CLIMAAX Community of practice

Relative Drought Risk Assessment: Learning from regions

May 14, 2026

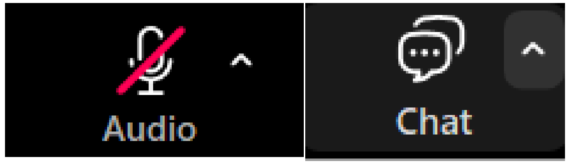
10:30-12 CET

The CLIMAAX project is funded by the European Union under Grant agreement ID 101093864.
This publication was funded by the European Union. Its contents are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Union.

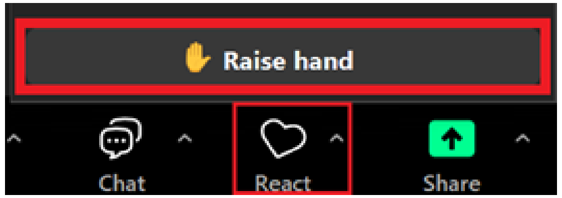
CLIMAAX
climate ready regions

Housekeeping

- Please note that the meeting is being **recorded**.



- Please, keep your **mic off**.



- Feel free to post your **questions in the chat** (bottom of the screen) or raise your hand to talk

The CLIMAAX project is funded by the European Union under grant agreement No. 101093864.
This work was funded by the European Union. Its contents are the sole responsibility of the authors and do not necessarily reflect the views of the European Union.

Meeting agenda

- ✓ 10:30-10:35 **Welcome & introduction to the webinar**
- ✓ 10:35-10:45 **Introduction to the *Relative Drought workflow***
  - Speaker: Silvia Artuso (IIASA)
- ✓ 10:45-11:15 **Regional experience**
  - Municipality of District 12 of Budapest, Hungary - Speaker: Emese Décsi
  - Region of Crete, Greece - Speaker: Aris Koutroulis
- ✓ 11:15-11:45 **Panel discussion and Q&A**
  - Moderators: Fulvio Biddau, Lisa Ferrari and Majid Niazkar (CMCC)
- ✓ 11:45-11:55 **Regional assessment**
  - Speaker: Fulvio Biddau (CMCC)
- ✓ 11:55-12:00 **Closing remarks**

Moving forward in CLIMAAX CoP from:

- **Thematic webinars** and workshops connecting science, policy and practice to support CRAs using the CLIMAAX Framework and Toolbox
- **Demo & co-design sessions** for refining and fostering usability of CLIMAAX outcomes

The CLIMAAX project is funded by the European Union under grant agreement No. 101093864.
This work was funded by the European Union. Its contents are the sole responsibility of the authors and do not necessarily reflect the views of the European Union.

NEW HAZARD- AND WORKFLOW-FOCUSED SERIES

INTRODUCTION TO RELATIVE DROUGHT WORKFLOW

Silvia Artuso
International Institute for Applied Systems Analysis (IIASA)

International Institute for Applied Systems Analysis
IIASA

RELATIVE DROUGHT WORKFLOW

CLIMAAX
climate ready regions

Silvia Artuso, Dor Fridman
International Institute of Applied System Analysis (IIASA)

Community of Practice webinar – Relative Drought Risk Assessment: Learning from Regions

14.05.2026

What is a drought?

Simply stated, drought is ‘the extreme persistence of precipitation deficit over a specific region for a specific period of time’.

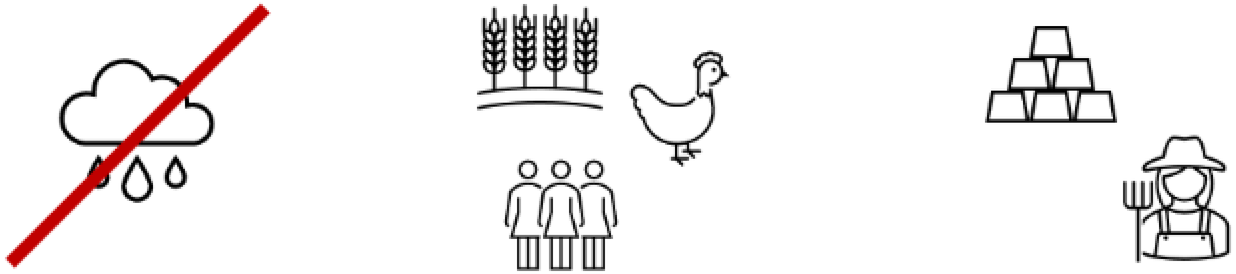
However, drought risk is not only about rainfall deficits. It depends on **where the drought happens** and **who or what is affected**.

Drought event
↓
Who/what is exposed?
↓
How vulnerable is the region?
↓
Drought risk is a measure for quantifying the likelihood of a meaningful impact from drought-event(s)

How do we assess drought risk?

This workflow quantifies **drought risk** as the product of drought **hazard**, **exposure** and **vulnerability**.

Hazard X Exposure X Vulnerability = Risk



What does “relative drought” mean?

The workflow compares regions **relative to each other**, not in absolute terms.

“Which regions are more at risk compared with other regions in the same country?”

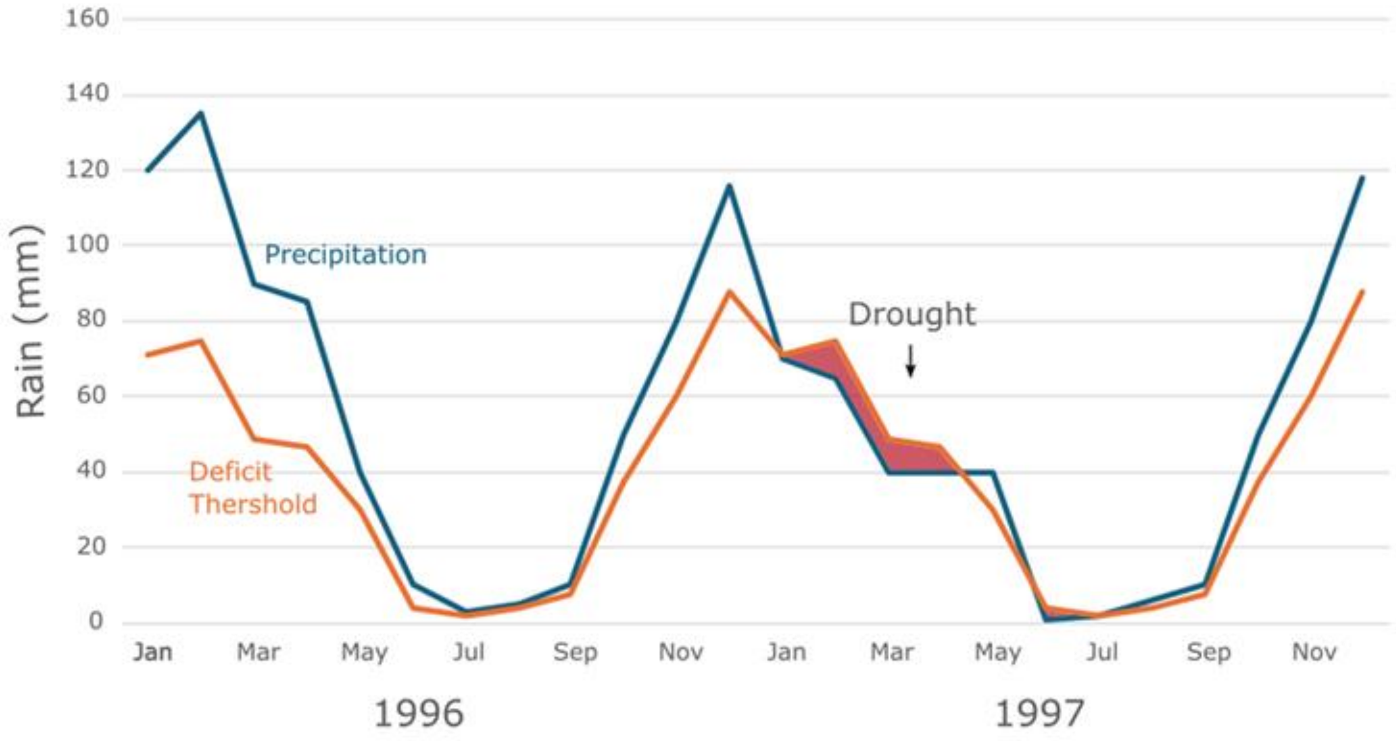
High risk = high compared with other regions in the same analysis

What data does the workflow require?

- Hazard data and methods
- Exposure data and methods
- Vulnerability data and methods

Hazard

The drought risk workflow is applied at **national scale (NUTS2)** and a **NUTS3 resolution**.



Input: monthly precipitation for each NUTS3 region.

Method: We use the weighted anomaly of standardized precipitation (WASP) index to define the severity of precipitation deficit.

Output: **drought hazard** per region and time period, i.e. probability of exceeding the median severe precipitation deficits of its country for the considered time period.

Our drought risk framework follows the methodology developed by Carrão et al. 2016. *Global Environmental Change* 39, 108-124.

Exposure and vulnerability

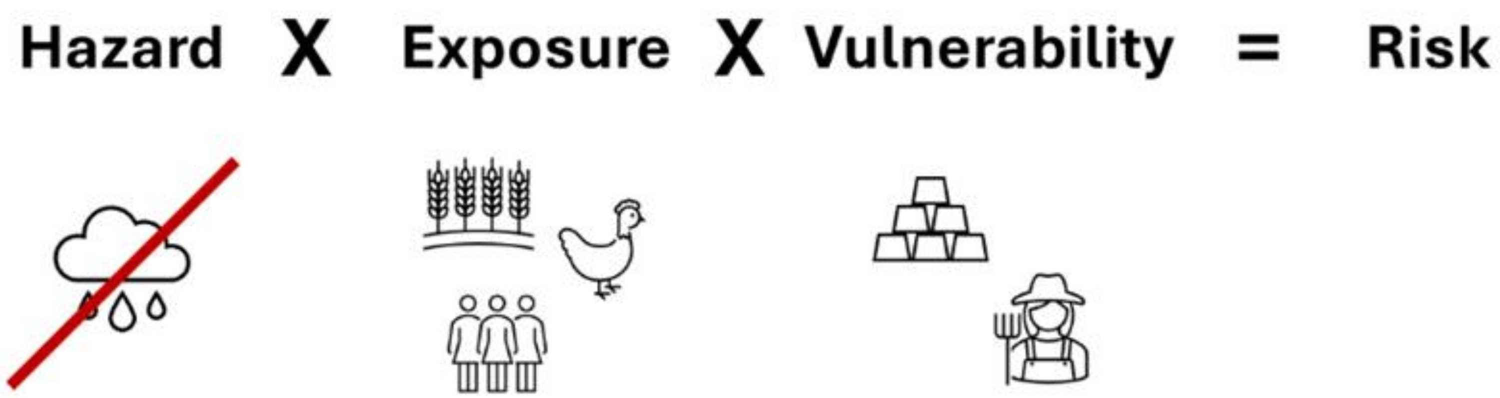
Exposure
Cropland
Livestock density
Water stress / competition for water
Population / human direct need

Vulnerability
GDP per capita (current US dollar)
Rural population
Other locally relevant indicators can be added

Exposure and vulnerability indicators are normalized and then combined into one exposure score and one vulnerability score.

