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FORMAS



## **Barcelona transforms schoolyards in climate shelter**

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Rising temperatures and the resulting heat waves in urban areas are just one of the effects of climate change. Although rising temperatures do not bring to our mind disastrous events such as hurricanes or floods, it can have serious consequences on human health.

In Europe, extreme heat appears to be a major cause of death in relation to the effects of climate change. Heat waves cause serious damage to people's health, and the elderly and children are those who suffer mostly from extreme heat events.

Heat waves don't seem to be "*democratic*". Indeed, they do not affect different areas of the city and the population in the same way. If the heat waves are mitigated by the presence of green areas, we immediately understand why they are not so democratic. The green areas in cities are not equally distributed throughout the texture of the cities. In most of the cities around the world is possible to notice how the greatest quantity are present in the wealthy neighborhoods.

Consequently, are the poorest neighborhoods that suffer mostly from this effect, further aggravating the situation of the inhabited areas which, often, have less access to green areas and air conditioning. Many cities are trying to mitigate the urban heats waves through adaptation and mitigation measures. Some local authorities, thanks to a strong institutional support, are able to build innovative solutions capable of answering to several questions at the same time. The city of Barcelona offers a virtuous case with the project "GBG\_AS2C - Blue, Green & Gray\_Adapting Schools to Climate Change", which in 2009 won the European urban innovative action (UIA) project to transform eleven schoolyards into climate shelters. The schools adaptation project aims to mitigate the urban microclimate by transforming schoolyards into climate shelters through the implementation of adaptation actions. The new climate shelters in school courtyards will then be opened to the entire population during school closing hours, and in particular in summer months, as neighborhood parks, where anyone can find shelter from urban heat waves but in particular the most vulnerable people identified in the Climate plan of the city as elderly, children and chronically ill.

In the Barcelona case, the innovation is to intervene on schoolyards with a lens on climate adaptation and transform them into climatically comfortable places, generating both a lowering of the urban micro-climate and new public spaces accessible to all.

The possibility of intervening on public schools was introduced with the Climate Plan, approved in 2018, which declares the need to identify and transform public spaces into climate shelters to tackle urban heat waves. The Climate Plan, also, takes in account the theme of climate justice, promoting actions based on a fair distribution of urban quality in the different areas of the city, creating a "climatically just" Barcelona.

In order to understand the different aspects of the project, an analysis was conducted on various official documents in relation to the Barcelona schools adaptation project and the Climate Plan but also through articles on the themes of urban greening and climate justice.

### **GBG\_AS2C - Blue, Green & Gray\_Adapting Schools to Climate Change Project**

**Location:** Barcelona, Catalunya, Spain.

#### **Promoters**

To tackle heat waves, the Barcelona climate plan, in line of action three--prevent excessive heat--identifies the need to transform public spaces into climate shelters. Schools and their open spaces have been selected as possible spaces of intervention. Based on this indication, the municipality of Barcelona, in collaboration with various local and territorial authorities, builds an innovative solution based on adaptation and mitigation measures.

In 2019, the project was candidate for the European UIA call with the project "GBG\_AS2C - Blue, Green & Gray\_Adapting Schools to Climate Change ". The project won the competition and was founded by the European project Urban Innovative Action (UIA).

#### **Beneficiaries**

The project "GBG\_AS2C - Blue, Green & Gray\_Adapting Schools to Climate Change", in accordance with the objectives and visions of the Climate Plan, identifies all citizens as beneficiaries, but with particular reference to the most fragile people who suffer most from the effect of heat waves. The project, however, also has direct beneficiaries in the school communities, which most experience the spaces of the school. In fact, children, teachers and school staff in general will receive the greatest benefits.

#### **Engagements with climate change**

- Adaptation: creation of green areas and points of water in the schoolyards
- Mitigation: renovation of the energy system of the schools

- Climate Justice: the most vulnerable are placed at the center of the initiative

The GBG\_AS2C project is based on the implementation of two measures, two adaptation actions carried out in the open spaces of the schools, and one of mitigation, implemented on the school building.

The adaptation measures are classified into blue and green actions and are intended to create water points, shaded areas, green coats and new gardens that will allow lowering the micro-climate of the area ensuring a greater climatic comfort.

Mitigation initiatives are identified as gray actions and concern the modernization of energy systems with a view to lower consumption and better performance. Although mitigation actions are equally important in contrasting climate change, the adaptation actions will intervene not only on the urban micro-climate but will also have wider repercussions, such as on sociality, when the schoolyards will be opened to the entire population.

