BARCELONA
SPAIN

2022 Exploring Urban Resilience Pathways

International Master CITY RESILIENCE Design and Management EDU | uic barcelona

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About the report and the collection

Exploring Urban Resilience Pathways

This report is part of a collection wishing to provide a global overview about different cities' experience in resilience, and how this is evolving. The series is titled "Exploring Urban Resilience Pathways" and each report is prepared by one student of the Int. MSc. in City Resilience Design and Management (URNet-UIC Barcelona). During the first semester, students develop these reports as a learning outcome for their acquired analytical skills: to find, understand, organize and communicate critically different perspectives, approaches and models of urban resilience implementation, in a chosen city.

The aim of each report is thus to offer an easy-to-read overview about how adaptive capacities have been evolving in a selected city. The reports explore the past and current mechanisms through which each city responded to overlapping shocks and stresses. Nowadays current City Resilience Strategies – launched and supported by the Rockefeller 100RC program – are included within these analyses, representing the ultimate trend of understanding and implementing city resilience. Finally, current COVID19 pandemic responses are the final lens through which resilience mechanisms are discussed, to understand the alignment of resilience with other key urban goals, and ultimately respect to urban living.

What is interesting to learn from this series of reports, is that each of them critically discusses how cities managed adaptive responses to different treats, and how the concept of resilience evolved. Although the scope of these reports is ambitious and the analysis could result complex, the presentation has been designed to be easy to read and accessible to the general public. Each report of this collection maintains a standard structure, facilitating the reading and the reports (and cities) comparison.

Hope this initiative contributes to spread the understanding about how resilience has been framed and implemented in many cities across the globe.

Lorenzo Chelleri, Ph.D.
Director of the International Msc. in City Resilience Design and Management

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SUMMARY

Barcelona, the regional capital of Catalunya in Spain, is a dense and compact city. As other Mediterranean cities, it had historically to deal with droughts, floods, and heatwaves. These events have been increasing in number and intensity in the last years and are likely to increase even more due to climate change. While these shocks have mostly been tackled with sectorial plans until the first decade of 2000s - with impressive projects such as the water retention tanks all over the underground of the city - in the recent past there have been a switch in the approach to urban resilience. First of all, the city has pioneered in setting up a monitoring and data gathering system to create coordination among different departments, not only to prevent, but to build up a model. And then, by taking a clear stand in the climate change debate, declaring the climate emergency in 2020, Barcelona recognized the need of a speed-up in its agenda.

This step has been possible also thanks to the efforts that have been done in the past: awarded in 2013 as a “role model city”, Barcelona has been one of the first cities to implement resilience governances and to understand that being resilient in the present time means hurrying up in reducing the environmental impact. Through a urban model change and fostering equity, inclusivity, and social justice to reduce vulnerabilities, the city is trying to face urban transformation in a comprehensive and holistic way.

In a moment of extreme changes at a global level, cities are challenged to take part in the debate. In this context, Barcelona is aiming to be a pioneer city, particularly regarding the fight against climate change and sustainability-oriented planning.

Fig. 2 *the Sagrada Familia in Barcelona*

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LIST OF **ABBREVIATIONS**

3Ss	Security of Services Supply
100 RC	100 Resilient Cities
CBC	Compromiso de Barcelona por el Clima
CRPP	City Resilience Profile Programme
CRPT	City Resilience Profile Tool
CCCC	Catalan Convention for Climate Change
OCCC	Catalan Office for Climate Change
PDU	Metropolitan Urban Master Plan
PGJB	Plan for Gender Justice in Barcelona (2021-2025)
CEAP	Climate Emergency Action Plan (2021-2030)
TISU	Taula de Infraestructuras I Serveis Urbans
UN-Habitat	United Nations Human Settlements Programme
UNDRR	United Nations Office for Disaster Risk Reduction