Our drought risk framework follows the methodology developed by Carrão et al. 2016. *Global Environmental Change* 39, 108-124.

Risk scores



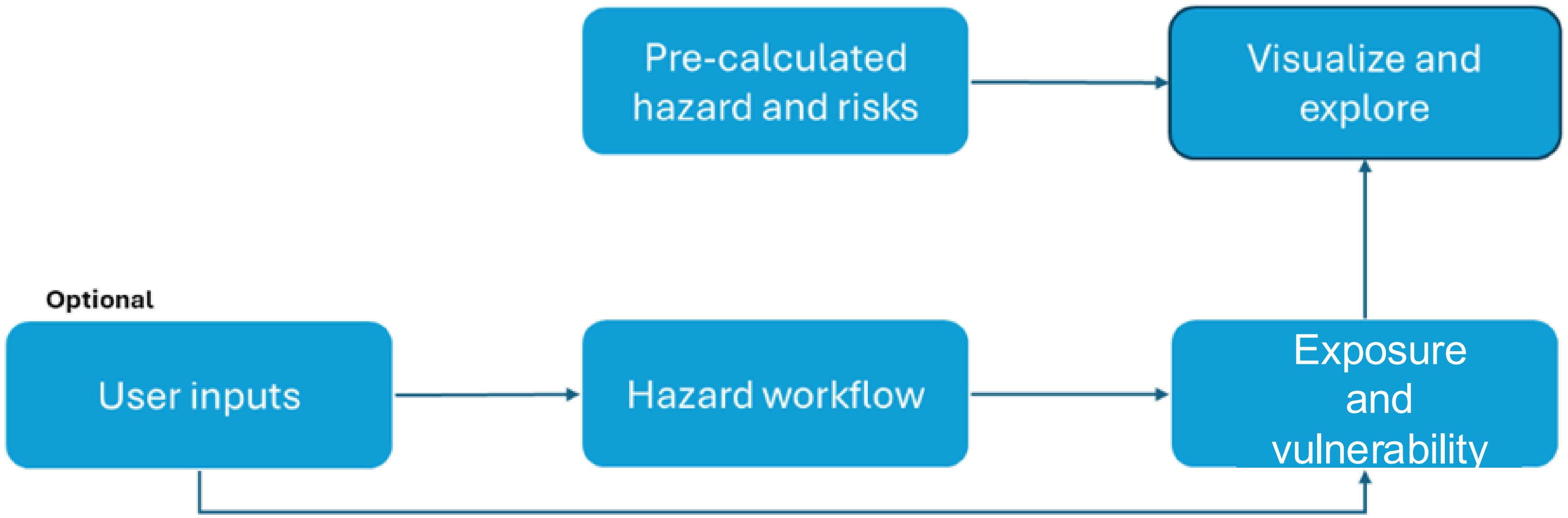
The workflows takes each **risk determinant** (i.e. hazard, exposure and vulnerability) and **normalised** it taking into account its maximum and minimum values across all sub-national administrative regions.

Regional drought risk scores are on a scale of 0 to 1, with 0 representing the lowest risk and 1 the highest. Regions are then compared using **5 risk categories**, with 1 representing the lowest risk and 5 the highest.

Our drought risk framework follows the methodology developed by Carrão et al. 2016. *Global Environmental Change* 39, 108-124.

How to use this workflow?

The workflow contains precalculated results, which can be explored in the visualization workflow. Users inputs is optional and can be fed into the hazard workflow, risk workflow (e.g., exposure, and/or vulnerability), or both. User inputs should cover the all NUTS3 in a (NUT2) country.

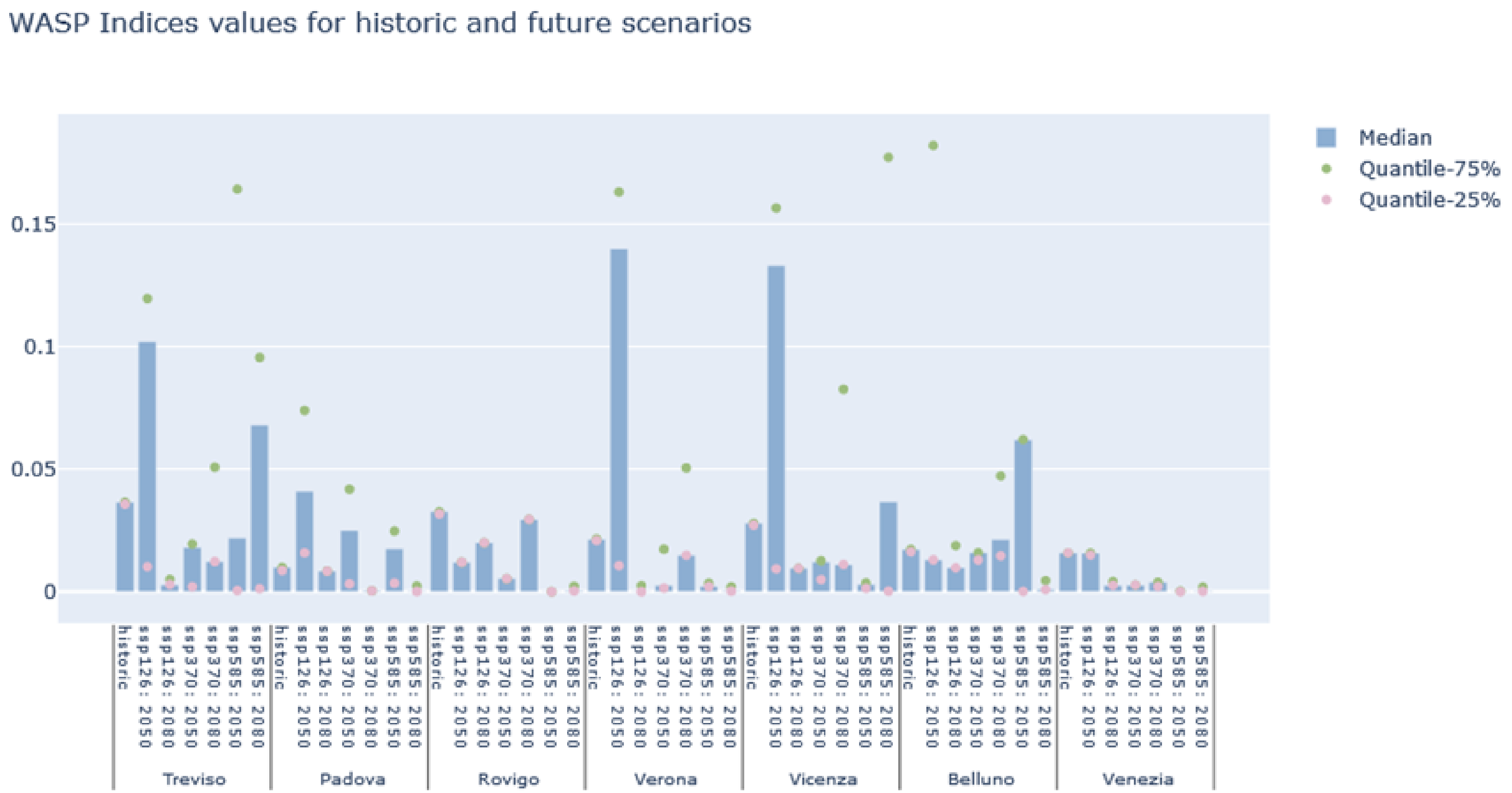


What are the main outputs?

- Hazard index
- Drought risk index

Main outputs for drought hazard

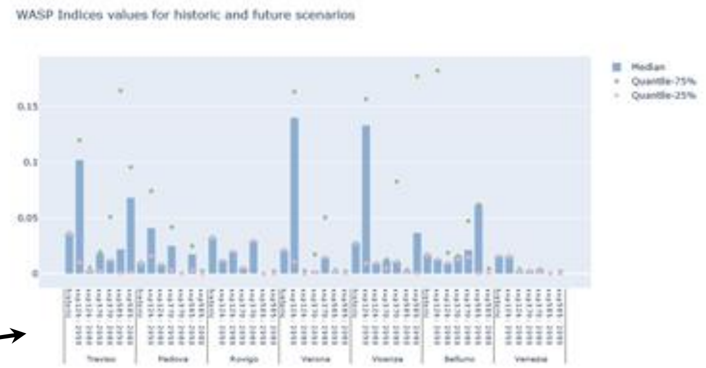
- How will the absolute drought hazard for the NUTS3 regions of the selected country change in the future?



Main outputs for relative drought risk

- What is the relative drought risk in each NUTS3 region of the selected country **within a given historical period**?
- How will the relative drought risk between NUTS3 regions change in the future?

Limitations and key takeaway



- Model and scenario uncertainty.
- **Risk level is relative, not absolute.**
  However:
  The **drought hazard is absolute and comparable among datasets**
- Users are encouraged to carefully select exposure and vulnerability indicators, adapting them to their regional context and data availability.
- This workflow needs to be run at the country level (NUTS2) for comparing among NUTS3 level.

THANK YOU
FOR
LISTENING

Dr. Silvia Artuso
artuso@iiasa.ac.at

Dr. Dor Fridman

International Institute for Applied Systems Analysis
IIASA

REGIONAL EXPERIENCES

MUNICIPALITY OF DISTRICT 12 OF BUDAPEST

Emese Décsi

REGION OF CRETE

Aris Koutroulis

CRETE

Climate Resilient CreTE

Relative Drought Risk Assessment for Crete

Aris Koutroulis
Technical University of Crete

CLIMAAX Community of Practice
Relative Drought Risk Assessment: Learning from regions, Thursday, 14 May 2026

The CLIMAAX project is funded by the European Union under Grant agreement ID 101093864.
This publication was funded by the European Union. Its contents are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Union.

CLIMAAX
climate ready regions

Who are we?

