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# LIFE URBANPROOF

## CLIMATE PROOFING URBAN MUNICIPALITIES

**The URBANPROOF toolkit: a decision support tool for climate proofing urban municipalities**

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ADAPTtoCLIMATE Conference, 19 April 2021

# THE PROJECT



**LIFE URBANPROOF**  
CLIMATE PROOFING  
URBAN MUNICIPALITIES

**Areas of implementation:**

Cyprus, Greece, Italy

**Budget:** 1,854,000 € (60% EC Co-funding)

**Duration:** 55 months

**Start Date:** 01/10/2016

**End Date:** 30/04/2021

**Website:** <https://urbanproof.eu/>



*The overall aim of the UrbanProof project is to increase the resilience of municipalities to climate change equipping them with a powerful tool for supporting better informed decision making on climate change adaptation planning.*

# THE CONSORTIUM

## Government Body



Department of Environment,  
Ministry of Agriculture, Rural  
Development and Environment  
of Cyprus  
**Coordinator**

## Research Institutes



**National Technical  
University Of Athens**



**National Observatory  
of Athens**

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Università Iuav  
di Venezia  
**University IUAV of Venice**

## Municipalities



**Municipality  
of Peristeri**



**COMUNE DI  
REGGIO NELL'EMILIA**

# PROJECT STRUCTURE



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- Simulation of current climate and projection of future changes in climate

- Climate change impact and adaptation assessment

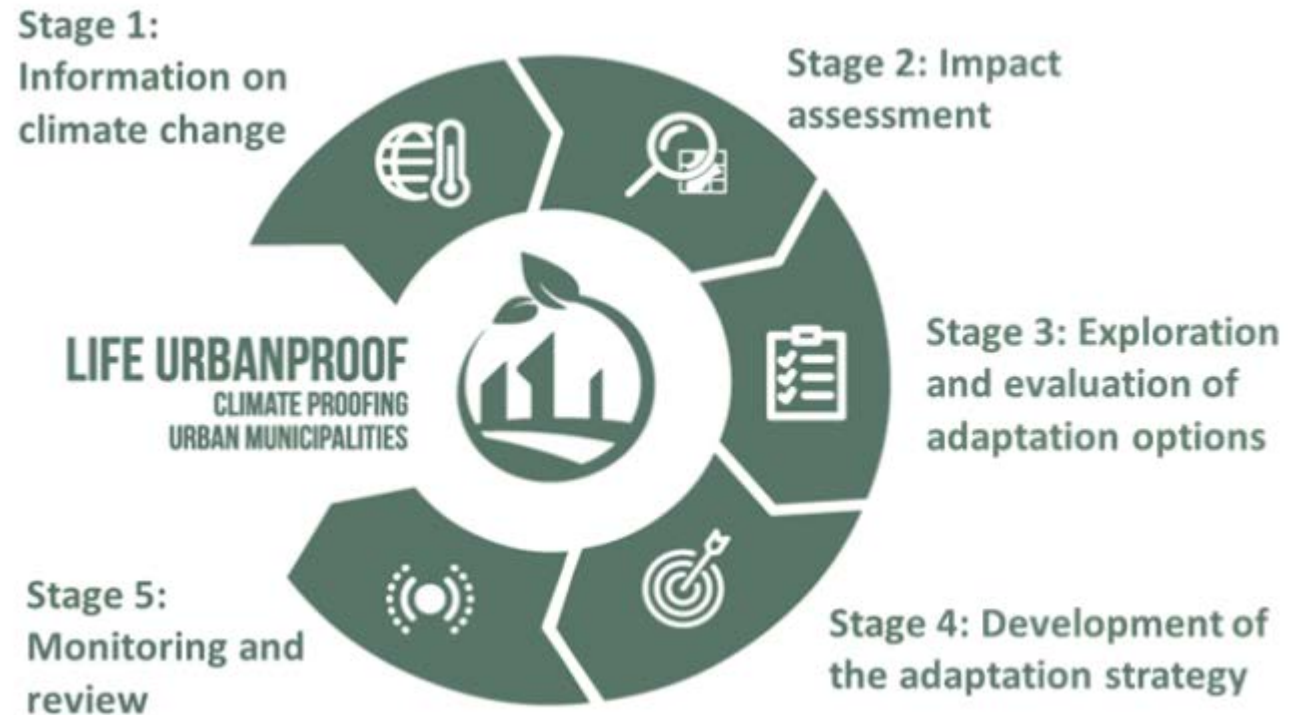
- Development of the **UrbanProof toolkit** for supporting better informed decision-making

- Implementation of selected green and soft adaptation measures

- Development of local climate change adaptation strategies

# The URBANPROOF toolkit

- ❖ The URBANPROOF toolkit aims to enable better informed decision making for climate change adaptation planning.
- ❖ It may support municipalities in the development of their local **Climate Action Plans**, e.g. in the framework of the *Covenant of Mayors*.
- ❖ The toolkit consists of **five interdependent stages** which, altogether constitute the adaptation process.





