

## Challenges of the BLLEE

The Metropolitan Area of Barcelona (AMB) is composed of 36 municipalities and over 3,239,337 inhabitants in 636 km<sup>2</sup>. It is a good example of a Mediterranean coastal region that can be severely affected by climate change impacts. Between 1981 and 2015, there were 109 episodes of flooding in AMB, of which 64 affected the city of Barcelona. They were usually consequence of heavy and local rains that caused minor damage, thanks to the existing management measures, but hinder the development of daily life and seriously affect traffic and the consequent pollution. Heavy rains in this region are expected to increase as a result of climate change, therefore, the adaptation measures need to be improved. 52.8% of the surface area of the AMB is urban type, implying a notable Urban Heat Island effect. Peri-urban areas register about 4°C less than in the middle of the city. For an average summer day (24°C-27°C), the risk of mortality is 40% higher than the average risk of mortality in most of the city; for a heat wave, this relative risk is greater than 80% in half part of the city. Future scenarios point to an increase of the relative risk that can overcome 100% in all the city. In this case the most usual adaptation measure is the installation of conditioned air, that dramatically increase the energy consumption

## Methodology of co-creation of the BLLEE

**1. Mapping of stakeholders:** from different sectors, Academia, civil society, public sector and industry (quadruple helix), according to the BLLEE interests (122 persons/teams)

**2. Stakeholders engagement:** contact and held individual online meetings to present the project and compile their interest/motivation (survey).



Stakeholders engagement

**4. Planning and development of citizen science tools:**

**3. First in-person stakeholder workshop:** successful participation of 33 representatives from the different stakeholders groups. A mix of presentations, participative dynamics, and a design thinking activity were used to co-define and improve the challenges of the BLLEE, for the identification of the barriers and drivers to the implementation of already defined adaptation routes and to propose new adaptation solutions. **Some results:**

- **The population is not aware of its exposure to these risks**, nor is it trained to respond correctly and reduce their impact. In the same way, it is unaware of the impact of their activity and behavior on the environment and climate justice/injustice.
- **A great deal of mitigation measures are not aligned with the European Green Deal Objectives** (i.e. conditioned air, potential new structural measures, ...). It is needed to develop adaptation solutions that cope with those risks as well as with climate change aligned with the Green Deal: *NBS solutions, Citizen science campaigns: identification of the impacts, informative campaigns led by citizens*
- Citizen science campaigns as a tool to:
  - a) **Cope with floods**, focused in the most affected quarters and population with low income
  - b) **Cope with extreme temperature**, focused on measurements at schools, on secure paths to go to schools and climate shelters, and the relationship between extreme temperatures and pollution.

**I-CHANGE Living Labs**

The 8 I-CHANGE Living Labs located in Amsterdam, Barcelona, Bologna, Genua, Jerusalem, Hasselt and Ouagadougou

**I-CHANGE - Citizen Actions on Climate Change and Environment:** impacts of Climate Change in extensive metropolitan areas have been one of the hot topics in the last years. To deal with these impacts and comply with European Green Deal, a transformation process that simultaneously encompasses mitigation and adaptation needs to be achieved. For this transformation to take place, there is the need to mobilize social commitment: citizens must be engaged to change their habits. To this aim, in the eight I-CHANGE Living citizens are invited to hands-on participation in the monitoring and assessment of different types of environmental data.