Region of Crete

Dr. Marinos KRITSOTAKIS
Director General
General Directorate for Sustainable Development

Anna KAGIAMPAKI
Deputy Head of Environment & Spatial Planning Department

Evgenia STYLIANOY
Head of the Independent Directorate of Climate Change

Elena KARGAKI
Deputy Head the Independent Directorate of Climate Change

Dr. Maria STRATIGAKI
Research scientist

Technical university of Crete

Aristeidis KOUTROULIS
Associate Professor
Applied Hydrology and Hydraulic Engineering
Technical University of Crete

Mikaela PAPA
Environmental Engineer
School of Chemical & Environmental Engineering,
Technical University of Crete

Irini KOUTSOGIANNAKI
Geologist, MSc Env Engineering
School of Chemical & Environmental Engineering,
Technical University of Crete

Evgenia GALANOPOULOU
Environmental Engineer
School of Chemical and Environmental Engineering,
Technical University of Crete

Who are we? Experience in CRA

2003

HarmoniRiB

WATCH Water and Global Change

combine

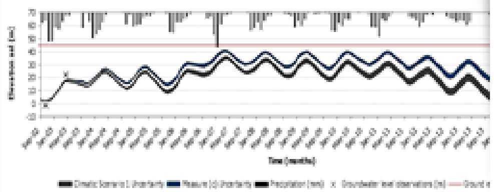
SCENES

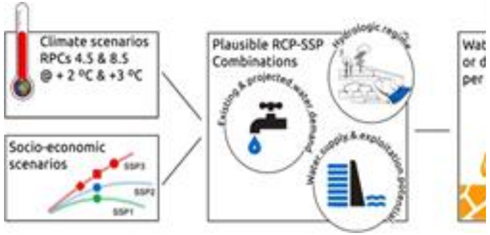
ECLISE

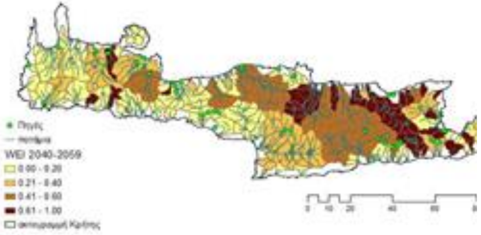
Quantifying projected impacts under 2°C warming IMPACT2

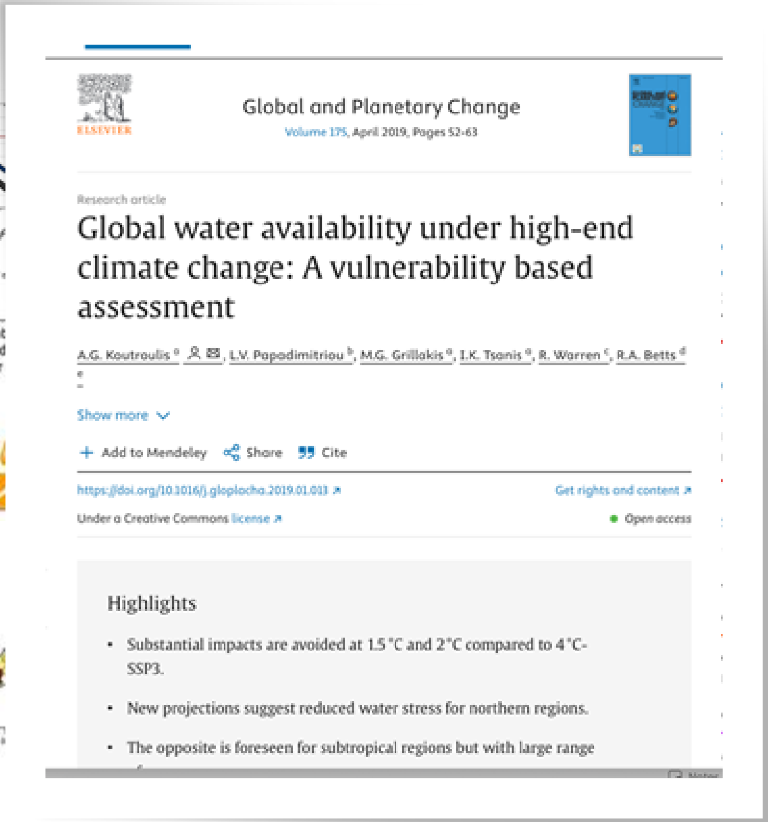
imprex Learn from today to anticipate tomorrow

CLIMAAX climate ready regions









Global and Planetary Change

Volume 175, April 2019, Pages 52-63

Research article

Global water availability under high-end climate change: A vulnerability based assessment

A.G. Koutroulis, L.V. Papadimitriou, M.G. Grillakis, I.K. Tsanis, R. Warren, R.A. Betts

Show more

Add to Mendeley Share Cite

https://doi.org/10.1016/j.gloplacha.2019.01.013

Get rights and content

Under a Creative Commons license

Open access

Highlights

- Substantial impacts are avoided at 1.5 °C and 2 °C compared to 4 °C-SSP3.
- New projections suggest reduced water stress for northern regions.
- The opposite is foreseen for subtropical regions but with large range

The CLIMAAX project is funded by the European Union under Grant agreement ID 101093864. This publication was funded by the European Union. Its contents are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Union.

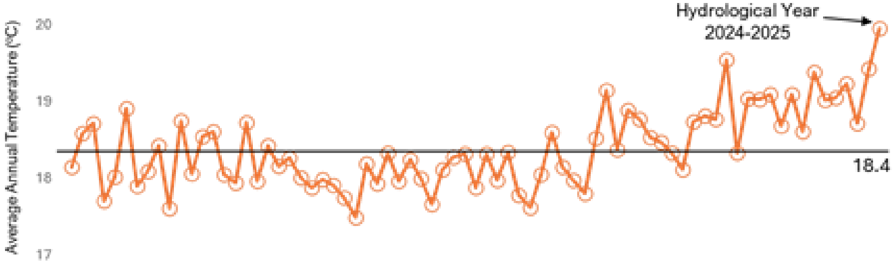
Regional Profile and Context

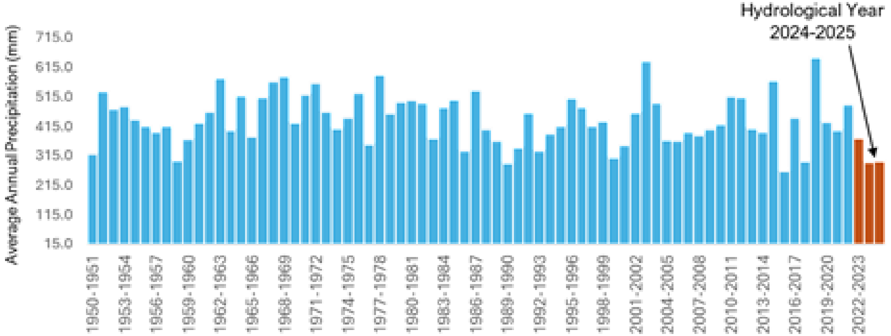
Debris and damaged cars are seen on a flooded seaside road during heavy rainfall at the village of Gournes on the island of Crete, Greece, Nov. 10, 2020. (photo: VOA News)

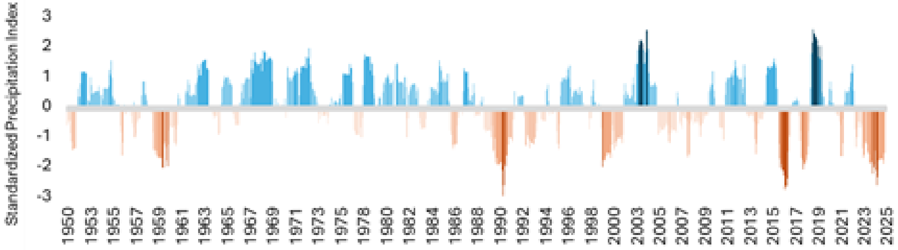
The CLIMAAX project is funded by the European Union under Grant agreement ID 101093864. This publication was funded by the European Union.
Its contents are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Union.

Regional Profile and Context

**Aposelemis reservoir, the main domestic water source of Heraklion town at its lower historical level Nov 2025*







The CLIMAAX project is funded by the European Union under Grant agreement ID 101093864. This publication was funded by the European Union.
Its contents are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Union.

Regional Profile and Context

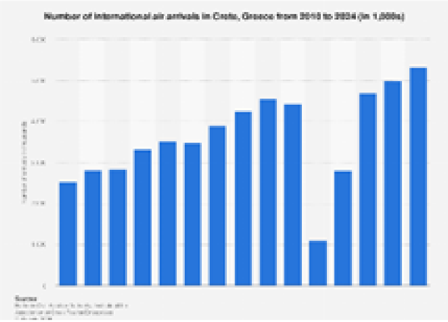
Location-size	largest Greek island and the fifth-largest island in the Mediterranean (**8,336 km²**)
Population	**624,408 residents**, 2021
Regional economy	**Gross Value Added in 2023 was ~€10 billion**, representing **5.1%** of Greece’s GVA.
Economic figures 2023	Tourism = **€3.5 billion** of GVA, by far the largest sector in Crete. Agriculture, forestry and fishing = **€1 billion.**
Tourism arrivals	Crete recorded **5.6 million international air arrivals in 2025**, **+5.5%** compared with 2024.

Existing Adaptation Strategies

- National Climate Law
- Regional Adaptation Action Plan (RAAP) – update every 6yrs
- Action Plan for Combating Drought & Water Scarcity

Increasing exposure





The CLIMAAX project is funded by the European Union under Grant agreement ID 101093864. This publication was funded by the European Union. Its contents are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Union.

Climate Risk Assessment Framework experience

a. Scoping
b. Risk Exploration – 92 individual responses
c. Regionalized Risk Analysis
d. Key Risk Assessment

Urgent

High priority

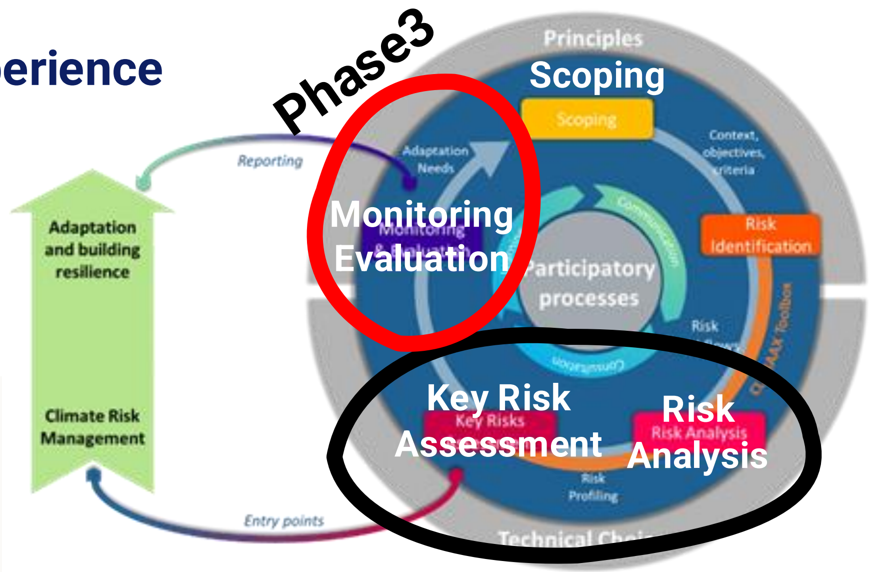
Strategic

The CLIMAAX project is funded by the European Union under Grant agreement ID 101093864. This publication was funded by the European Union. Its contents are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Union.

