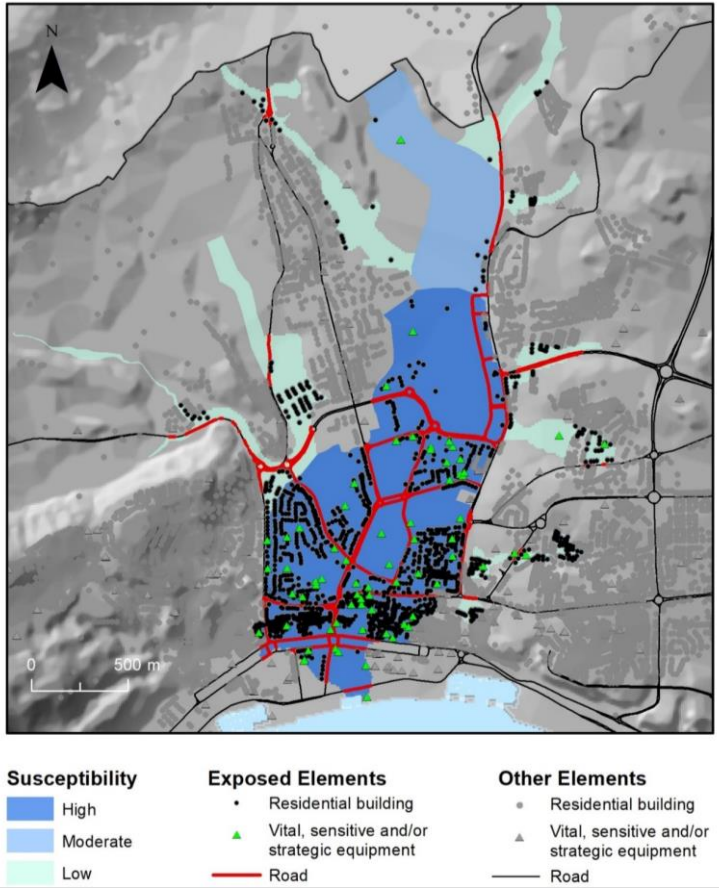
Exposure – Exposed infrastructure

Flash flooding in the centre of Setúbal can affect up to 12% of residential buildings. While half of the administrative buildings of the city are located in the center and expected to be flooded as well as many health facilities and education buildings.

One major concern is the potential disruption of the emergency management of the city due to flooded roads and buildings. It was calculated that only about 6% of the roads can be flooded but the exposed roads are of high importance for emergency management and the only connection to the industrial area in the south-east of the city.



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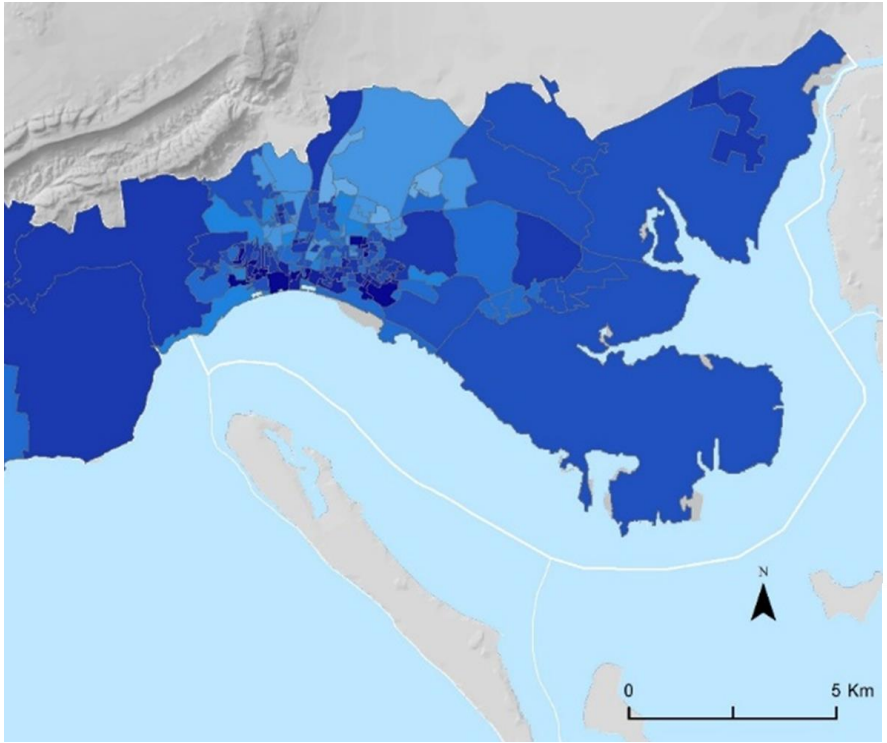
Vulnerability – Vulnerable Population