INTRO
BARCELONA

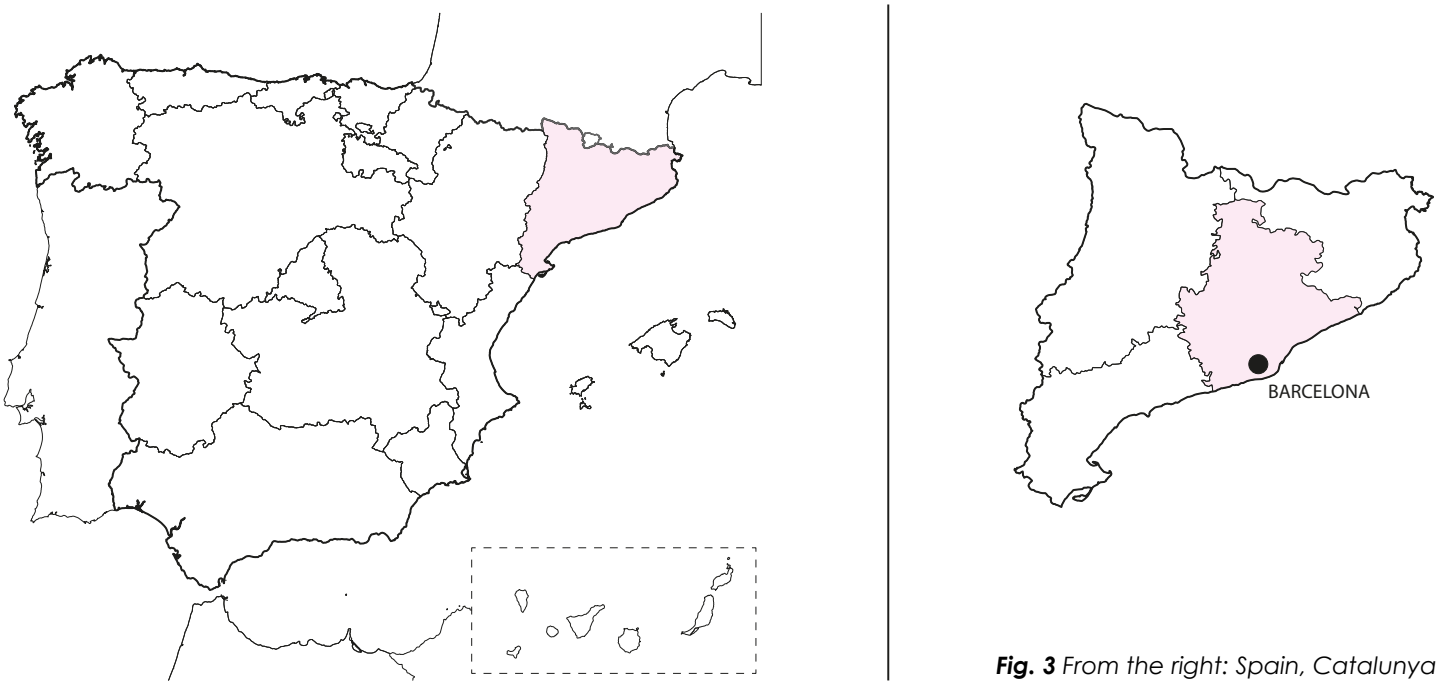


Fig. 3 *From the right: Spain, Catalunya*

Barcelona is a coastal city located in Northern East Spain, and the capital of the autonomous community of Catalonia. With a population of 1.6 million within 10.135 ha, Barcelona is a dense and compact city, and one of the most populated metropolitan areas in Europe, with a total of 3.2 million inhabitants. It is located in a plain between two rivers: the Llobregat River to the South and the Besos River to the North, and it is bounded between the coast to the east and the Collserola mountain range to the west. (Barrera et al.,2005)

The city is an economic driver in southern Europe, strongly geared towards the service sector. Tourism plays an important role in the economy, with 12 million visitors in 2019, being the sixth most visited city in Europe (Euromonitor International, 2019) with over 30 million visitors per year (Ajuntament, 2020). The tourism industry, while economically beneficial, does place additional strain on resources and increases the overall use of fossil fuels within the city. Regarding the resident population, the growth is relatively steady, with a projected increase of 0.3% from 2016 to 2030. Moreover, similarly to what is happening in most cities in developed countries, Barcelona is facing the challenges of an ageing population. 21% of the population is over the age of 65, followed closely by 65% of the population between 18 and 64 years (Ajuntament, 2022) The ageing of the population requires a transition in the functioning of the city as the older population is more vulnerable to the effects of climate change.