Climate Risk Assessment Framework experience

a. Scoping
b. Risk Exploration – 92 individual responses
c. Regionalized Risk Analysis
d. Key Risk Assessment

Projections evaluated under SSP1-2.6, SSP3-7.0, and SSP5-8.5



Risk Workflow	Severity C	Severity F	Urgency	Capacity Resilience/ CRM	Risk Priority
River flooding	3	3	3	2	High
Drought	2	3	4	2	High

Severity	Urgency	Resilience Capacity	Risk Ranking
Critical	Immediate action needed	High	Very high
Substantial	More action needed	Substantial	High
Moderate	Watching brief	Medium	Moderate
Limited	No action needed	Low	Low

The CLIMAAX project is funded by the European Union under Grant agreement ID 101093864. This publication was funded by the European Union.
Its contents are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Union.

Risk analysis using the CLIMAAX Toolbox

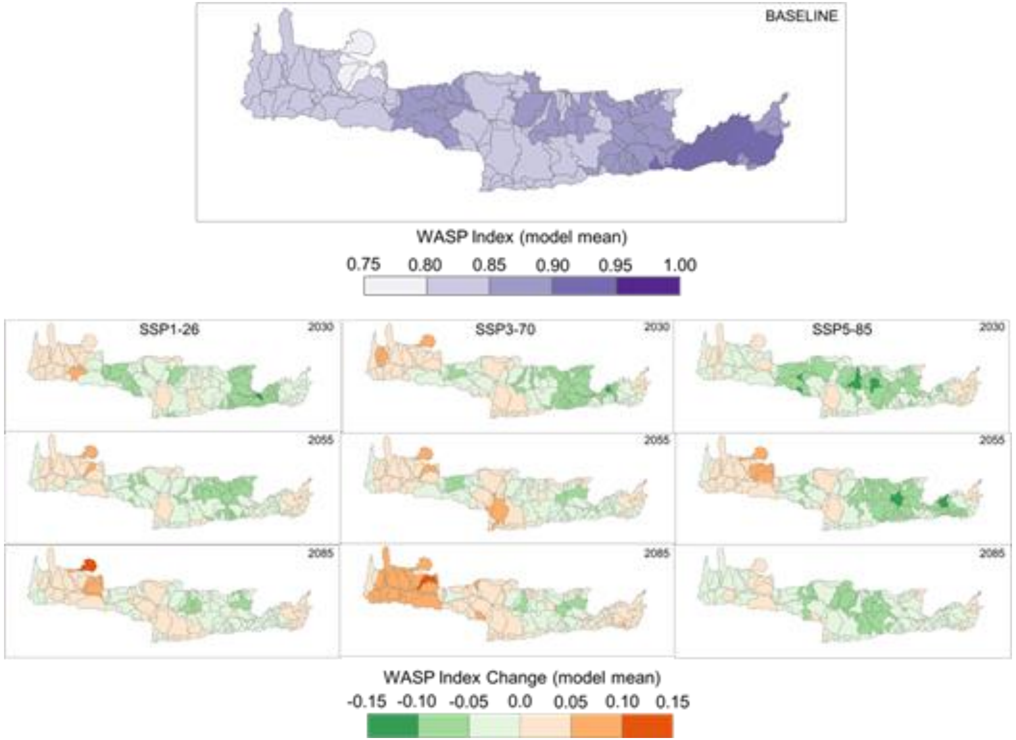
Hazard

CHELSA BIOCLIM+ (1km),*(Brun et al., 2022)*

- BIO1 (Annual Mean Temperature)
- BIO5 (Max Temperature Warmest Month)
- BIO12 (Annual Precipitation)

ISIMIP3b precipitation:

- WASP drought index
  Carrão et al., (2016)

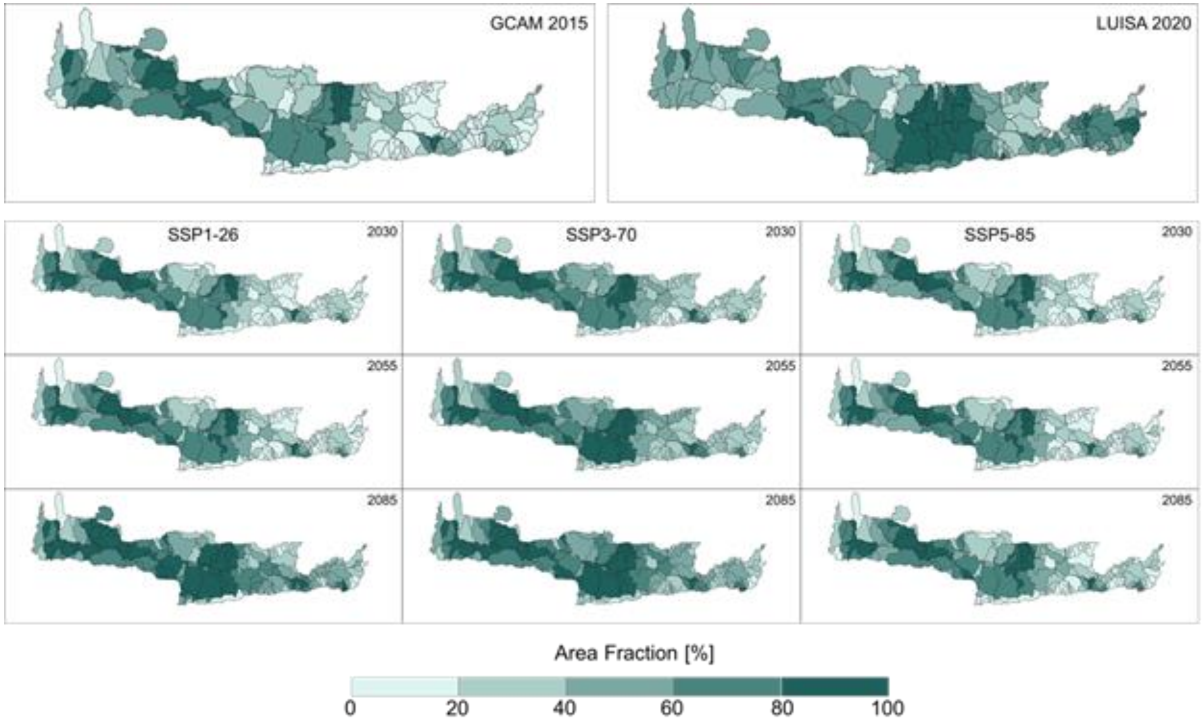


The CLIMAAX project is funded by the European Union under Grant agreement ID 101093864. This publication was funded by the European Union. Its contents are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Union.

Risk analysis using the CLIMAAX Toolbox

Exposure

- GCAM/Demeter cropland fractions *(Chen et al., 2020)*,
- SSP population projections *(Wang et al., 2022)*
- Tourism exposure datasets *(Koutroulis et al., 2018)*

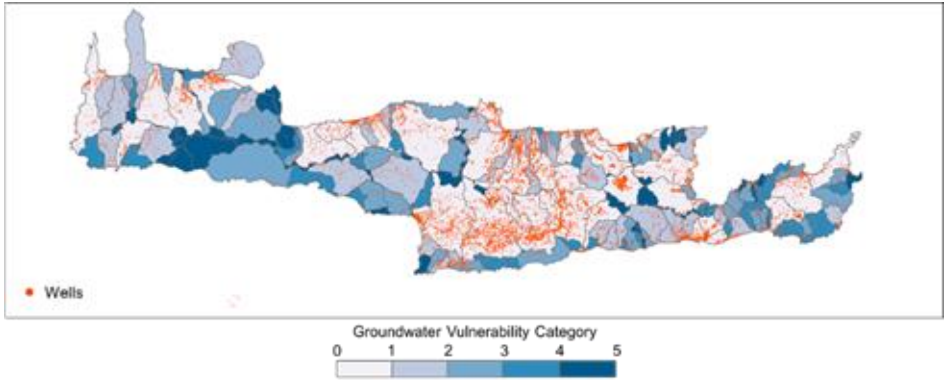


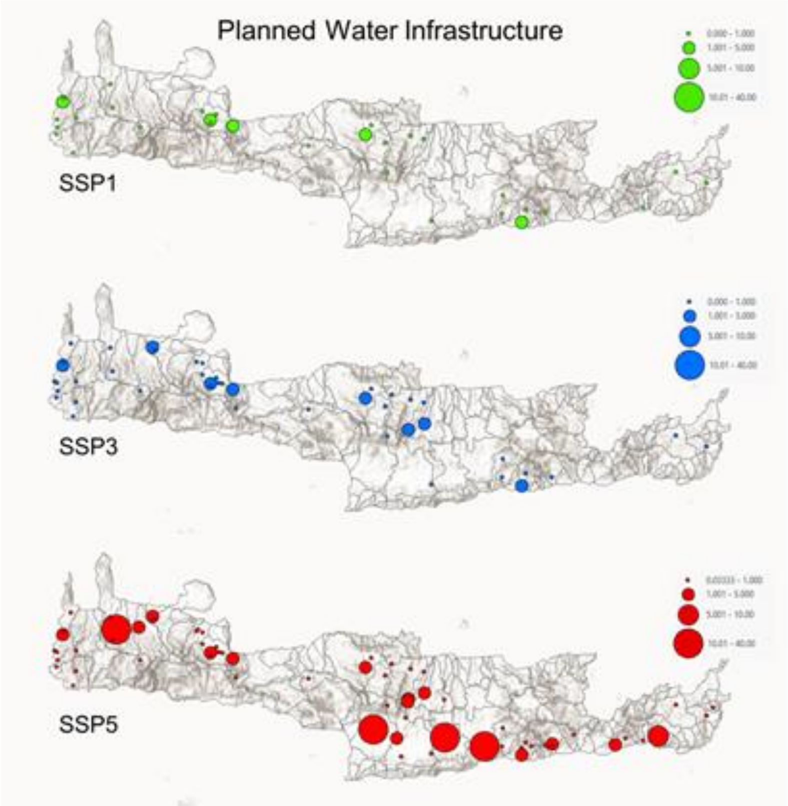
The CLIMAAX project is funded by the European Union under Grant agreement ID 101093864. This publication was funded by the European Union. Its contents are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Union.