The buildings in the medieval center of the city are very old and are partly lacking sufficient maintenance. A socio-economic assessment was performed looking at the demography, social support, economic status, education level, housing conditions, family structures employment rate, and health conditions. The assessment highlighted the fact that this old center of Setúbal is more vulnerable than others.

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CLIMAAX
climate ready regions

www.climaax.eu

Thank you

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Assessorato all'Ambiente

Uniting science, services, and standards for a climate-resilient future
Climate Services and Innovation Festival, Venezia, 11-13 Marzo 2024

Climate change and nature-based solution: L'Aquila case study

Ph.D. Dina Del Tosto
Environment and Civil Protection Sector
Municipality of L'Aquila - Italy

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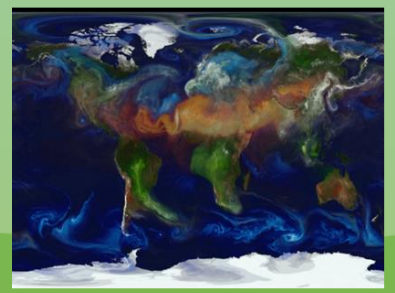
Cities at risk: dealing with the pressures of climate change

When we talk about climate change, we need to understand the role of the city…
We are already seeing the impacts of climate change which will subject populations to untold risk and suffering, push already struggling services to the brink and undermine city government's efforts to protect their citizens.
The cities have a crucial role to play in order to manage the unavoidable and avoid the unmanageable.
It is in urban areas that the challenge to climate change will be won or lost.



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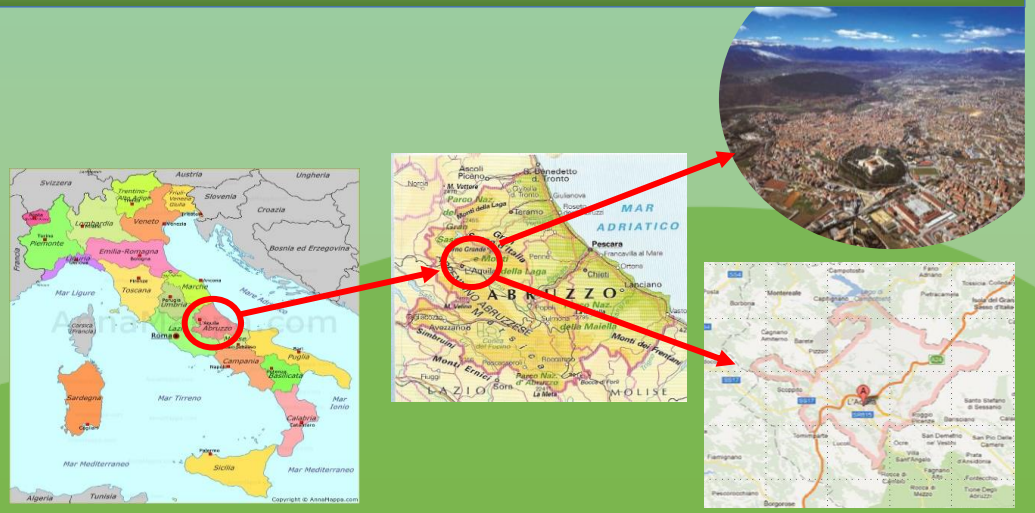
Cities at risk: dealing with the pressures of climate change