Fig. 4 *Barcelona Metropolitan area*

Over the centuries, Barcelona have always adopted a compact city model, with a series of historical expansions that today result in a highly optimised spatial occupation and access to services. However, the city is also facing problems related to extremely dense cities such as the lack of green and public space and overloaded infrastructures, together with very common problems in coastal Mediterranean cities, such as flash floods due to heavy rain event, droughts and heatwaves. Such events are likely to increase and become more extreme in the near future due to the climate change, exposing particularly the more vulnerable population. (CEAP, 2021)

This is why the city has tried to face these problems with an increasing intensity during the last decades: while until mid-2000s such issues were tackled by sectorial-risk reduction plans, after the creation of the resilience board in 2009 Barcelona has become a pioneer city for sustainability-oriented planning. Moreover, with the 2018 Climate Plan followed by the declaration of Climate Emergency State in 2020, the strategic planning of the city took a clear stand in addressing directly problems related to it. Overall, Barcelona can be considered as a pioneer city for sustainability-oriented planning that aims to become a global best practice for planning for climate change. (CEAP, 2021)

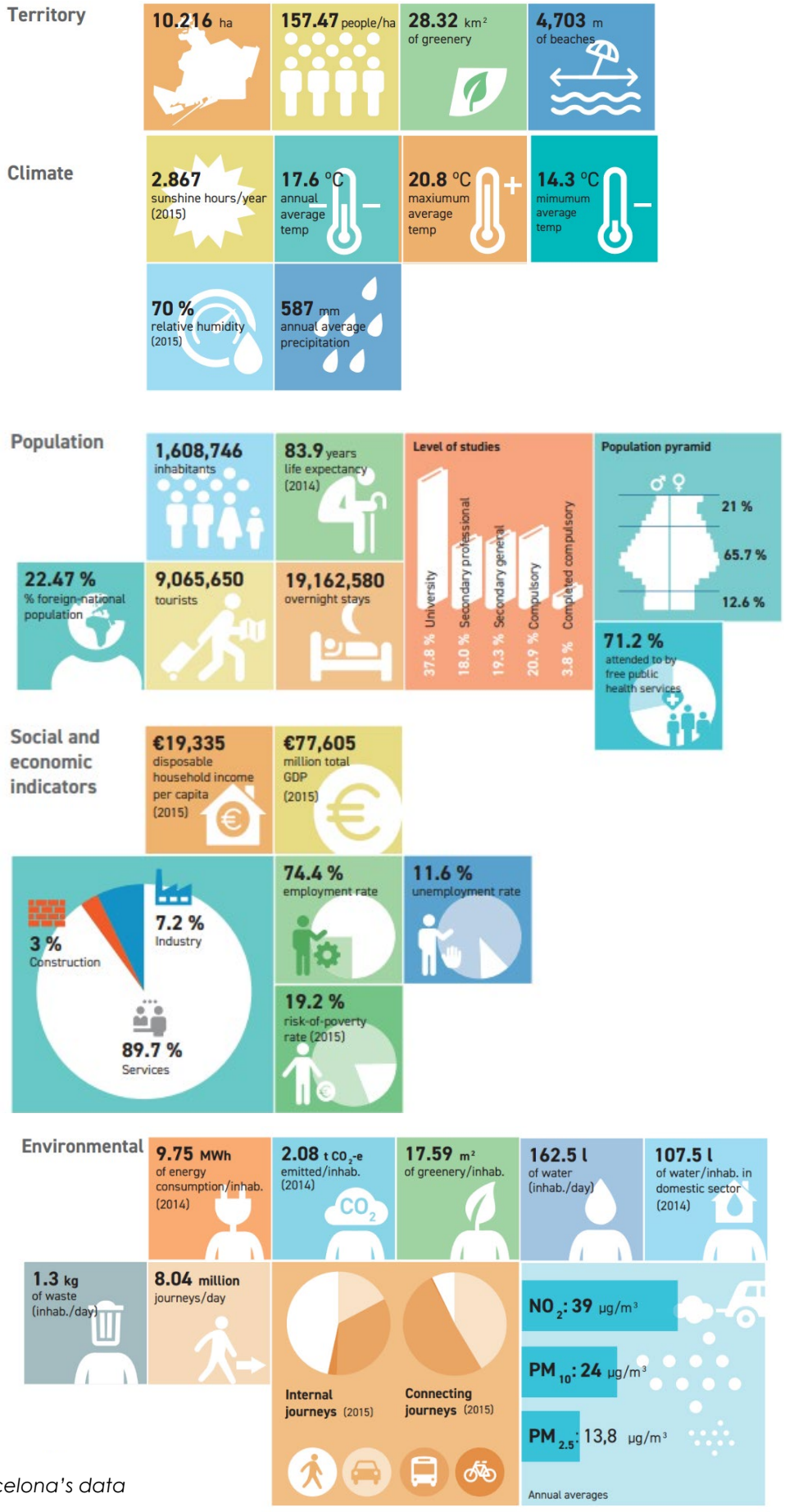


Fig. 5 *Barcelona's data*

Fig. 6 *The port of Barcelona*

Fig. 7 *Festival of Castellera in Plaza St Jaume, 2015*

CITY PAST

ADAPTIVE PATHWAY

Barcelona has a long story of coping with shock and stresses, which nowadays are documented and assessed in several plans. Barcelona had to deal with both extreme events and problems related to the density of the city, and, at the beginning of this century, also with failing infrastructures events (Fig. 8). Regarding natural events, in the last decades extreme rainfall events have increased while overall precipitations have diminished, and average temperature got higher with increasing heatwaves (Fig. 9-10). This situation is likely to get worse in the near future, according to several studies (Barcelona City Council, 2021. González A. et al., 2020). The city throughout the centuries had to address these vulnerabilities, dealing with resilient planning even when the term had not yet been even used.

In this chapter, part of Barcelona's pathway to cope with shock and stresses will be retraced, starting from the 19th century, until 2017, when the city developed the City Resilience Strategy.