Risk analysis using the CLIMAAX Toolbox

Vulnerability

- ○ GDP per capita (Wang and Sun, 2022)
- ○ Groundwater-access indicators
- ○ Irrigated area fraction *GAEZ v5 (2020)*
- ○ Planned water infrastructure

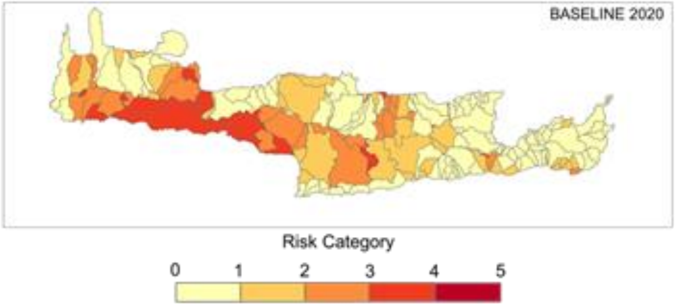


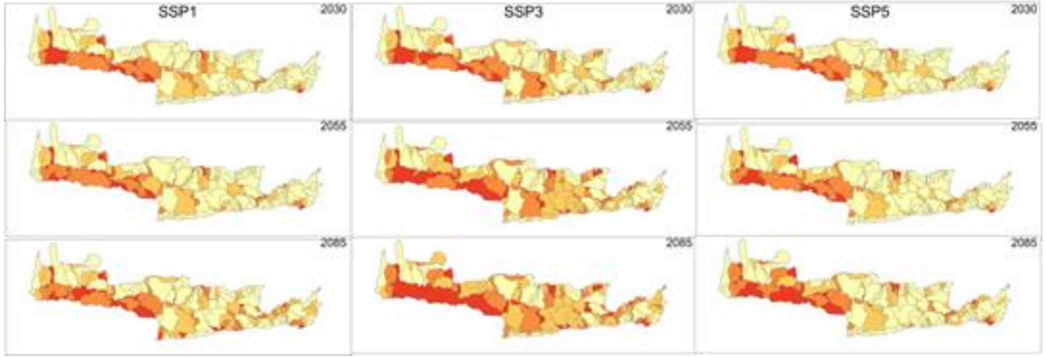


The CLIMAAX project is funded by the European Union under Grant agreement ID 101093864. This publication was funded by the European Union. Its contents are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Union.

Our CRA results

Risk





Municipality	Baseline	SSP126 2011–2040	SSP126 2041–2070	SSP126 2071–2100	SSP370 2011–2040	SSP370 2041–2070	SSP370 2071–2100	SSP585 2011–2040	SSP585 2041–2070	SSP585 2071–2100
Iraklio	0.81	0.18	0.18	0.13	-0.16	-0.11	-0.02	-0.16	-0.11	-0.02
Archanes - Asteroussia	1.85	-0.13	-0.78	-0.78	-0.13	0.01	0.01	-0.78	-0.78	-0.78
Viannos	0.64	-0.17	0.11	1.04	0.22	0.76	0.76	-0.48	-0.48	-0.37
Gortyna	2.63	-0.75	-0.83	-0.83	0.00	0.02	0.02	-0.75	-0.92	-0.91
Malevizi	0.12	0.00	0.21	0.26	0.26	0.30	0.53	-0.01	0.00	0.26
Minoa Pediadas	1.78	-0.59	-0.96	-0.79	-0.59	0.17	0.17	-0.76	-0.96	-0.79
Faistos	1.45	-0.72	-0.72	-0.72	-0.72	-0.65	0.00	-0.72	-0.72	-0.72
Chersonissos	0.91	-0.11	-0.17	-0.10	-0.10	0.70	0.84	-0.18	-0.04	-0.01
Aghios Nikolaos	0.11	0.23	0.23	0.66	0.74	1.04	1.74	0.23	0.28	0.50
Ierapetra	0.76	-0.06	0.07	0.54	0.11	0.47	0.96	-0.09	0.15	0.19
Oropedio Lassithiou	1.94	-0.10	0.14	0.40	0.14	0.40	0.40	-0.17	-0.67	-0.60
Sitia	0.37	0.03	0.17	0.85	0.32	0.56	1.18	-0.01	0.28	0.47
Rethymno	0.78	0.42	0.82	0.54	0.54	1.17	1.44	0.42	1.17	1.22
Aghios Vassilios	3.81	-0.34	-0.34	-0.17	-0.34	0.17	0.17	-0.34	-0.34	-0.17
Amari	2.97	-0.04	-0.65	0.04	0.00	0.15	0.18	-0.04	-0.03	0.00
Anogia	1.58	0.05	0.05	0.10	0.05	0.78	1.05	0.05	0.05	0.10
Mylopotamos	1.95	-0.97	-1.76	-0.74	-0.78	-0.55	-0.55	-0.97	-1.76	-1.57
Chania	1.01	-0.38	-0.38	0.03	-0.38	0.11	0.70	-0.38	0.11	0.35
Apokoronas	3.31	-1.37	-1.28	-1.37	-1.37	-0.67	-0.47	-1.37	-1.29	-0.47
Kandanos - Selinos	2.75	0.49	0.03	0.29	0.49	0.63	0.77	0.49	0.29	0.29
Kissamos	1.76	-0.60	-0.60	-0.60	-0.60	-0.44	0.32	-0.60	-0.60	-0.16
Platanias	0.92	-0.56	-0.56	-0.56	-0.56	0.35	0.40	-0.62	-0.56	-0.52
Sfakia	3.92	-0.85	-0.85	-0.57	-0.60	-0.52	0.08	-0.85	-0.77	-0.21

The CLIMAAX project is funded by the European Union under Grant agreement ID 101093864. This publication was funded by the European Union.
Its contents are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Union.

Risk analysis using the CLIMAAX Toolbox

Decide on Risk Priority

Stakeholder-based evaluation of:

- Severity
- Urgency
- Resilience capacity

Participation from:

- Regional directorates
- Civil protection
- Environment & water authorities
- Technical services

Risk Workflow	Severity C	Severity F	Urgency	Capacity Resilience/CRM	Risk Priority
River flooding	3	3	3	2	High
Drought	2	3	4	2	High

Severity	Urgency	Resilience Capacity	Risk Ranking
Critical	Immediate action needed	High	Very high
Substantial	More action needed	Substantial	High
Moderate	Watching brief	Medium	Moderate
Limited	No action needed	Low	Low

Higher urgency due to:

- Consecutive dry years
- Reservoir depletion
- Rising water demand

Risk Workflow	Severity C		Severity F		Urgency		Capacity Resilience/CR		Risk Priorit
	Median	StDev	Median	StDev	Median	StDev	Median	StDev	
River flooding	3	0.85	3	0.83	3	0.76	2	0.62	High
Drought	2	0.76	3	0.83	4	0.91	2	0.36	High

The CLIMAAX project is funded by the European Union under Grant agreement ID 101093864. This publication was funded by the European Union.
Its contents are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Union.

Support to Risk evaluation and management

The CLIMAAX project is funded by the European Union under Grant agreement ID 101093864. This publication was funded by the European Union.
Its contents are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Union.

Phase 3: A roadmap for an operational drought monitoring system for Crete


ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ

ΑΠΟΚΕΝΤΡΩΜΕΝΗ ΔΙΟΙΚΗΣΗ ΚΡΗΤΗΣ

ΓΕΝΙΚΗ ΔΙΕΥΘΥΝΣΗ ΧΩΡΟΤΑΞΙΚΗΣ & ΠΕΡΙΒΑΛΛΟΝΤΙΚΗΣ ΠΟΛΙΤΙΚΗΣ

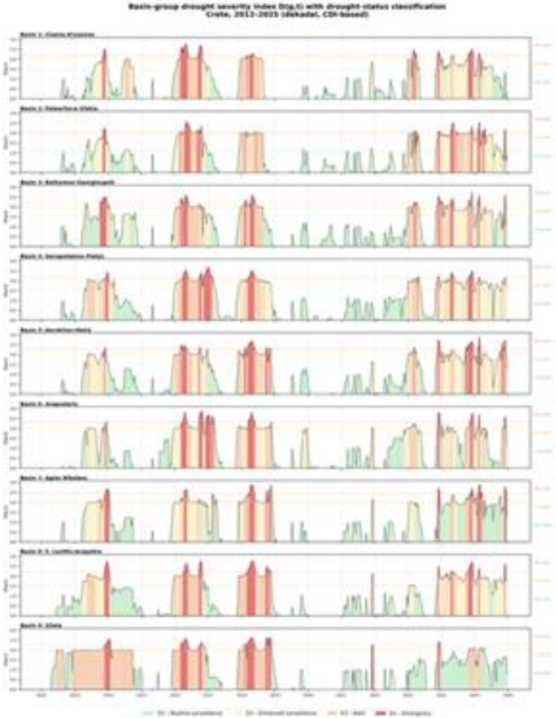
ΔΙΕΥΘΥΝΣΗ ΥΔΑΤΩΝ

ΤΜΗΜΑ ΠΑΡΑΚΟΛΟΥΘΗΣΗΣ ΚΑΙ ΠΡΟΣΤΑΣΙΑΣ ΥΔΑΤΙΚΩΝ ΠΟΡΩΝ

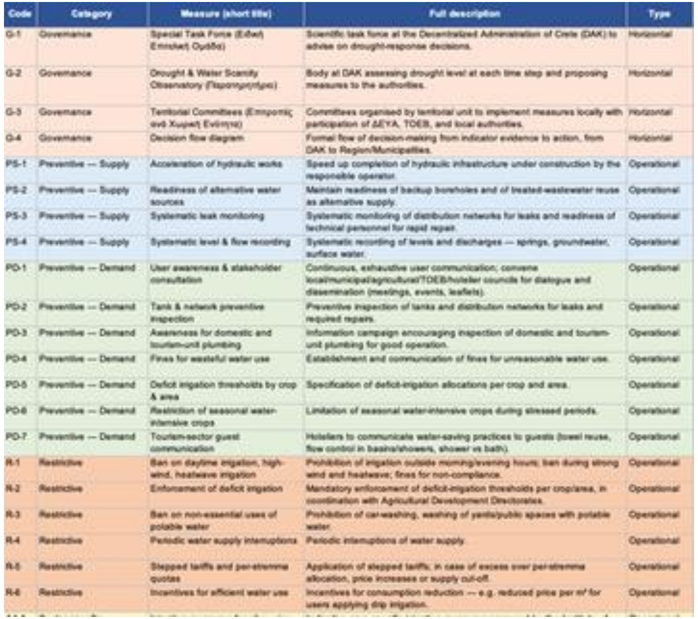
ΚΑΤΑΡΤΙΣΗ ΣΧΕΔΙΟΥ ΔΡΑΣΗΣ ΓΙΑ ΤΗΝ ΑΝΤΙΜΕΤΩΠΙΣΗ ΞΗΡΑΣΙΑΣ - ΛΕΙΨΥΔΡΙΑΣ ΣΤΗΝ ΠΕΡΙΦΕΡΕΙΑ ΚΡΗΤΗΣ