L'Aquila stands 721 metres above sea level, in the earth of the Abruzzo Region of which it is the administrative centre.
It is a city located among the Apennines and which is affected by the effects of climate change on mountainous areas



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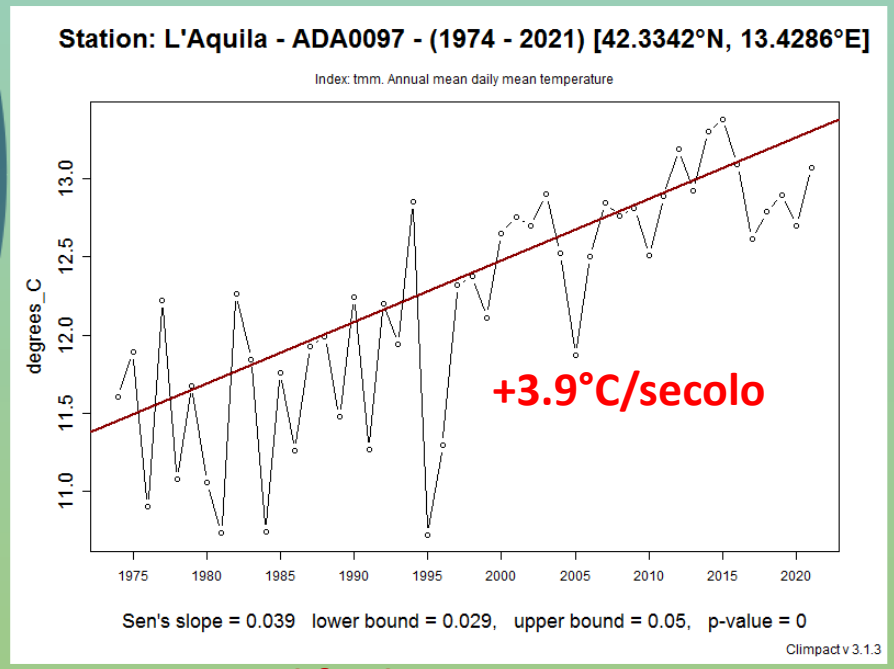
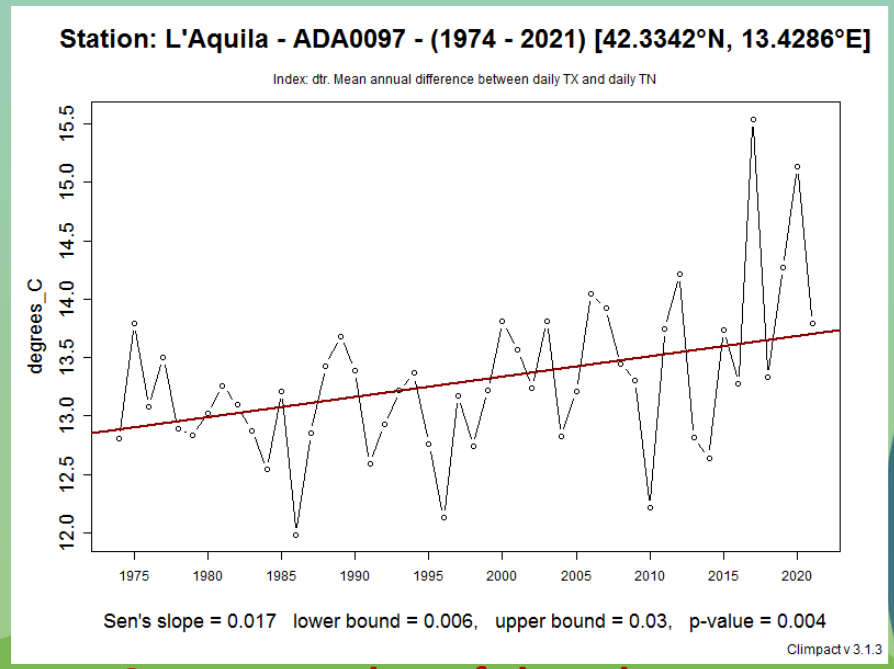
Current temperature trend in L'Aquila (1974-2021)

