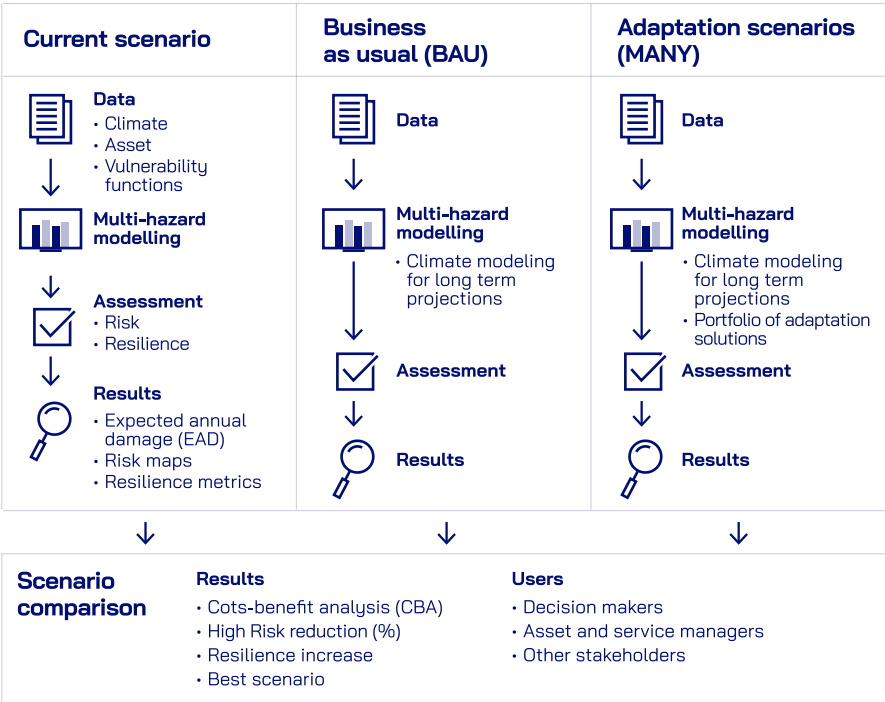# Key outcomes

Technological results

- Climate Multi-Hazard modeling tools
- Holistic climate resilience assessment tool
- Portfolio of adaptation solutions
- Decision Support System for adaptation to extreme and compound events with sustainabe and cost-effective measures.

Scientific results

- Project framework for climate multi-hazard holistic assessment at a regional level
- Regional climate projections in long-term considering the local socio-economic dimension
- Methods for mending the data gaps and uncertainty analysis for the risk and impact models
- Climate-related multi-risk tangible impact assessment method
- Multi-risk and resilience assessment for the 3 case studies
- Replication, sustainability and explorations of ICARIA results

Current scenario	Business as usual (BAU)	Adaptation scenarios (MANY)
Data • Climate • Asset • Vulnerability functions ↓ **Multi-hazard modelling** ↓ **Assessment** • Risk • Resilience ↓ **Results** • Expected annual damage (EAD) • Risk maps • Resilience metrics	**Data** ↓ **Multi-hazard modelling** • Climate modeling for long term projections ↓ **Assessment** ↓ **Results**	**Data** ↓ **Multi-hazard modelling** • Climate modeling for long term projections • Portfolio of adaptation solutions ↓ **Assessment** ↓ **Results**

Scenario comparison	Results	Users
	• Cots-benefit analysis (CBA) • High Risk reduction (%) • Resilience increase • Best scenario	• Decision makers • Asset and service managers • Other stakeholders

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ICARIA

The ICARIA project, co-funded by the European Commission's Horizon Europe program within the scope of the European Climate Change Adaptation Mission, will **promote the use of a comprehensive asset level modelling framework to achieve a better understanding about climate related impacts produced by complex, compound and cascading disasters and the possible risk reduction provided by suitable, sustainable and cost-effective adaptation solutions**.

Budget: 2,294.146€

Duration: 39 months
(January 2023 – March 2026)

Coordinated by:

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CENTRE FOR RESEARCH & TECHNOLOGY - HELLAS Information Technologies Institute

DEMOKRITOS

DRAXIS ENVIRONMENTAL TECHNOLOGIES

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aegean islands Region of South Aegean

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CENTRO STUDI PLINIVS

Verbund

ICARIA

IMPROVING CLIMATE RESILIENCE OF CRITICAL ASSETS

More information at
icaria-project.eu

A European project to improve the resilience of critical infrastructures to extreme weather events
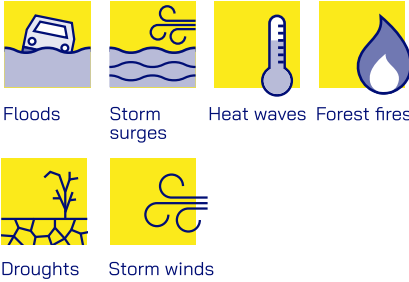
Why?