ΣΧΕΔΙΟ ΔΡΑΣΗΣ ΓΙΑ ΤΗΝ ΑΝΤΙΜΕΤΩΠΙΣΗ ΞΗΡΑΣΙΑΣ - ΛΕΙΨΥΔΡΙΑΣ ΣΤΗΝ ΠΕΡΙΦΕΡΕΙΑ ΚΡΗΤΗΣ

9 Basin Groups



23 Operational Measures

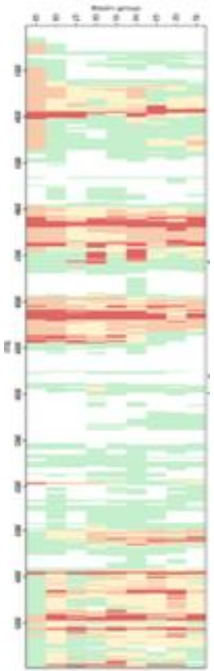


Code	Category	Measure (short title)	Full description	Type
G-1	Governance	Special Task Force (Ειδική Επιστημονική Ομάδα)	Scientific task force at the Decentralized Administration of Crete (DAK) to advise on drought-response decisions.	Horizontal
G-2	Governance	Drought & Water Scarcity Observatory (Παρατηρητήριο)	Body at DAK assessing drought level at each time step and proposing measures to the authorities.	Horizontal
G-3	Governance	Territorial Committees (Επιτροπές ανά Χωρική Ενότητα)	Committees organised by territorial unit to implement measures locally with participation of ΔΕΥΑ, TOEB, and local authorities.	Horizontal
G-4	Governance	Decision flow diagram	Formal flow of decision-making from indicator evidence to action, from DAK to Region/Municipalities.	Horizontal
PS-1	Preventive — Supply	Acceleration of hydraulic works	Speed up completion of hydraulic infrastructure under construction by the responsible operator.	Operational
PS-2	Preventive — Supply	Readiness of alternative water sources	Maintain readiness of backup boreholes and of treated-wastewater reuse as alternative supply.	Operational
PS-3	Preventive — Supply	Systematic leak monitoring	Systematic monitoring of distribution networks for leaks and readiness of technical personnel for rapid repair.	Operational
PS-4	Preventive — Supply	Systematic level & flow recording	Systematic recording of levels and discharges — springs, groundwater, surface water.	Operational
PD-1	Preventive — Demand	User awareness & stakeholder consultation	Continuous, exhaustive user communication; convene local/municipal/agricultural/TOEB/hotelier councils for dialogue and dissemination (meetings, events, leaflets).	Operational
PD-2	Preventive — Demand	Tank & network preventive inspection	Preventive inspection of tanks and distribution networks for leaks and required repairs.	Operational
PD-3	Preventive — Demand	Awareness for domestic and tourism-unit plumbing	Information campaign encouraging inspection of domestic and tourism-unit plumbing for good operation.	Operational
PD-4	Preventive — Demand	Fines for wasteful water use	Establishment and communication of fines for unreasonable water use.	Operational
PD-5	Preventive — Demand	Deficit irrigation thresholds by crop & area	Specification of deficit-irrigation allocations per crop and area.	Operational
PD-6	Preventive — Demand	Restriction of seasonal water-intensive crops	Limitation of seasonal water-intensive crops during stressed periods.	Operational
PD-7	Preventive — Demand	Tourism-sector guest communication	Hoteliers to communicate water-saving practices to guests (towel reuse, flow control in basins/showers, shower vs bath).	Operational
R-1	Restrictive	Ban on daytime irrigation, high-wind, heatwave irrigation	Prohibition of irrigation outside morning/evening hours; ban during strong wind and heatwave; fines for non-compliance.	Operational
R-2	Restrictive	Enforcement of deficit irrigation	Mandatory enforcement of deficit-irrigation thresholds per crop/area, in coordination with Agricultural Development Directorates.	Operational
R-3	Restrictive	Ban on non-essential uses of potable water	Prohibition of car-washing, washing of yards/public spaces with potable water.	Operational
R-4	Restrictive	Periodic water supply interruptions	Periodic interruptions of water supply.	Operational
R-5	Restrictive	Stepped tariffs and per-stremma quotas	Application of stepped tariffs; in case of excess over per-stremma allocation, price increases or supply cut-off.	Operational
R-6	Restrictive	Incentives for efficient water use	Incentives for consumption reduction — e.g. reduced price per m³ for users applying drip irrigation.	Operational

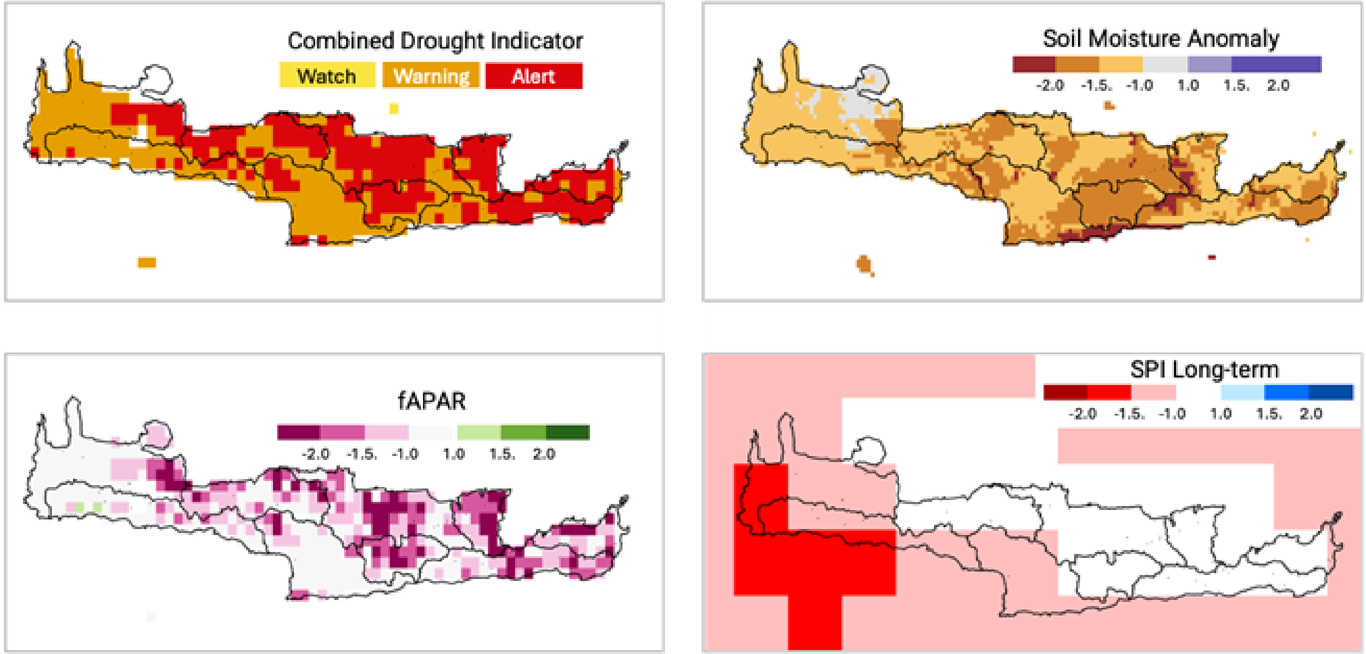
E1 – Routine surveillance E2 – Enhanced surveillance E3 – Alert E4 – Emergency

The CLIMAAX project is funded by the European Union under Grant agreement ID 101093864. This publication was funded by the European Union.
Its contents are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Union.

Phase 3: A roadmap for an operational drought monitoring system for Crete

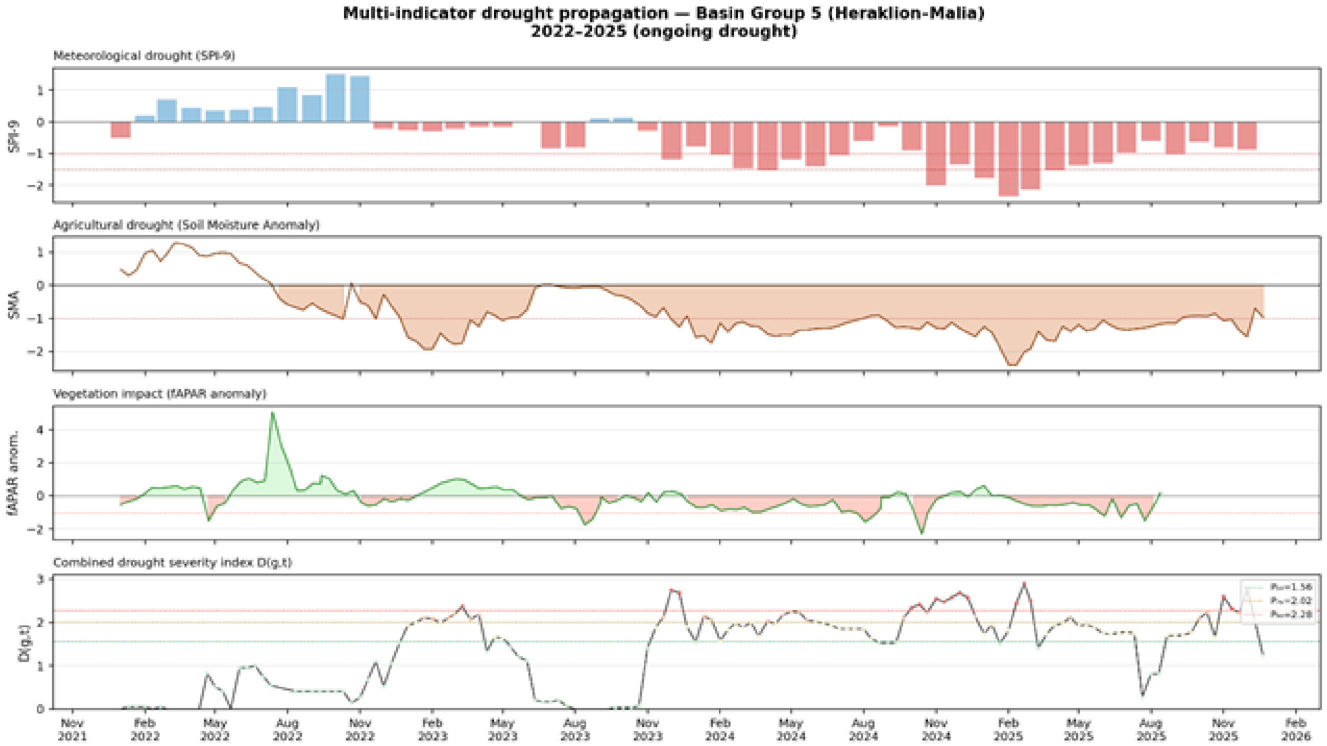


3rd December 2025



The CLIMAAX project is funded by the European Union under Grant agreement ID 101093864. This publication was funded by the European Union. Its contents are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Union.

Phase 3: A roadmap for an operational drought monitoring system for Crete



The CLIMAAX project is funded by the European Union under Grant agreement ID 101093864. This publication was funded by the European Union.
Its contents are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Union.

CLIMAAX
climate ready regions

www.climaax.eu

Thanks

The CLIMAAX project is funded by the European Union under Grant agreement ID 101093864. This publication was funded by the European Union.
Its contents are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Union.