# LIFE URBANPROOF *toolkit*

## APPLICABILITY OF THE TOOL

URBAN MUNICIPALITIES

# APPLICABILITY OF THE TOOLKIT

- The URBANPROOF toolkit may be used for conducting an impact and adaptation assessment for every urban municipality of Italy, Greece and Cyprus.
- The URBANPROOF municipalities include all Local Administrative Units level 2 (LAU2) which are classified as:
  - Cities (densely populated areas)
  - Towns & suburbs (intermediate density areas).



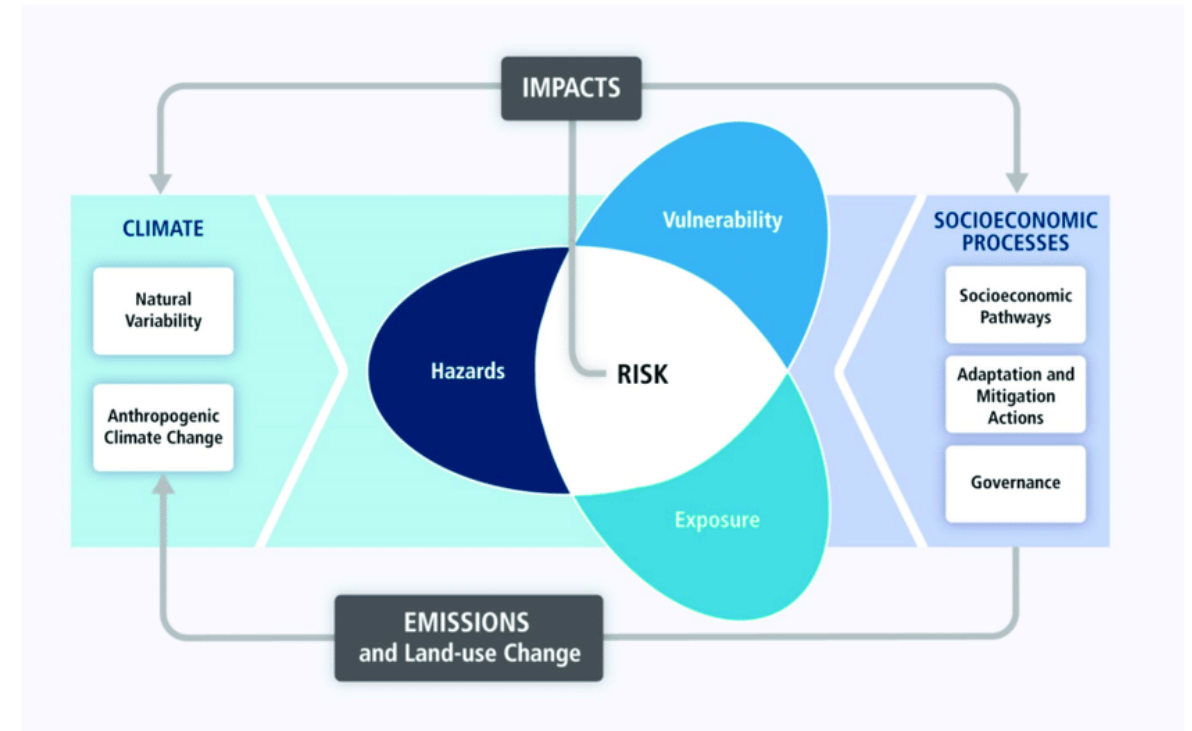






# IMPACT ASSESSMENT METHODOLOGY

- The impact assessment methodology is based on the relevant conceptual framework presented within the 5<sup>th</sup> Assessment Report (AR5) of the IPCC (2014)
- Impacts are considered to result from the interaction of **hazard** and **vulnerability**, while the latter is considered to be a function of the **exposure**, **sensitivity** and **adaptive capacity** of population and infrastructure.