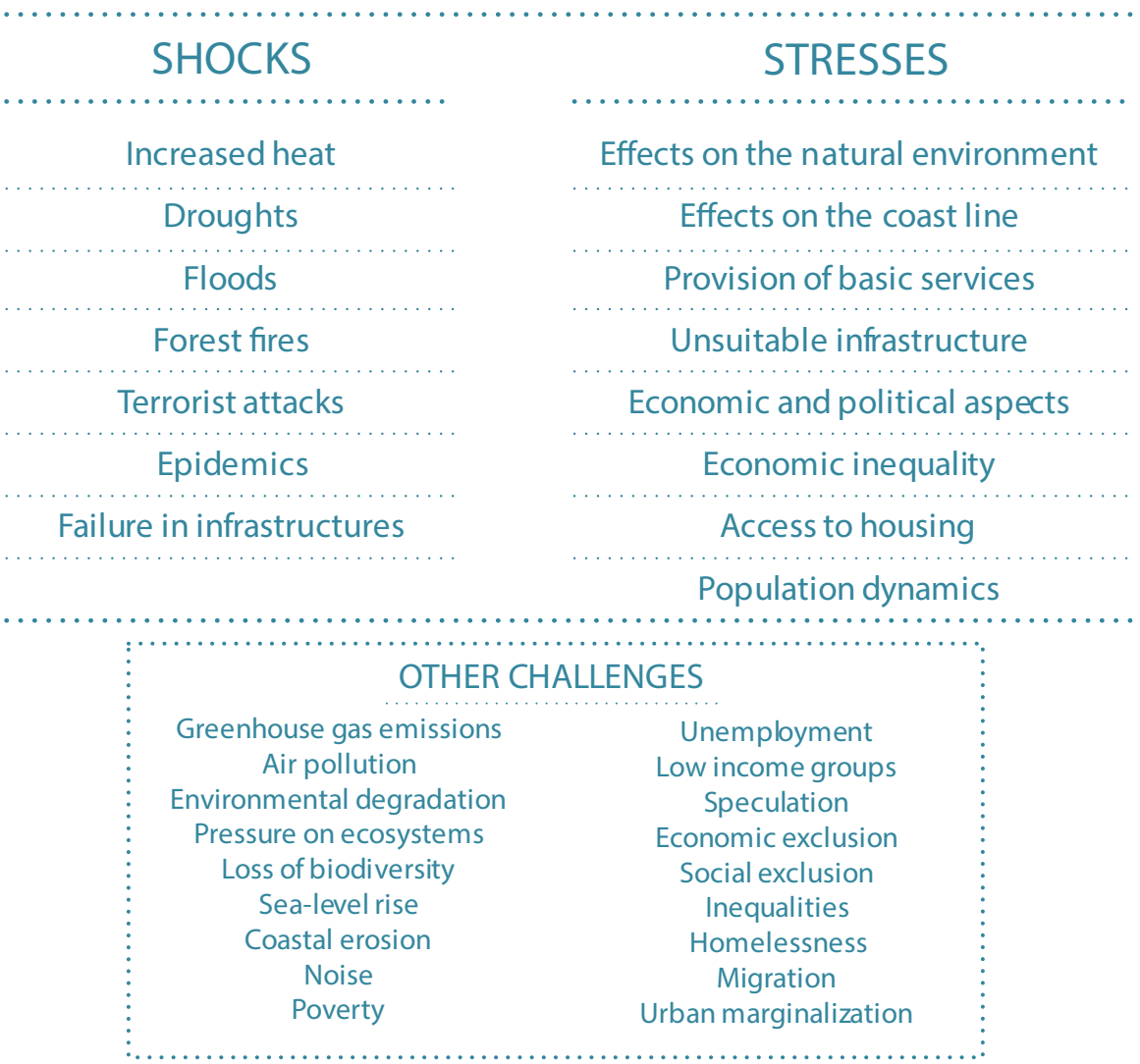


Fig. 8 *Shock, stresses, and other challenges in Barcelona*

Fig. 9 *Temperature variation (1780-2019)*

This variation is calculated by comparing