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Mark the preferred option

**What do you think is the phenomenon that causes the most problems in your neighbourhood?**

Floods	5
Extreme temperatures	23

**What phenomenon worries you the most?**

Floods	5
Extreme temperatures	18

**In an emergency, do you feel well informed?**

YES	9
NO	14

**Do you think the city is prepared for these phenomena?**

	YES	NO
Floods	2	19
Extreme temperatures	2	17

**Do you know what to do when faced with the risk of flooding or extreme temperatures?**

	YES	NO
Floods	12	14
Extreme temperatures	21	3

Results of the survey in the first stakeholders' meeting

**EXTREME EVENTS**

Mobile App to upload georeferenced images and information about impacts

**EXTREME TEMPERATURES**

Low cost weather stations

Meteotracker: to obtain meteorological information while moving around the city

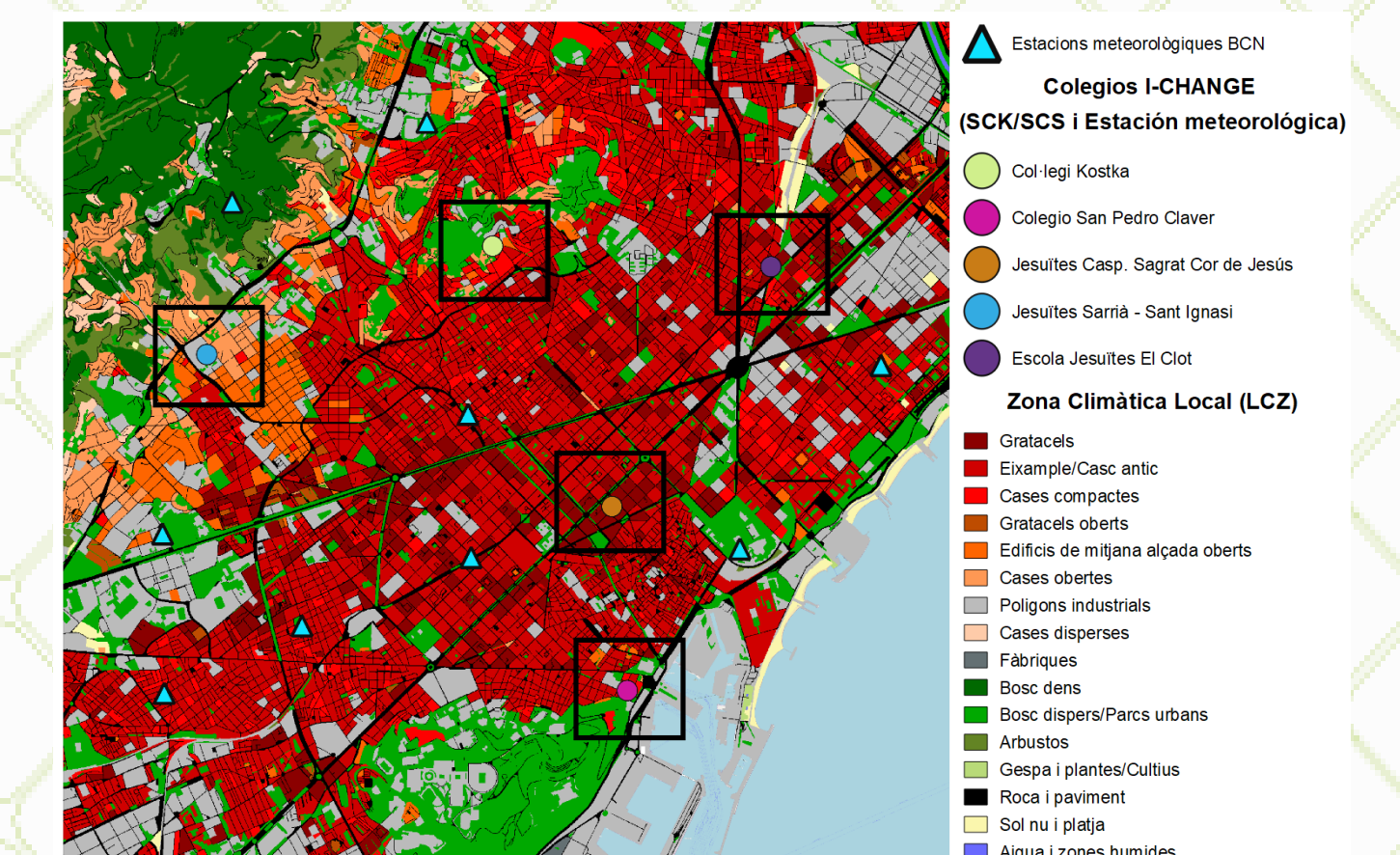
**AIR POLLUTION**

Smart Citizen Kits and stations: low cost sensors to monitor air pollutants and basic meteorological variables

**5. Implementation of measures and citizen science activities previously agreed with the stakeholders:** It has a double objective: to acquire more information about extreme events in the Metropolitan Area of Barcelona and to modify habits, improving the resilience to face those extremes and reducing the GHG footprint.

- A) Workshops with citizen science activities:** one-off activities in different environments and different target audiences (>800 citizens involved)
- Primary schools: Demonstration + Hands-on activity
  - High schools: Programme based on citizen science and climate change
  - Workshops "on the street": demonstration activities with participative spaces

- B) Collecting data and increasing awareness in 5 Barcelona schools**
- Each school have a Smart Citizen Kit (SCK) and a low-cost weather station to monitor the air particles and collect meteorological data.
  - Materials to introduce Climate Change and their local impacts into the students' curriculum are being co-created together between school's teachers and stakeholders from BLLEE (quadruple helix)
  - Preliminary and post-activity surveys are used to assess the level of knowledge gained before and after the educative programmes. This will serve to evaluate the impact in the trained students.



Distribution of the SCKs in the selected schools of Barcelona (FJE network) placed on very different socioeconomic environments and different local climate zones (geographic layer: Institut Cartogràfic i Geològic de Catalunya)



Link to the abstract

Encourage the learning process, increase the scientific knowledge, promote awareness of the impacts of climate change and motivate behavioural change towards sustainability