*IPCC 2014: Summary for policymakers. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*

# IMPACT ASSESSMENT METHODOLOGY

## Hazard indicators

- Relevant climatic information for each impact

## Exposure indicators

- Exposure of population, land and/or critical infrastructure to an impact

## Sensitivity indicators

- Population groups which are considered sensitive to climate change

## Adaptive capacity indicators

- Capacity of the health care system and of the economy to address climate change impacts

# IMPACT ASSESSMENT APPROACH

- For assessing climate change impacts, the **composite indicator** approach is selected, as composite indices capture the multi-dimensionality of impacts in a comprehensible form and therefore may support practical decision-making processes.
- Indicators were **normalized** by applying the min-max method (OECD 2008), while a five-class system was then applied representing values from “High” to “Low”.

| Qualitative scale | Numerical scale |
|-------------------|-----------------|
| Low               | $0 < I \leq 1$  |
| Low to Medium     | $1 < I \leq 2$  |
| Medium            | $2 < I \leq 3$  |
| Medium to High    | $3 < I \leq 4$  |
| High              | $4 < I \leq 5$  |

# IMPACT ASSESSMENT APPROACH

- The results of the impact assessment may provide an **indication** of the intensity of impacts expected and of the areas that will be mostly affected
  - More detailed field research and consultation with stakeholders are necessary in order to determine what is needed for adaptation planning.



# LIFE URBANPROOF *toolkit*

CLIMATIC DATA



# GHG EMISSION SCENARIOS

- **Stabilization of GHG levels, with mitigation policies (RCP4.5)**

RCP4.5 is a stabilization scenario that assumes that global annual GHG emissions peak around 2040 and then decline, leading to a radiative forcing of  $4.5 \text{ W/m}^2$  in the year 2100. This scenario assumes the imposition of emissions mitigation policies.

- **Increasing GHG levels, no mitigation policies (RCP8.5)**

RCP8.5 is a so-called 'baseline' scenario that does not include any specific climate mitigation target. The greenhouse gas emissions and concentrations in this scenario increase considerably over time, leading to a radiative forcing of  $8.5 \text{ W/m}^2$  at the end of the century.

- The period 1971-2000 was used as the base period providing a reference for comparison with future projections for the period 2031-2060.



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## SOCIAL VULNERABILITY INDEX

AND SOCIO-ECONOMIC INDICATORS USED

# SOCIAL VULNERABILITY INDEX

- The social vulnerability indicators are combined to form the composite **Social vulnerability index**, which reflects the **population groups sensitive to climate change impacts and the adaptive capacity of the health care system and of the economy**.
  - Elderly people and very young children/infants
  - Illiterate
  - Population with chronic diseases
  - Population at poverty risk
  - Regional Gross Domestic Product
  - Available hospital beds per capita
- *The indicators are normalized based on their position with respect to the respective European average value (above/below average EU value).*