the average annual temperature with 1981-2010 timeframe

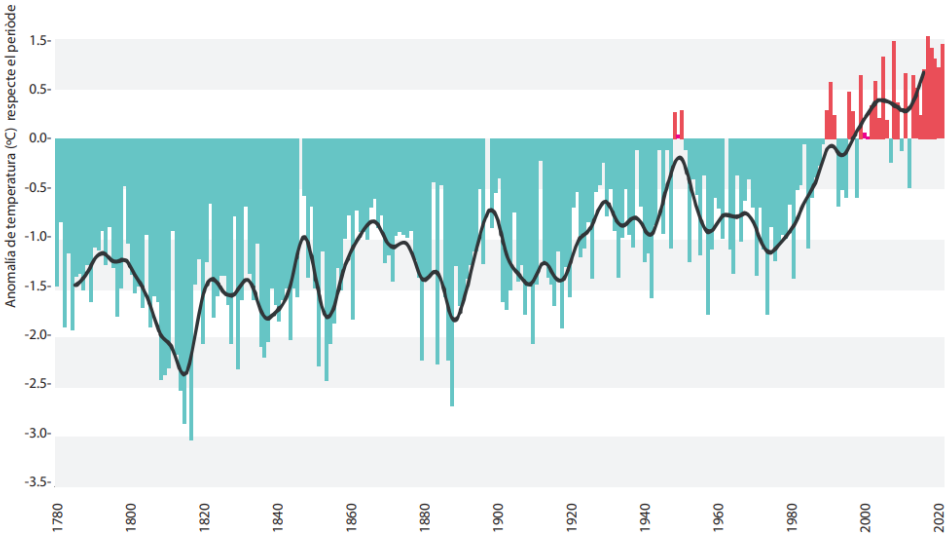
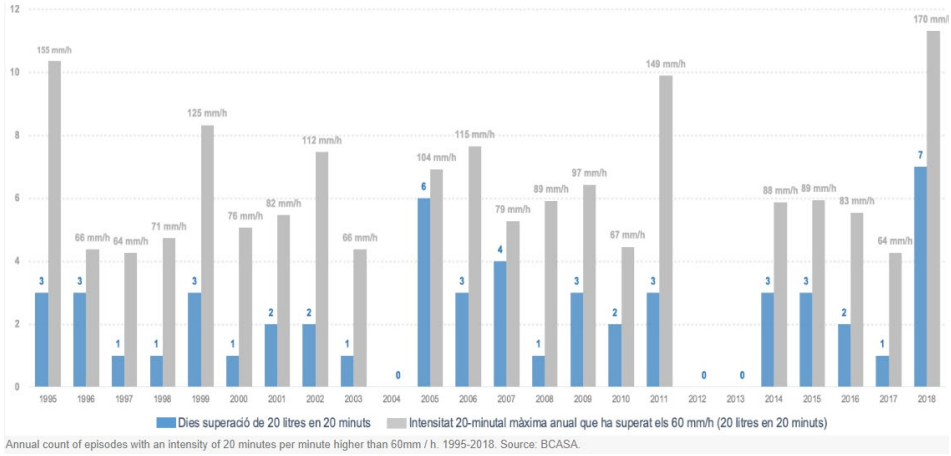
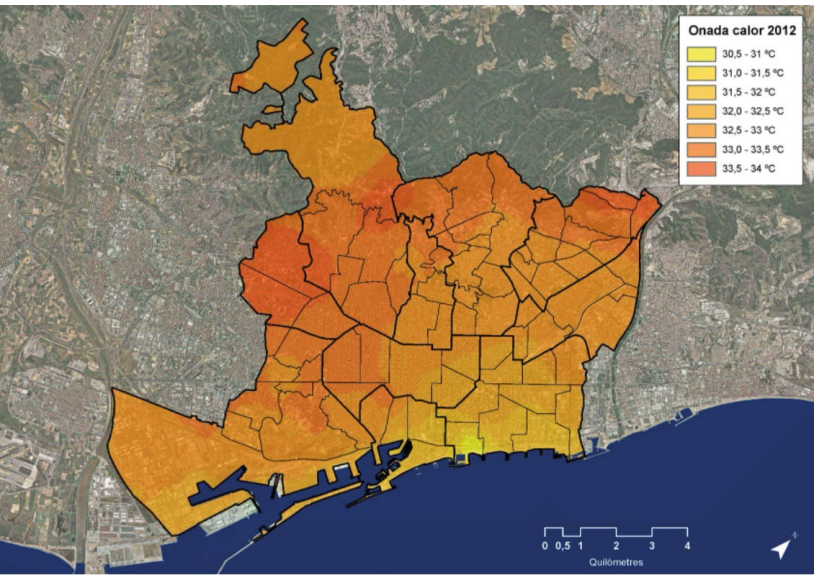