The overlooked survivors of cities

Relative drought climate risk assessment of urban green spaces

Municiplaity of District 12 of Budapest

Budapest, 14 May 2026

Emese Décsi, project manager

The CLIMAAX project is funded by the European Union under Grant agreement ID 101093864.
This publication was funded by the European Union. Its contents are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Union.

CLIMAAX
climate ready regions

Who are we?

Managing **R**isks towards a **C**limate **Adapt**ive Hegyvidék (MARCAdapt)

Municipality

Green Office
International projects Office
(+Urban Development Office,
Healthcare Office, etc.)

External experts

Geospatial data scientist
Climate researcher
Communication expert

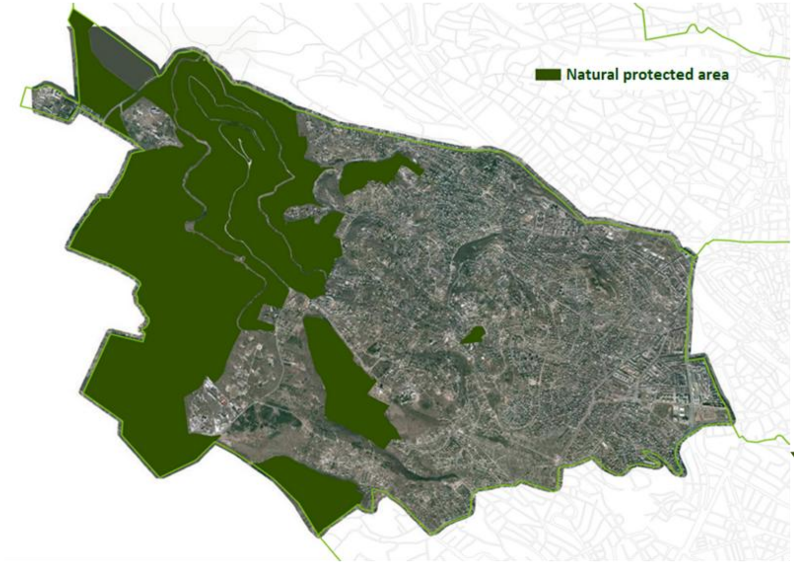
Stakeholders

City of Budapest, Budapest Public Transport, Budapest Sewers, Public Space Maintenance, Universities, Social Care, NGOs, etc.

Local population

The CLIMAAX project is funded by the European Union under Grant agreement ID 101093864. This publication was funded by the European Union. Its contents are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Union.

Regional Profile and Context



Hegyvidék Municipality

- a district in Budapest
- 27 km2
- 57,000 inhabitants
- 33% elderly
- hilly topography
- vast green area

The CLIMAAX project is funded by the European Union under Grant agreement ID 101093864. This publication was funded by the European Union.
Its contents are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Union.

Regional Profile and Context

- Climate hazards: heavy rainfall, heatwaves, **relative drought**
- Vulnerable groups impacted by drought: the ecosystems of
  - **forests**
  - **urban parks and gardens**
  - **tree rows**
  - **flower beds, green strips, bee pastures, lawns**
  - **private green areas**
- Shock of the extreme drought in 2022

The CLIMAAX project is funded by the European Union under Grant agreement ID 101093864. This publication was funded by the European Union. Its contents are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Union.

Regional Profile and Context

- **Challenges:**
  - Urban tissue
  - Double-government system – complicated responsibilities
  - Legal background and clashing interests
  - Extreme use and heavy visitation rates
  - Communication with the residents
- **Leverages:**
  - Relating local projects and programmes
  - Collaborations with researchers
  - Changing political context
- Local Environment Protection Programme, Climate Strategy, Rainwater Management Action Plan

The CLIMAAX project is funded by the European Union under Grant agreement ID 101093864. This publication was funded by the European Union.
Its contents are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Union.

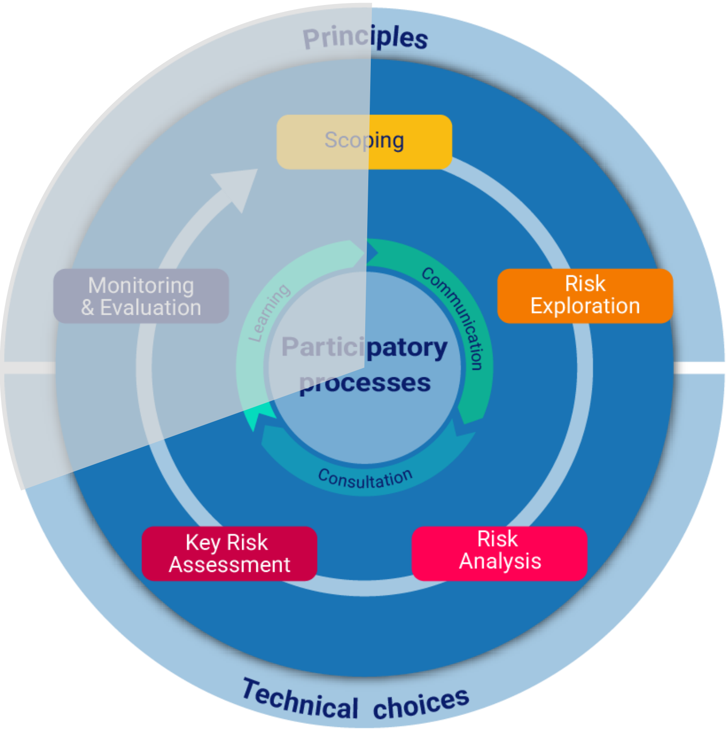
Relative Drought CRA experience

Accomplished:

- Scoping
- Risk exploration
- Risk analysis
- Key Risk Assessment

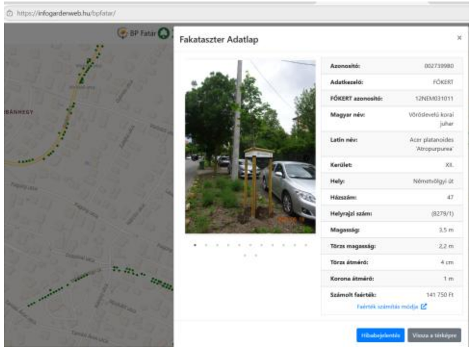
Remaining tasks:

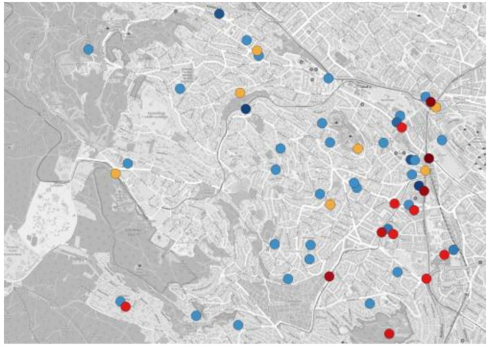
- Fine-tuning Key Risk Assessment
- Overall Monitoring and Evaluation
- Risk Management Action Plan



The CLIMAAX project is funded by the European Union under Grant agreement ID 101093864. This publication was funded by the European Union.
Its contents are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Union.

Relative Drought CRA experience





Preliminary in-house understanding and outlines

Stakeholder involvement - defining aspects and indicators in workshops

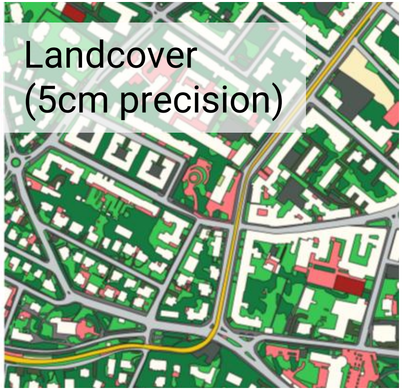
Data collection – purchases and partnerships

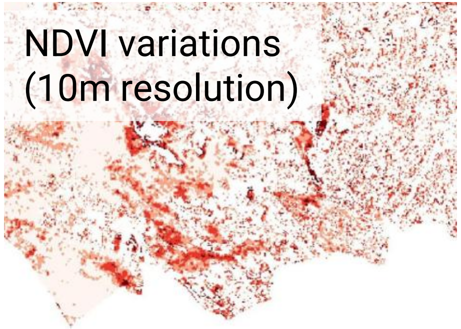
Citizens involvement connecting to other projects – sharing experiences

The CLIMAAX project is funded by the European Union under Grant agreement ID 101093864. This publication was funded by the European Union.
Its contents are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Union.

Risk analysis using the CLIMAAX Toolbox

	Relative drought (urban green areas)
Hazard	CMIP6 global climate models - WASP index, SSP3-7.0 and SSP5-8.5, near future + local NDVI-based component
Exposure	LANDSAT surface temperature, mobility
Vulnerability	Land cover, tree density





The CLIMAAX project is funded by the European Union under Grant agreement ID 101093864. This publication was funded by the European Union.
Its contents are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Union.

Risk analysis using the CLIMAAX Toolbox

Data processing:

- Spatial scale: urban blocks and streets
- 1-10 scores
- Weights
- **Risk = Hazard x Exposure x Vulnerability**

Lack of data:

- Plant species
- Maintenance practices
- Long-term effect of drought

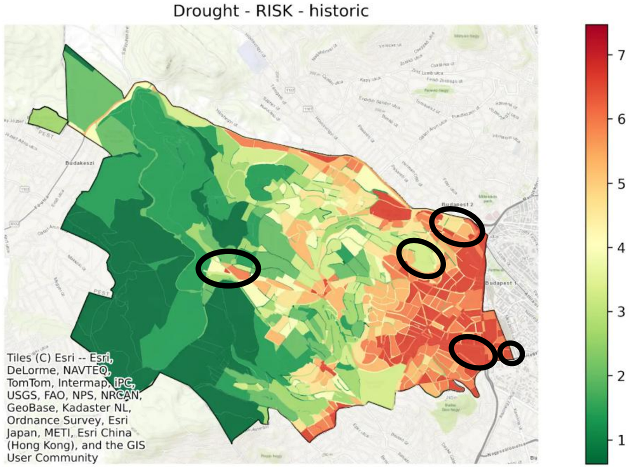
The CLIMAAX project is funded by the European Union under Grant agreement ID 101093864. This publication was funded by the European Union.
Its contents are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Union.