# Climate change impacts in the UrbanProof toolkit



Floods



Heatwaves and health



Peri-urban fires



Electricity demand  
for cooling



Water availability and  
droughts



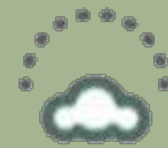
Ozone Exceedance



# LIFE URBANPROOF *toolkit*

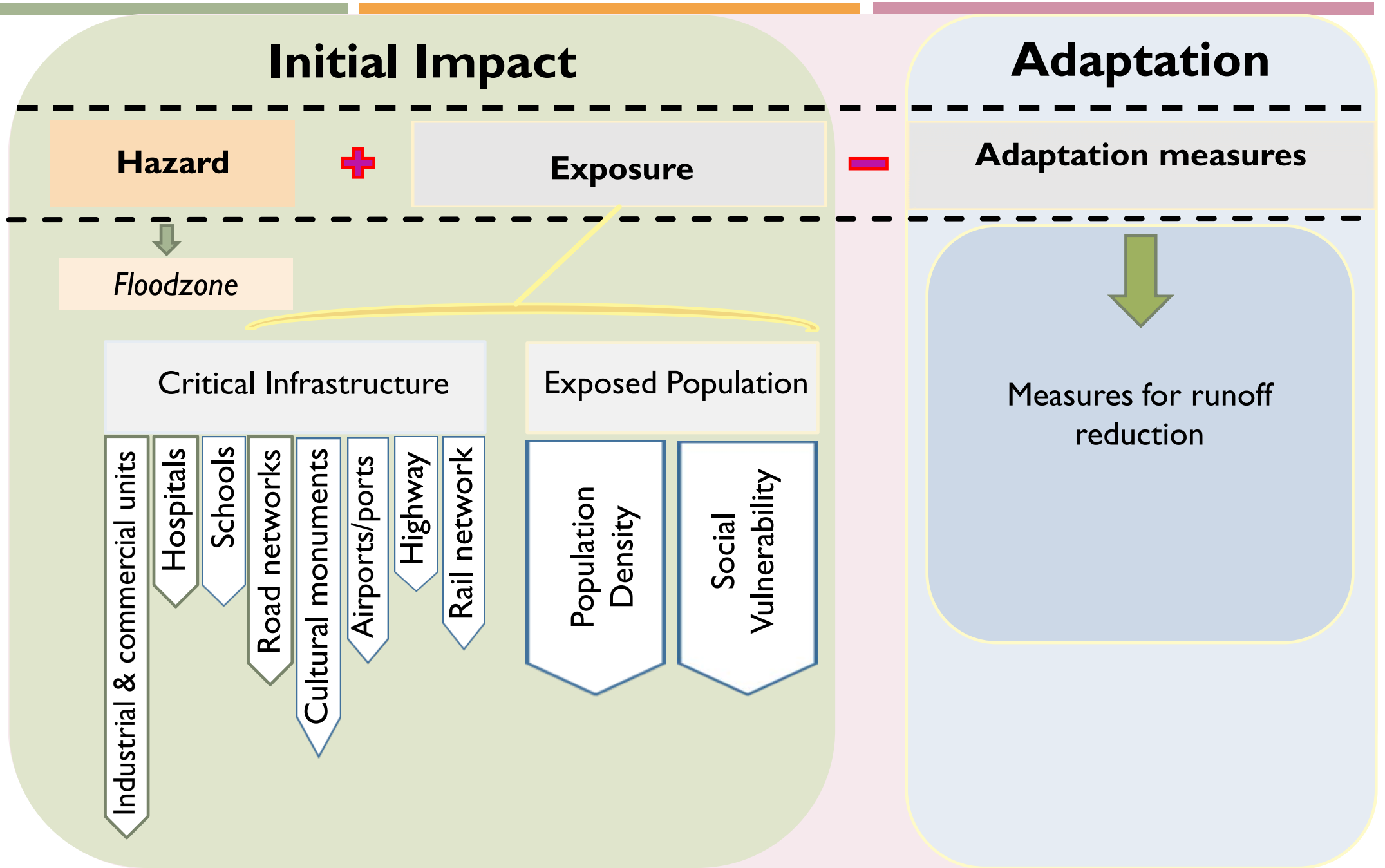
## CLIMATE CHANGE IMPACTS

Relevant to the urban environment



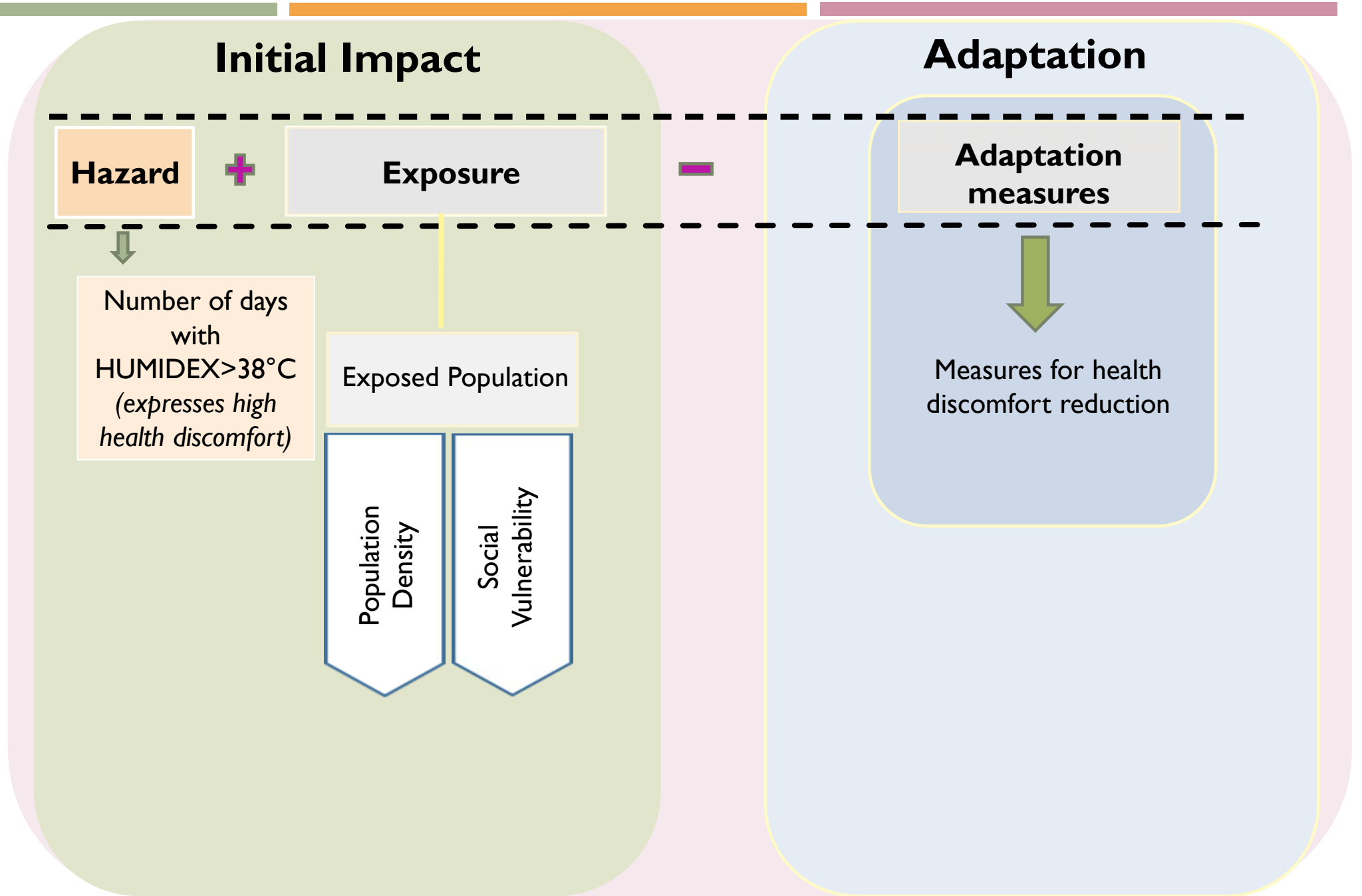


# FLOODS

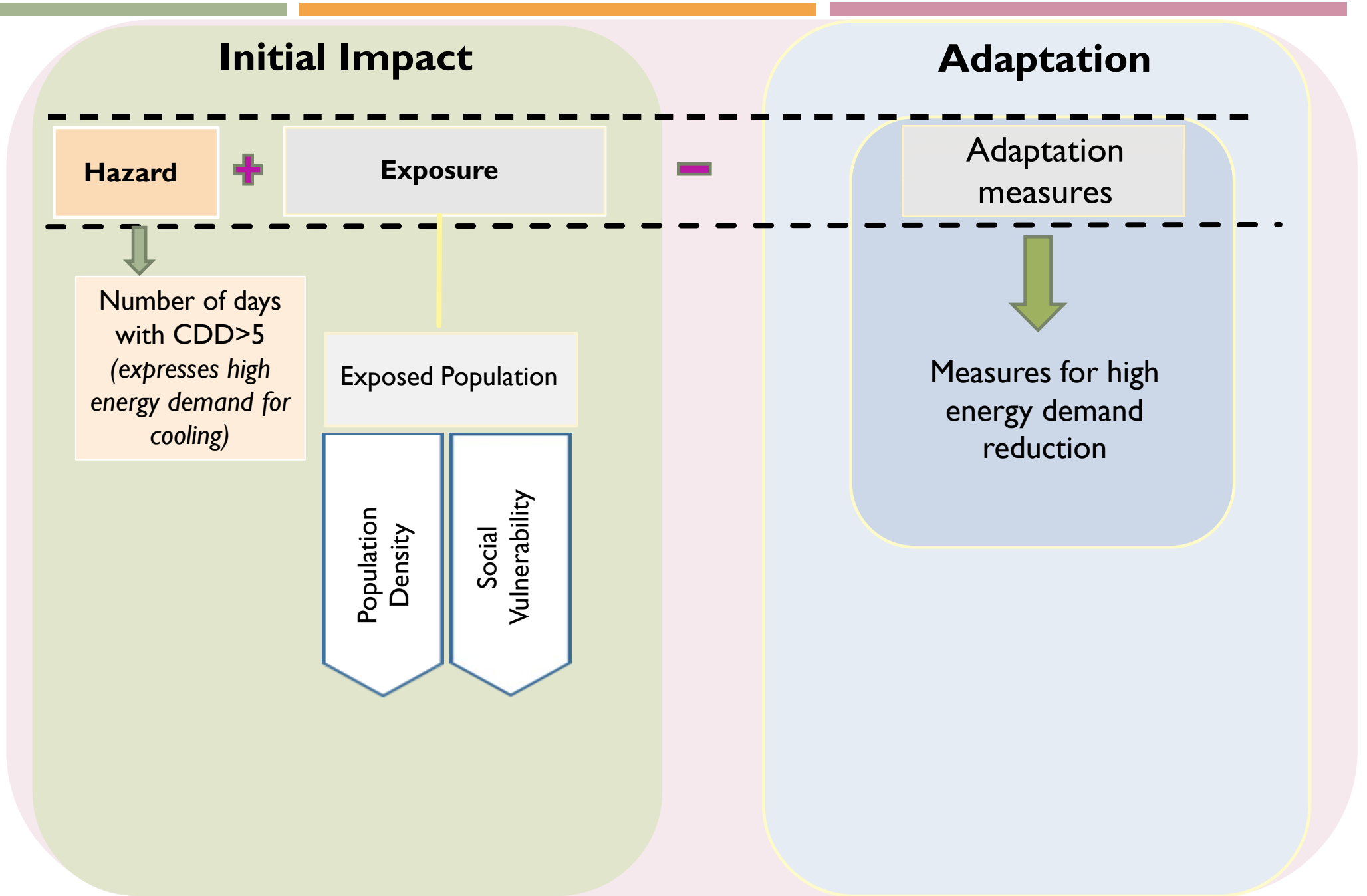




# HEATWAVES AND HEALTH

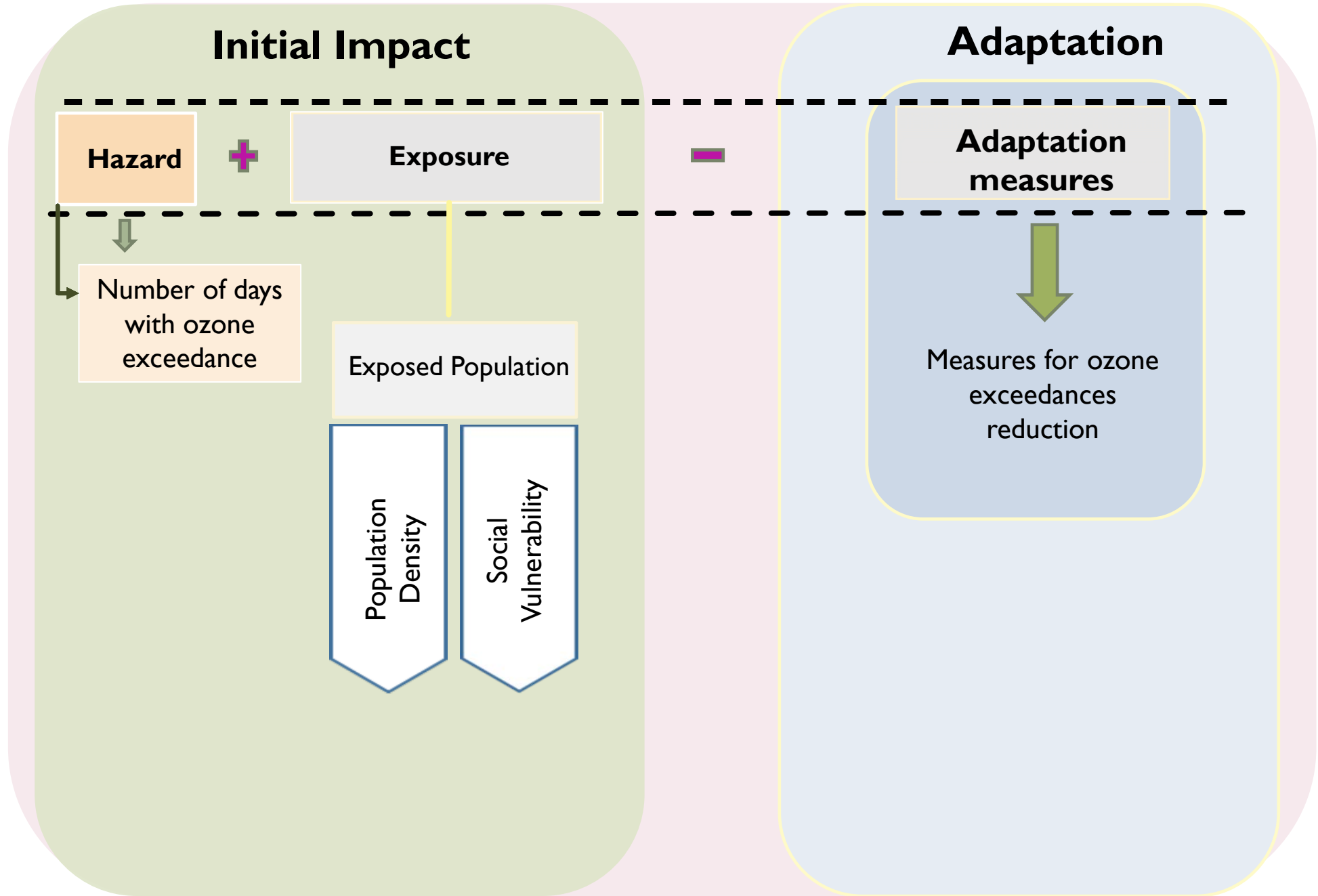


# ELECTRICITY DEMAND FOR COOLING



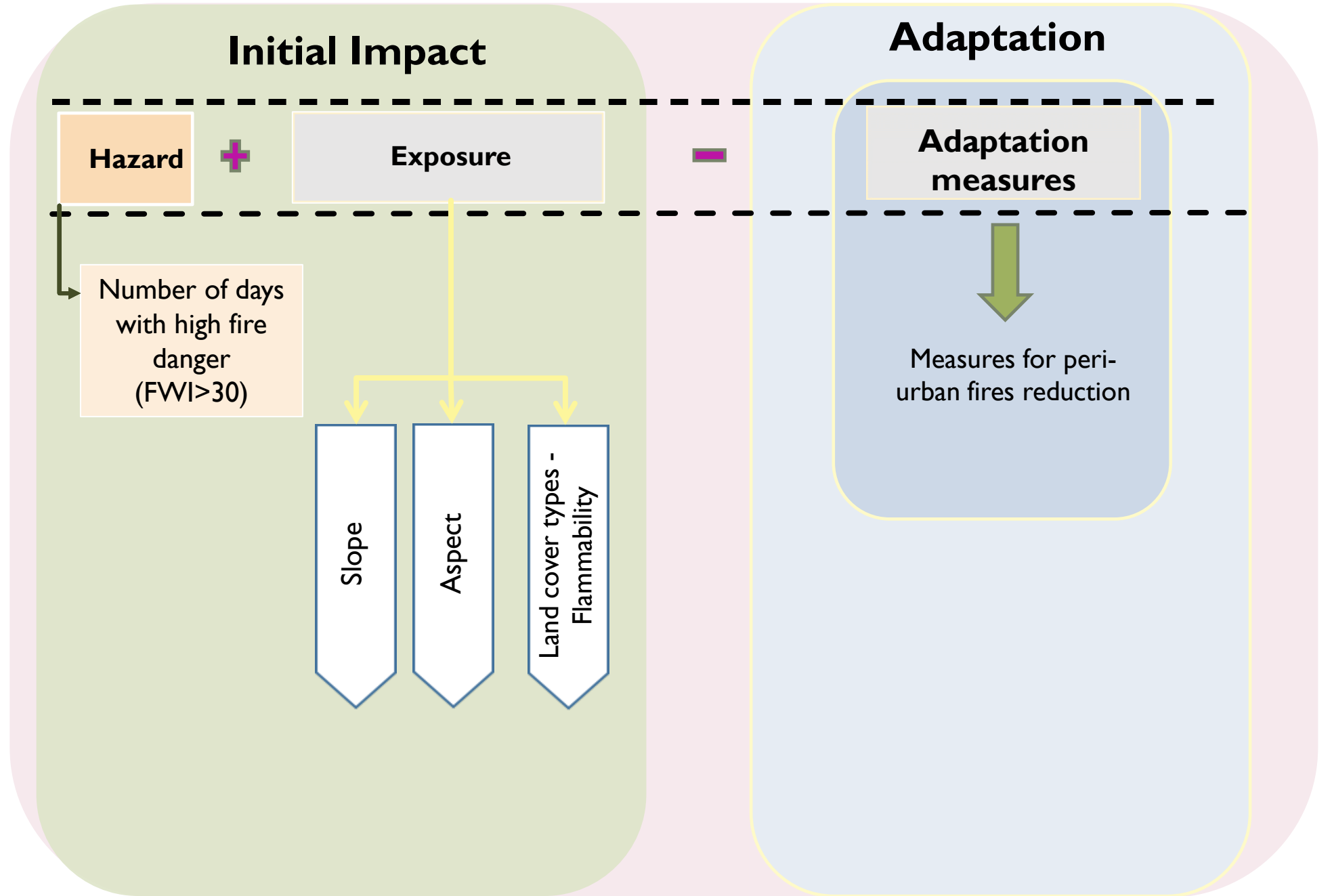