The Barcelona project, in line with the objectives of the Climate Plan, also takes into account the aspect of climate justice. In order to establish which areas of cities are most affected by extreme heat, various climate analyzes were conducted. The analysis carried out by the Barcelona Region between 2015 and 2017 shows how the coolest areas are those located along the coast, while the hottest neighborhoods are those of Les Corts, Eixample Esquerra, Nou Barris and Ciutat Vella. To answer the issue of climate justice, the GBG\_AS2C project has developed well-defined criteria to select the pilot schools on which to intervene. In fact, the various criteria include environmental ones aimed at identifying schools located in places most affected by high temperatures, high concentrations of pollution and a lack of green areas. Finally, eleven schools were selected, one for each district.

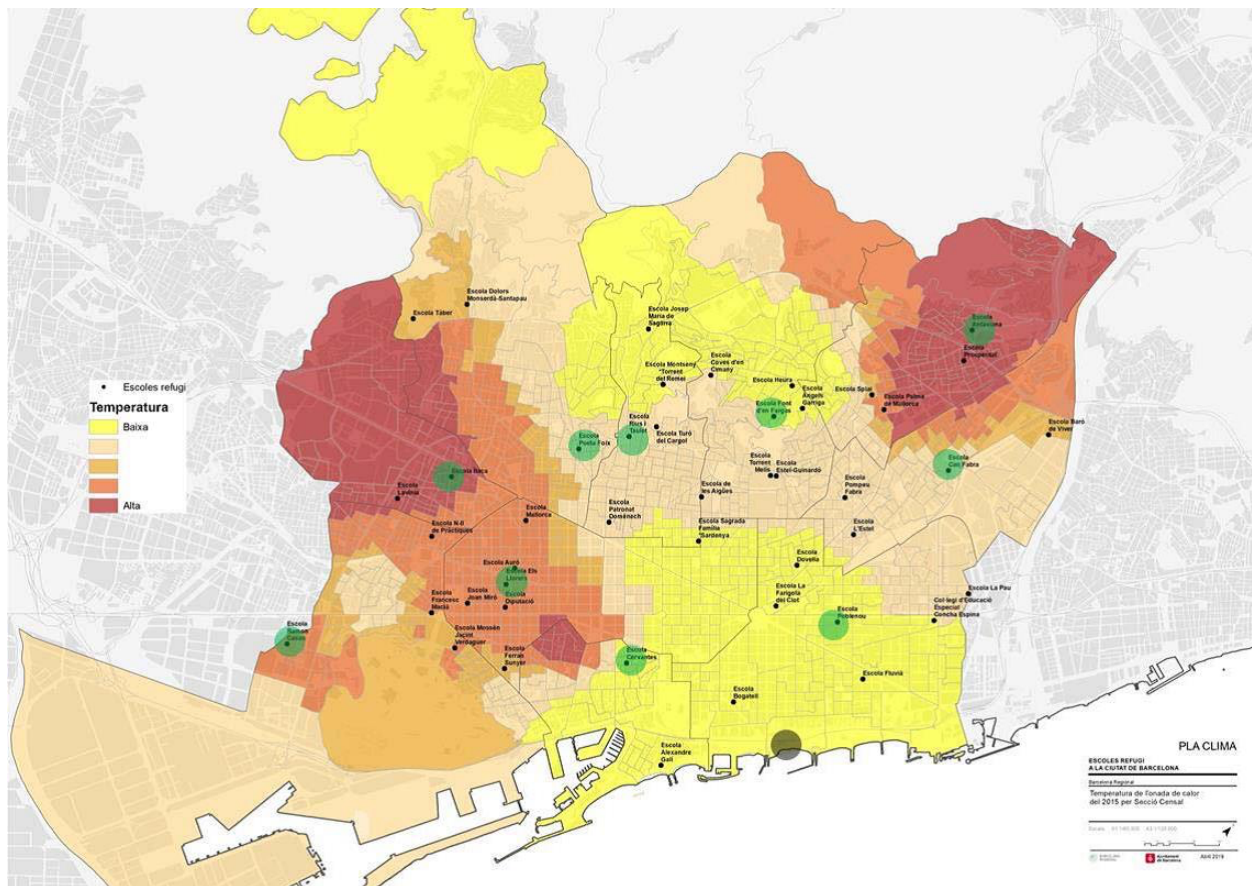


Figure 1: “Selected schools per Barcelona district” by UIA Project “<https://uia-initiative.eu/en/news/adapting-barcelona-climate-change-multicriteria-approach-selection-schools-be-converted>”

## Objectives

The main objective of the Barcelona project is so described by the proponents: "schools playgrounds will be transformed into climate shelters and be open to the wider public in non-school period" (Uia project, 2020). The general objective of the project is to reduce the effect of heat waves by transforming schoolyards into climatic shelters. Thanks to this transformation, new green areas and new water points will be created that will help lower the urban micro-climate. Once the transformation is complete, the courtyards will be included in the list of climatic shelters in the city and open to the entire population during the closing hours of the school.