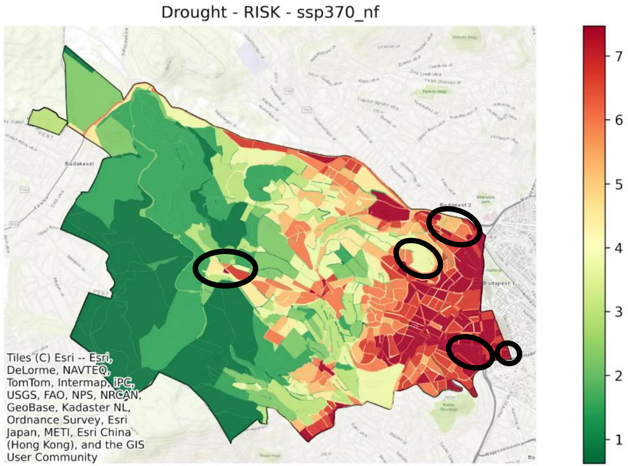
Our CRA results and conclusions

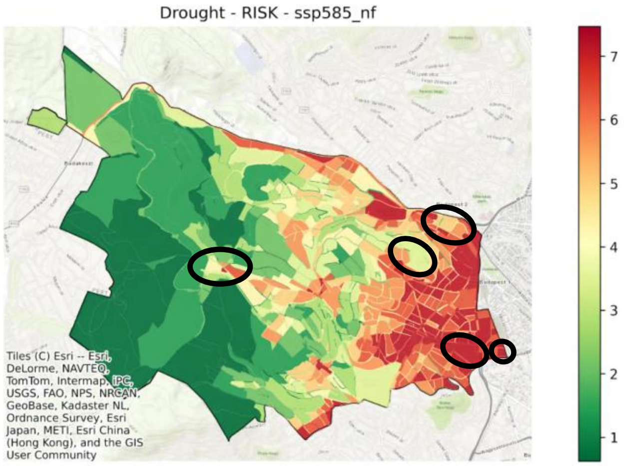
- Risk is lower in larger green areas
- Risk is higher in downtown
- Heavily visited forests are also at risk!
- Private areas are extremely impacted

→

- Protection, preservation, development
- Climate-adaptive green space maintenance practices
- Trees as basic utilities?
- Public awareness, private gardening practices
- Influence tourism and traffic trends







The CLIMAAX project is funded by the European Union under Grant agreement ID 101093864. This publication was funded by the European Union. Its contents are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Union.

Risk evaluation and management

Key Risk assessment

Risk Workflow	*Severity*		*Urgency*	*Capacity*	*Risk Priority*
	C	F		Resilience/ CRM	
Relative drought	moderate	substantial	immediate and sustained action	medium	Very high

The CLIMAAX project is funded by the European Union under Grant agreement ID 101093864. This publication was funded by the European Union.
Its contents are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Union.

Risk evaluation and management

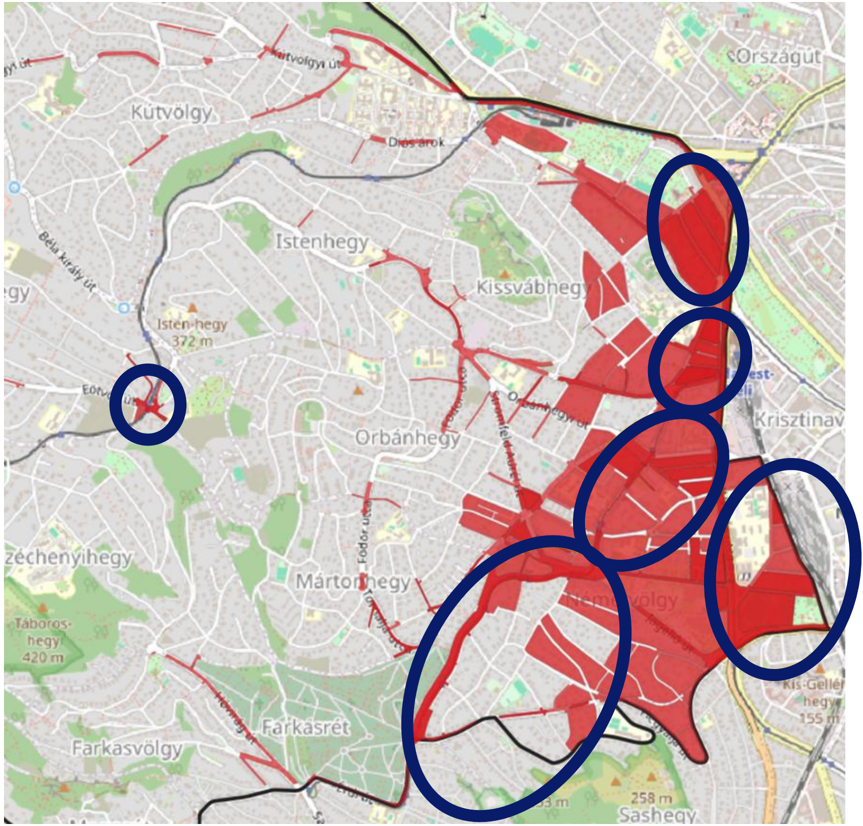
Spatial coherence with heatwaves and heavy rainfall CRA results -> **co-management of climate risks!**

Targeting climate adaptation and risk management measures:

- Sectors
- Spatial location
- Priority, timing

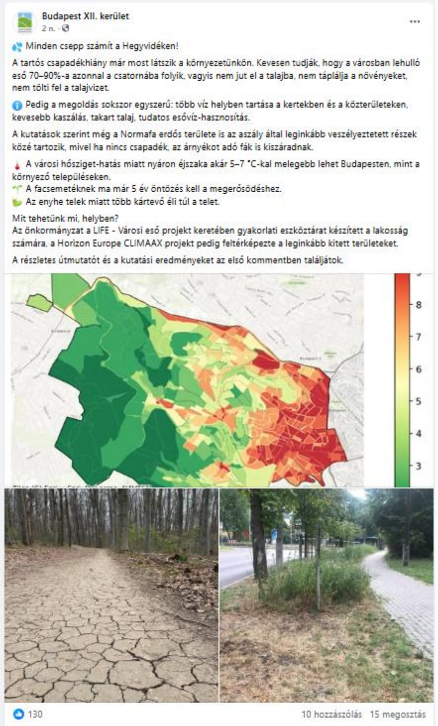
Building **connections** with other developments – coherent municipal strategies!

Mobilizing stakeholders (and residents) to take action



The CLIMAAX project is funded by the European Union under Grant agreement ID 101093864. This publication was funded by the European Union. Its contents are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Union.

Reflections on using CLIMAAX toolbox and next steps



- Challenge of **downscaling** the methodology to local scale
- Various **local data** formats -> altering the workflows
- Interpreting the **climate scenarios**
- Next steps:
  - Fine-tuning Key Risk Assessment
  - Current risk management evaluation
  - Risk Management Action Plan
  - Stakeholder consultations
  - Pilot: incorporating tree cadastre data
  - Communication of the results
  - Building connections with other projects

The CLIMAAX project is funded by the European Union under Grant agreement ID 101093864. This publication was funded by the European Union. Its contents are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Union.

CLIMAAX
climate ready regions

www.climaax.eu

Thank you for your attention!

Emese Décsi
Municipality of District 12 of Budapest
decsi.emese@hegyvidek.hu

The CLIMAAX project is funded by the European Union under Grant agreement ID 101093864. This publication was funded by the European Union. Its contents are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Union.

PANEL DISCUSSION AND Q&A SESSION

INTERNATIONAL
INSTITUTE FOR
APPLIED SYSTEMS ANALYSIS

Silvia Artuso

MUNICIPALITY OF
DISTRICT 12 OF
BUDAPEST

Emese Décsi

REGION OF
CRETE

Aris Koutroulis

Upcoming events

- **21 May 2026 10.30 CET**

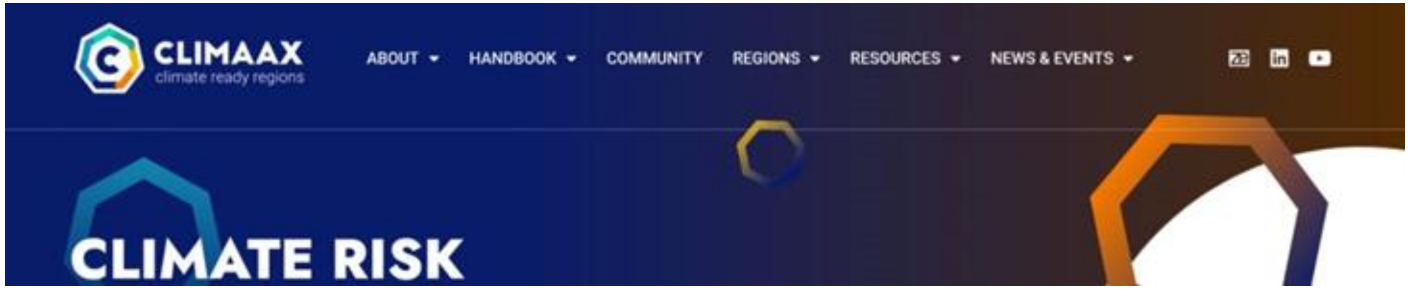
To register:

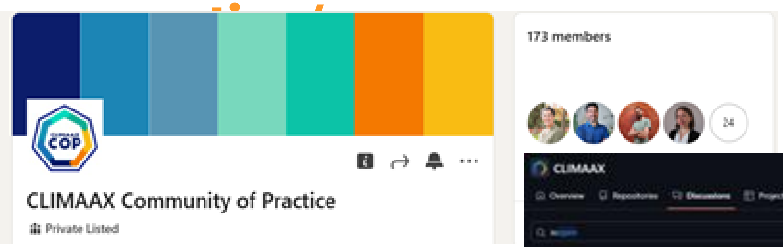
The CLIMAAX project is funded by the European Union under grant agreement No. 101093864.
This work was funded by the European Union. Its contents are the sole responsibility of the authors and do not necessarily reflect the views of the European Union.

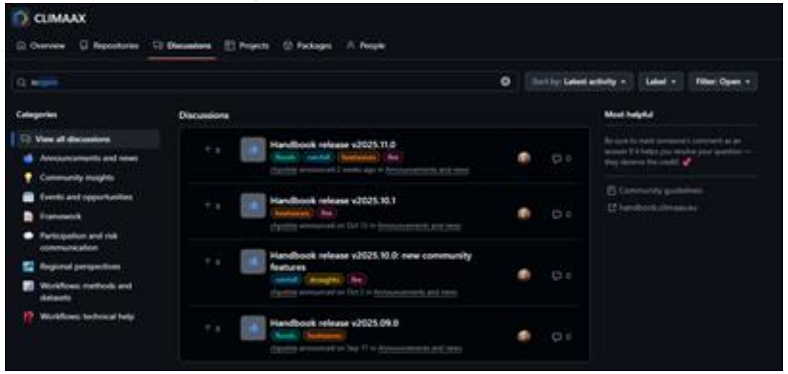
How to engage in the Community of practice

- Join our LinkedIn group and community forum
- Take our surveys
- Subscribe to the CoP to receive communication of further updates

https://www.climaax.eu/community-of-







!! Scan this !!

The CLIMAAX project is funded by the European Union under grant agreement No. 101093864.
This work was funded by the European Union. Its contents are the sole responsibility of the authors and do not necessarily reflect the views of the European Union.

CLIMAAX
climate ready regions

www.climaax.eu

Thank you and see you next time!

cop@climaax.eu

The CLIMAAX project is funded by the European Union under Grant agreement ID 101093864. This publication was funded by the European Union. Its contents are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Union.