Average annual temperature



- Less need for heating
- More need for cooling
- Diversification of crops

Average daily excursion



- Greater number of clear days
- Fewer cold waves
- Fewer heat waves

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Current temperature trend in L'Aquila (1974-2021)

From the analysis of the trend of thermal indicators it can be deduced that at an adaptation level actions are appropriate to moderate the effects of summer heat during the day, for example with greater shading, more reflective materials and cool islands in places of pedestrian passage or parking and cycle lane.

It can also be deduced that there will be increasingly greater energy savings for heating buildings in the winter period, which however will be partly offset by greater summer spending on cooling.

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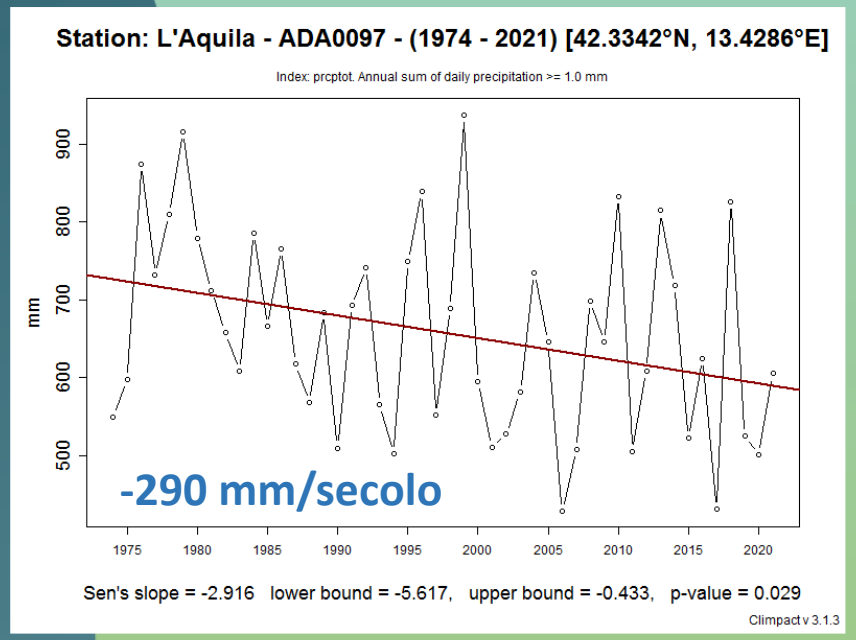
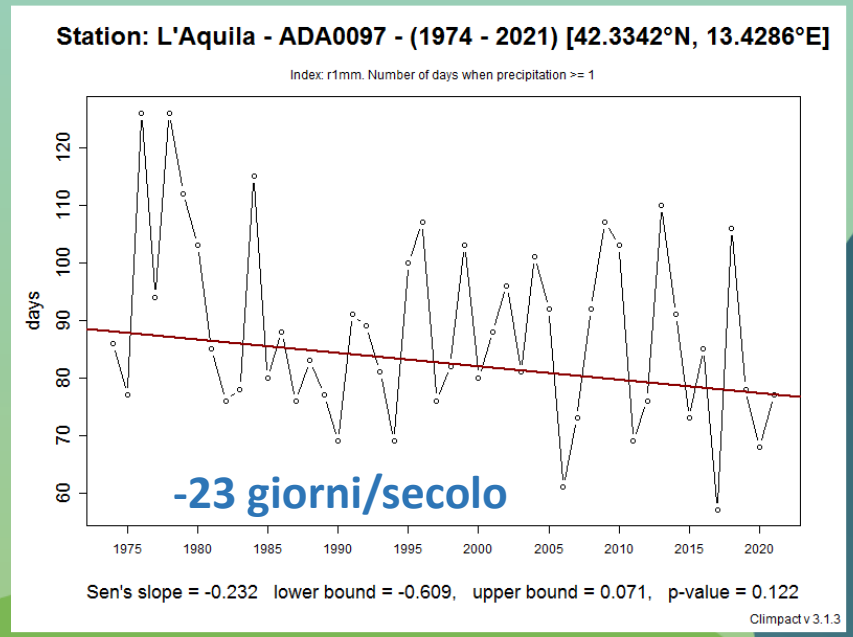
Current precipitation trend in L'Aquila (1974-2021)