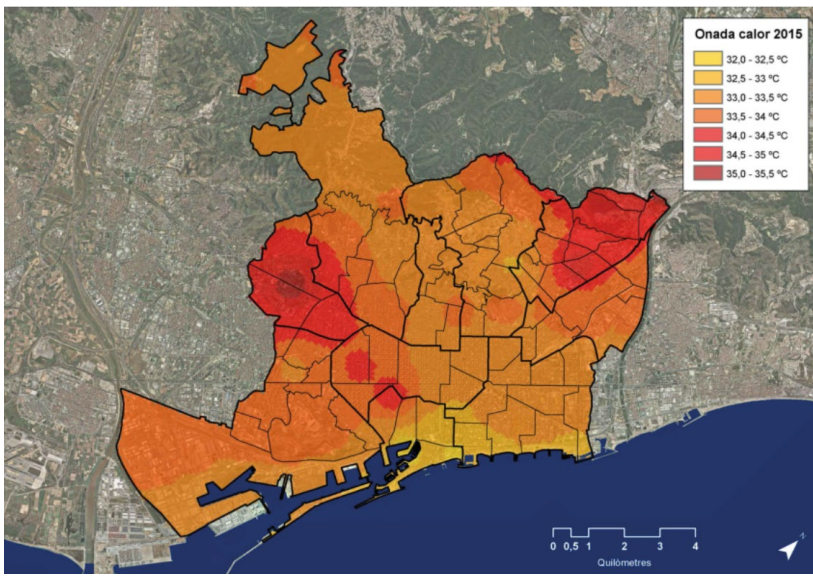
Fig. 10 *Annual count of episodes with an intensity of 20 minutes per minute higher than 60 mm/h. 1995-2018*



Annual count of episodes with an intensity of 20 minutes per minute higher than 60mm / h. 1995-2018. Source: BCASA.