# OZONE EXCEEDANCES





# PERI-URBAN FIRES







# WATER AVAILABILITY AND DROUGHTS

- For the impact assessment, the Water Exploitation Index (WEI) and the Standardized Precipitation Evapotranspiration Index (SPEI) were used.
- The assessment was made at the wider river basin management level where the main domestic water supply sources of the municipalities are located
- The results refer to the municipalities as a whole, since water supply is managed at central level and may be used by the competent authorities for investigating whether there will be need for adaptation action



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**GEOSPATIAL DATABASES**

# GEOSPATIAL DATABASES



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| Geospatial data                                 | Databases  |
|---|--|
| Climatic data                                   | CORDEX regional climate model (RCM) simulations for the European domain (EURO-CORDEX) database |
| Population density (urban block resolution)     | Urban Atlas database - Copernicus Land Monitoring Service                                      |
| Population density (grid resolution: 500x500m ) | Global Human Settlement (GHS)<br>Population grid (LDS) – Joint Research Centre                 |
| Urban trees, urban green areas                  | Urban Atlas database - Copernicus Land Monitoring Service                                      |
| Land use  | Corine Land Cover - Copernicus Land Monitoring Service   |
| Schools, Hospitals, Cultural units              | OpenStreetMap - Open Data Commons Open Database License Geodata.gov.gr                         |
| Floods hazard zones                             | EIONET Reporting Obligations Database (ROD) - European Environment Agency                      |
| Soil-hydraulic properties                       | European Soil Data Centre (ESDAC) - Joint Research Centre                                      |
| Socio-economic data                             | Eurostat, National Statistical Services  |