The project also has secondary objectives such as promoting a new approach to foster children's cognitive, social and behavioral development, rising the awareness about environmental problems and organizing course in open spaces of the school. In addition, various meetings have been provided in schools with the aim of informing, communicating and involving not only school users but also the resident population in the neighboring areas. These events aim to raise awareness on climate

change, but also to inform the population about the importance of producing adaptation and mitigation actions.

In accordance with the indications of the Climate Plan, the project aims to increase climate justice by implementing actions based on equity.

Finally, there is the goal of further optimizing the participatory process and co-production of the interventions to be implemented. Despite the problems caused by the Covid-19 pandemic, and the impossibility of holding events in person, the co-production meetings were held remotely using the Zoom platform. Net of the opening of the school courtyards, we can say that the structure put in place has led to the desired effects, considering that the school staff, children and parents responded optimally and got involved.

### **Values**

- Participation
- Communication
- Scaling-up
- Links with other projects of the municipality

The fundamental aspect of the project is certainly the participation and co-production of the actions. Several participatory events were organized with the aim of motivating and involving the school community in the project. Pupils, teachers and parents were able to inform designers about the needs of each school and promote ideas and suggestions.

One of the added values of the project is communication. The objective of the communication plan was to inform about four fundamental aspects of the project: 1) to convey the need to adopt adaptation strategies to climate change, 2) to inform the residents of the areas surrounding the schools on the adaptation of schoolyards, 3) to raise awareness of the school community, 4) to inform about the technical and scientific aspects of the project.

As well as participation and communication, replicability and scaling are two other qualitative aspects of the project. The project proved its potential through the achievement of the goals and the opening of the first eleven adapted school courtyards. Given the potential that emerged, it was decided to intervene on other schools; specifically, the aim is to adapt another 29 schools by 2023.

It is possible to notice a scalarity beyond local borders; in fact "the Province of Barcelona has also recognized the potential of the project and has been promoting the conversion of two schools into small cities in the region, to Climate Shelters" (Cartalis, 2021, p.17)

To broaden the social effects, the project aims to give the population, especially the fragile ones, new green areas where they can find shelter from heat waves. In order to allow the opening of the courtyards to the entire population, the project was included in the "Schoolyards Open to the Neighborhood Program" which allows: "the school grounds open to the neighborhood are school spaces that open to public use for citizenship outside school hours, both at the weekend and during school holidays". (Ajuntament Barcelona, 2020)

### **Timeline**

The project began in the 2019-2020 school year. During the first months of 2020, a preliminary study was carried out for the selection of pilot schools, and mandatory criteria were established in order to decide "the number of schools per district of Barcelona, the type of school and the educational level" (Cartalis, 2020 p.14). As priority criteria, the study considered "the state of environment in the area of the school, the building, the patio and the risk for social exclusion" (ibidem).

Once the preliminary analysis was completed, online meetings were held for each school involving the school community in the co-production of the actions. The works began in June of the same year and finished in three months. The works were scheduled during the summer break so they would not interfere with the school activities.

In 2021, the scale-up phase began aiming to integrate the Climate Shelters project into the wider program "Let's transform the school yards". This program aims to transform at least 10 schoolyards per year (Cartalis, 2021).

### **Visible effects:**

- Physical effects
- Social effects

The project has brought visible effects in spatial terms by transforming over 1000m<sup>2</sup> of cemented soil into permeable areas. The objectives set by the green and blue measures envisaged by the project were achieved through the planting of several trees and the installation of over 20 water points. According to the Ajuntament de Barcelona, "As a result, 1,000 square meters of natural space was regained, with vegetation in playgrounds and the creation of 2,213 square meters of new shade using pergolas and awnings. In addition, 74 trees were planted and 26 new water sources were installed" (Ajuntament de Barcelona, 2020)

The photos below show some of the first eleven schoolyards transformed.