Annual precipitation



The combined effect of increasing temperatures, therefore with greater potential evapotranspiration, combined with the slight decrease in precipitation, suggest that actions are appropriate to safeguard the water resource for all uses.

Number of rainy days per year



- **Greater drought also due to greater evaporation (increased temperatures)**
- **Increase water resource storage**

- **Increase in dry periods**
- **Non-significant variation in extreme precipitation events**

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What actions?

Building resilience will be key for urban policymakers, and will provide many co-benefits, making cities wealthier and healthier places to live and work.
L'Aquila is actively working on the use of Nature-Based-Solutions (NBS) to fight climate change through urban forestation and the creation of rain gardens, which are also important for Health and human well-being.
The nature-based solutions, especially urban forestation, can reduce the heat island effect and combating extreme climatic events and cut down carbon dioxide emissions.
NBS represent a multi-purpose and multi-service approach, which includes a series of solutions inspired by nature to improve environmental quality and provide improvement in the psycho-physical health of the population in cities.

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Experimental program for adaptation to climate change in urban areas

MINISTERO DELL'AMBIENTE
E DELLA SICUREZZA ENERGETICA

Planned projects and financed by the Ministry of the Environment

- Urban forestry, functional to mitigating the effects of climate change and act as a carbon sink: it is planned to plant around 600 native trees
- 2 Rain gardens to filter, manage and accumulate rainwater, integrated within two green areas
- 1 Water Square: it can be a valid tool for accumulating water for different uses (for example for the irrigation of green areas), but also for intercepting runoff water that can overload the city's water systems..

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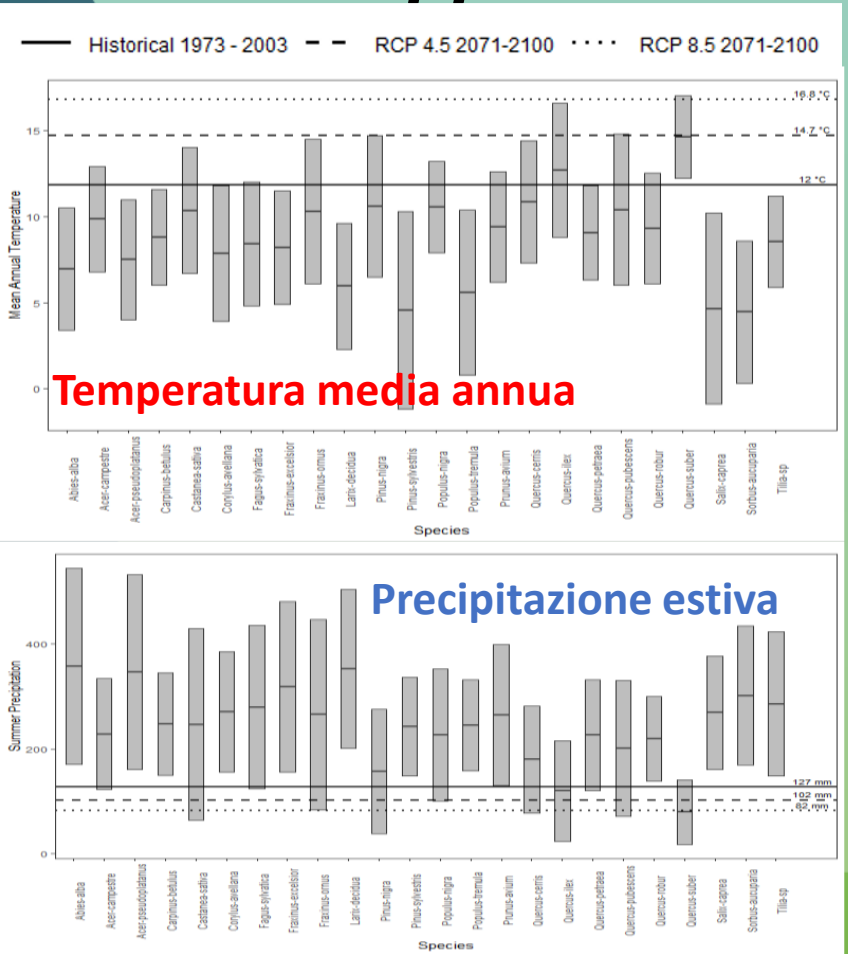
Application example: adaptability of tree species