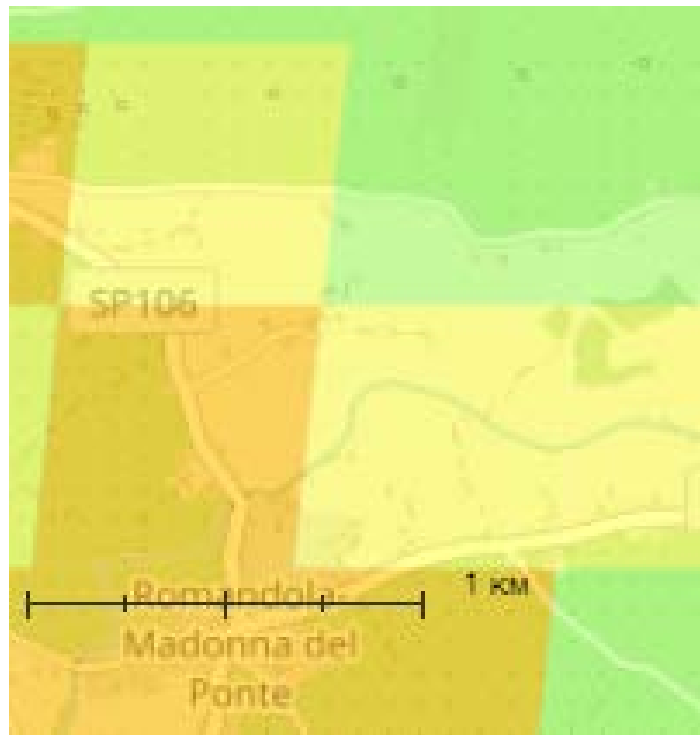
# LIFE URBANPROOF *toolkit*

## RESOLUTION ANALYSIS

URBAN MUNICIPALITIES & PROJECT MUNICIPALITIES

# RESOLUTION ANALYSIS

All urban municipalities: Presentation of results in grid cells of 500x500m



LIFE URBANPROOF project municipalities: Presentation of results at urban block level



*This applies for Stage 2. The results of Stage 5 are presented for all urban municipalities in grid cells of 500x500m*



# The UrbanProof toolkit online

Website:

<https://tool.urbanproof.eu/>

Developer company:  
Geospatial Enabling  
Technologies



Home UrbanProof toolkit ▾ The project Useful material ▾ Evaluate the tool Login/Sign up Contact us  

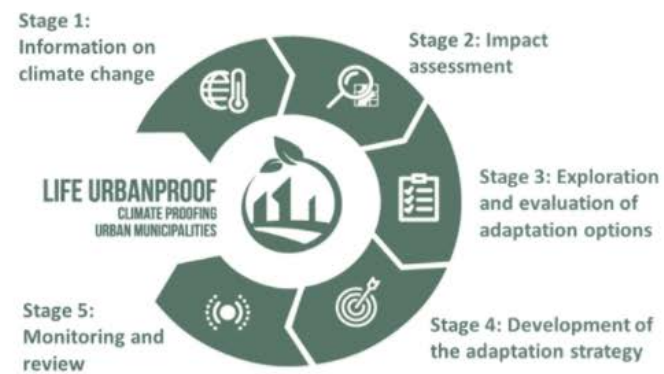


The URBANPROOF toolkit is a powerful decision support system aimed to enable better informed decision making for climate change adaptation planning. In specific, the user is guided through the different features of the toolkit in order to gain insight into the climate change impacts to the urban environment, to explore and evaluate the available adaptation options and to investigate the effect of adaptation interventions in increasing climate change resilience.

The tool has been developed in the frame of the LIFE URBANPROOF project "Climate Proofing Urban Municipalities" which is co-financed by the LIFE programme for the Environment and Climate Action (2014-2020).

The tool currently may be used for conducting an impact and adaptation assessment for every urban municipality in Italy, Greece and Cyprus. Higher resolution data are provided in the cases of the municipalities of Reggio Emilia (Italy), Peristeri (Greece) and Strovolos and Lakatamia (Cyprus) which are partners of the LIFE URBANPROOF project.

The toolkit consists of 5 interdependent modules/stages which altogether comprise the adaptation process, as shown next:



# POTENTIAL END USERS



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- **Municipalities**
- Consulting companies
- Competent regional and national departments
- Environmental technology companies
- Assurance companies
- Organizations and initiatives dealing with climate change adaptation
- Researchers, students
- All citizens



Thank you for your attention!

Contact email: [chpapad@chemeng.ntua.gr](mailto:chpapad@chemeng.ntua.gr)

Please take part in our *poll* for the  
evaluation of the **UrbanProof**  
toolkit!