In the recent years, the number of disasters caused by climate hazards has increased considerably. According to the United Nations, in the last 20 years, more than 7,000 disasters caused by the climate crisis were recorded, affecting more than 4 billion people and causing an economic loss of nearly $3 trillion worldwide. This increment in damages is mainly due to a significant increase in extreme weather events, such as heat waves, droughts or floods. If the raise in global temperature remains on the current trajectory, the frequency of these catastrophes will continue growing.
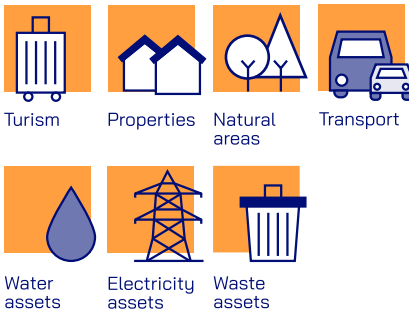
What?

ICARIA aims to promote the use of asset-level modelling framework to better understand climate-related impacts and reduce the risk by providing sustainable and cost-effective adaptation solutions.
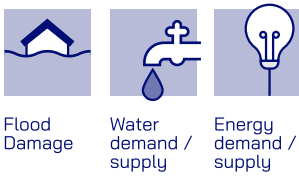
Hazards

Floods • Storm surges • Heat waves • Forest fires
Droughts • Storm winds

Assets/services

Turism • Properties • Natural areas • Transport
Water assets • Electricity assets • Waste assets

Tangible impacts

Flood Damage • Water demand / supply • Energy demand / supply

Includes
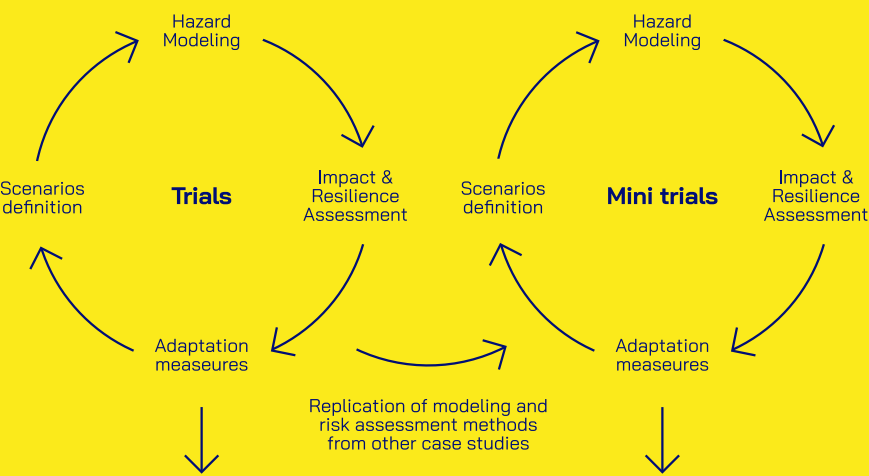
Compound hazards • Cascading effects on assets

How?

To validate the effectiveness of the solutions, two cycles of comprehensive risk and resilience assessment will be conducted in the case studies.

1. Implementation phase

The first assessment will focus on the best known climate hazards of each case study and on the potentially affected assets for which there is more knowledge and data availability. The results from this stage could be used "as is" for operative decision making.

2. Replication phase

The second cycle of implementation fill focus on other disasters and assets historically less studied, completing the available information. Artificial Intelligence (AI)-based techniques could be used for filling data gaps. This phase will serve to validate the replicability of the tools implemented in the Trials in other regions and under data limitations.

Trials
Hazard Modeling → Impact & Resilience Assessment → Adaptation measeures → Scenarios definition

Mini trials
Hazard Modeling → Impact & Resilience Assessment → Adaptation measeures → Scenarios definition

Replication of modeling and risk assessment methods from other case studies

- Adaptation measures
- "Best case study scenarios"
- Good data availabity
- Well-known climate hazards and impact assessment methods

- Limited resources
- Suboptimal data availability
- Coarse methodlogy for risk assessment and damage quantification

Where?

ICARIA will work on 3 case studies across Europe:

South Aegean region

	Trial	Mini trial
Hazards		
Assets/services		
Tangible impacts		

Barcelona Metropolitan Area

	Trial	Mini trial
Hazards		
Assets/services		
Tangible impacts		

Salzburg region

	Trial	Mini trial
Hazards		
Assets/services		
Tangible impacts		

■ **Case studies**
- South Aegean region (Greece)
- Barcelona Metropolitan Area (Spain)
- Salzburg region (Austria)

■ **Follower regions**
- Comunidad Valenciana (ES)
- Region of Central Macedonia (GR)
- Regione Campania (IT)
- Upper Austria (AT)
- Crete (GR)
- Naples Metropolitan Area (IT)
- Greater London (UK)