Currently, together with the University of L'Aquila, a study is underway to identify the best native tree species that can adapt to the increase in temperature in the coming years.

Climate adaptability index

Species	Total
Quercus-ilex	4
Pinus-nigra	5
Quercus-pubescens	5
Castanea-sativa	6
Fraxinus-ornus	6
Quercus-cerris	7
Quercus-suber	8
Corylus-avellana	9
Fagus-sylvatica	9

Application example: River Contract of Aterno

The Aterno River Contract is an important tool for mitigation and adaptation to climate change; it is a voluntary instrument of strategic and negotiated planning which pursues the protection, correct management of water resources and the valorisation of river territories, as well as safeguarding them from hydraulic risk, contributing to local development.

The Action Plan of the Aterno River Contract was also developed which provides nature-based solutions for river redevelopment (Ecosystems and nature-based solutions) and hydrogeological risk management. (Climate proofing of critical public infrastructure)

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European Missions and L'Aquila

EU MISSIONS

CLIMATE-NEUTRAL & SMART CITIES

L'Aquila
gemellata con
Drammen

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Special thanks:

- Mayor of L'Aquila – Pierluigi Biondi
- Environment Councilor - Fabrizio Taranta
- Environmental Sector Manager – Roberto Evangelisti
- CETEMPS – University of L'Aquila

E-mail: dina.deltosto@comune.laquila.it

AGORA

A Gathering place to cO-design and co-cReate Adaptation.

Nicola Loglisci, CIMA

Climateurope2 Festival
Venice, 11 March 2014

Funded by
the European Union

Agora
just and inclusive
climate adaptation

AGORA in a nutshell

AGORA is a HORIZON Europe initiative started in January 2023 and coordinated by the CMCC Foundation.

AGORA aligns with the **overall goals of the EU Mission on Climate Change Adaptation**, promoting **social transformation processes** in diverse contexts through transdisciplinary tools and approaches.

The project encourages **effective engagement of citizens and communities in actions against climate change**, accelerating and expanding local adaptation processes to build a Europe resilient to climate change.

Objectives


A wide community of aware and informed citizens to address the climate crisis.
Specific **solutions** to address the climate crisis locally
Tackling disinformation on climate change for empowered communities
JOIN THE COMMUNITY
Best **practices,** innovative approaches, and digital tools for active participation
Tangible **actions** for societal changes

Digital tools for education, learning and engagement

- The digital AGORA
- The Academies (on Climate data and on disinformation)
- The mobile app to tackle disinformation
- The digital handbook

Activities in the pilot areas

Inception Workshops

SE: Malmö
12 September

ES: Zaragoza
24 October

IT: Roma
9 November

DE: Dresden
16 November

More workshops in 2024!

Join the AGORA community

Followers: **regions** as well as **associations**, **organizations and institutions** that are involved in the process of adaptation to climate change can join the project as followers.

This opportunity enlarges the AGORA community beyond the 4 pilot areas, involving a greater number of people and supporting the whole adaptation process in Europe.

Thanks

Coordinated by