Figure 2: “Plantation of trees at the school yard” by “Uia Project” “<https://uia-initiative.eu/en/news/barcelona-city-climate-action>”



Figure 3: “Barcelona Schoolyard” by Cristina Visconti

As for the social consequences, the project has had greater impacts in the poorest neighborhoods, where clearly the most vulnerable groups suffer the most from heat waves and have less chance of finding shaded areas to shelter. This view is confirmed by Amorim-Maia, Anguelovski, Chu, et al. which declare “adaptation projects are shown to have a greater social impact on poorer neighborhoods, where residents are generally more vulnerable to heat” (2021).



**Actors involved:**

- Public Health Agency of Barcelona - sectoral agency
- Barcelona Consortium of Education, Barcelona Cycle of Water
- Public Service Provider
- Barcelona Institute for Global Health
- Higher Education and Research Institute
- Institute for Environmental Science and Technology UAB - Higher Education and Research Institute

The project for the adaptation of first eleven Barcelona schools was conceived thanks to a strong collaboration between various local and territorial bodies. The municipality of Barcelona was the project leader because of the "extensive experience of the City Council of Barcelona in urban projects (also of environmental and climatic character)" (Cartalis, 2020 p.8) and for the "tradition and experience of the City of Barcelona in participatory processes as developed from other projects" (Ibidem, p.10).

**Critical points:**

Despite the great value of the climate change adaptation actions proposed by the project and the value of fair distribution, it would have been even more productive to select schools only in neighborhoods where there was a greater need to install the new climate shelters.

Figure 1 shows that two of the eleven selected pilot schools are located in privileged neighborhoods. This consideration does not jeopardize the value of the project; nonetheless, the criteria for selecting schools could be better re-designed, concentrating all the resources on the most vulnerable and marginalized neighborhoods.

Another criticality is linked to the high technical dimension of the proposed interventions. One of the greatest risks is that it is not possible to maintain the technical solutions implemented, both due to the lack of skills of the schoolyards managers and the high costs to be incurred. An example could be that relating to blue solutions, which, as Cartalis (2021) states, require "high maintenance costs".

Finally, there is a critical point relate to the specifics of the selection announcement for schools. In the first call only primary schools were allowed. But with the upscaling project the inclusiveness of the project has increased since the new call has been opened to all school levels.

## **Replicability**

The initiative responds to the proposed objectives and it is replicable, creating more and more climate shelters in schoolyards, thereby making schools one of the engines for adapting to climate change in the city. Intervening on schools to implement adaptation and mitigation to climate change has proved to be an innovative solution. Several cities are thinking about the transformation of schoolyards into neighborhood parks at the service of the entire population.

Schools become important for their distribution and capillarity on the urban texture, which appears to be similar in all European cities. This means that the reasoning on schools as the new green areas of the neighborhood can be replicated and implemented in different cities. With this statement, however, we do not want to propose a "one size fits all" solution. It is known that there are no actions that can be applied in same manner everywhere and there will always be a need to contextualize the intervention based on the context of the place.

Various scholars have argued that schools can play a key role in contrasting the negative effects of climate change. Barò et al. (2021) state that "tree cover in schoolyards or the number of street trees around schools are directly related to urban cooling benefits." Palestino et al. (2020) declare that "schools can therefore be strengthened and networked to collaborate in the rebalancing of urban metabolism and the quality of neighborhood life"<sup>1</sup> (Author's translation)

## **Conclusions**

The "GBG\_AS2C" initiative is a good example of planning to tackle the effects of urban heat waves. There are several added values of the project that make it worthy of attention. The major added values of the project are the participatory and co-production processes leading to the actions and the replicability and scalability of the project.

The implementation of the project was made possible thanks to the good management of the municipality, with a strong tradition of participatory actions and community involvement.

The initiative has led to the creation of new open spaces accessible to all, which bring benefits not only to the school communities that most experience the new climate shelters, but also to the population as a whole, paying attention to the most disadvantaged.

1 - "le scuole possono dunque essere potenziate e messe in rete per collaborare al riequilibrio del metabolismo urbano e alla qualità della vita di quartiere" - Reinventare le scuole come hub socio-ecologici, 2020, p-183.

The initiative implemented by the municipality of Barcelona led to think about the importance of involving schools in climate planning processes, expanding the range of possible solutions to tackle the negative effects of climate change. When the scale-up phase is over, it will be possible to further analyze the role of the new climate shelters in relation to the mitigation of the urban micro-climate. It will be interesting to analyze the results achieved in the new "Let's transform the school yards" program.

Given the effectiveness of adapting schoolyards, the question to ask could be: what will be the next public space where to intervene for tackling climate change and create new climate shelters?

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