Fig. 11 *Territorial distribution of 2012 and 2015 heatwaves*





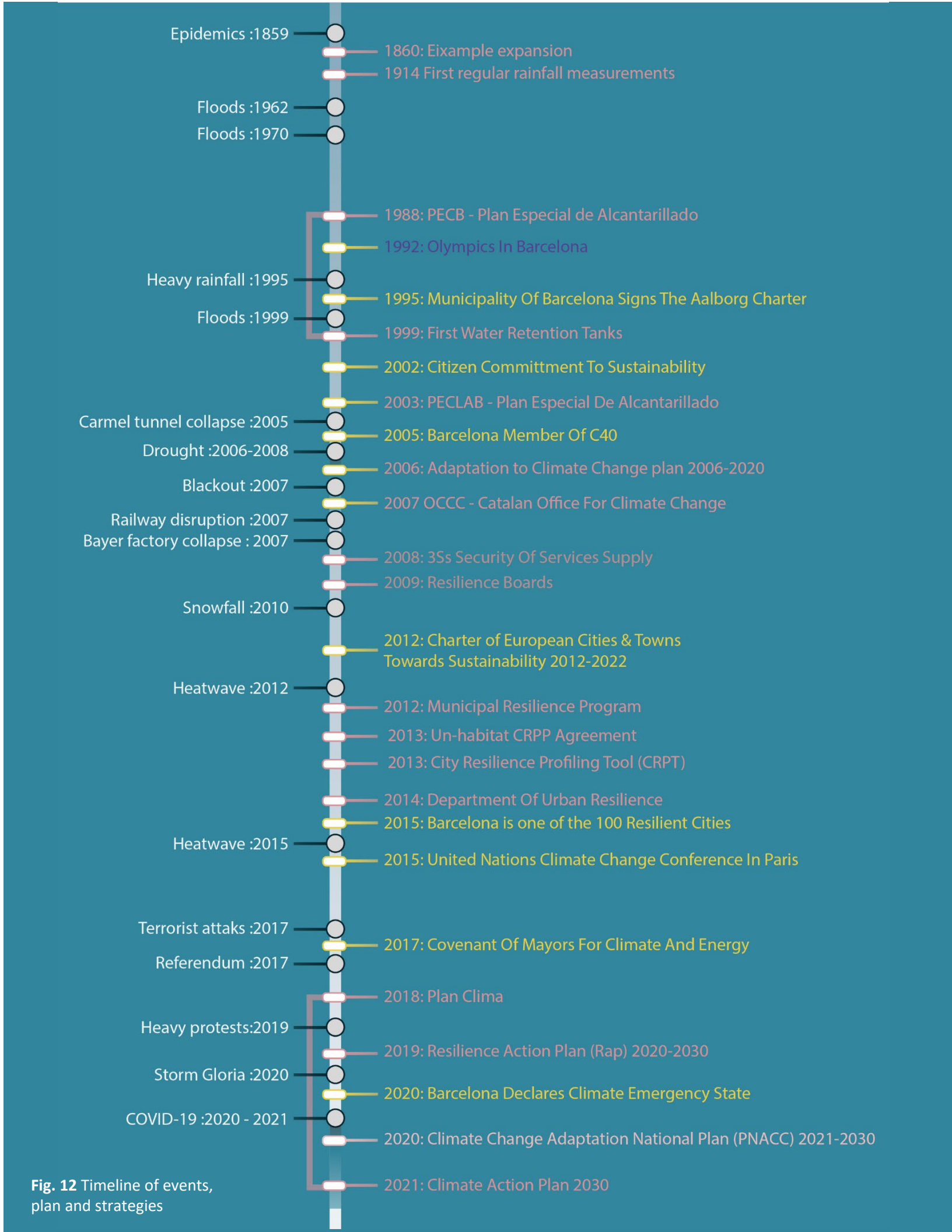


Fig. 12 Timeline of events, plan and strategies

Fig. 13 *Storm Gloria 2020*

Fig. 14 Flood 1962

Fig. 15 *the evolution of the city. From the left: The roman settlement, Eixample expansion, the city nowadays*

A good example of coping with stresses can already be found in the 19th century, with the great 'Eixample' neighbourhood expansion. At that time the city, an important port and industrial hub in Spain, was still confined among its defensive walls, with a steadily increasing population. This led to a critical increase in population density: 856 inhabitants per hectare - Paris at the time had less than 400 (The Guardian, 2016). As consequence, periodic epidemics and therefore increased mortality were lowering life expectancy. To address this situation, in 1859, a new urban expansion plan has been developed by Ildefonso Cerdà. This plan was born precisely out of the need to change the model of the city: from the medieval layout, with its defensive walls, to a modern, healthier layout. The new 'Eixample' neighbourhood, in fact, was structured in a wide grid with large avenues and green courtyards in which the healthy air could flow.

Moving closer to our days, another significant urban regeneration step happened in the occasion of the 1992 Olympic Games. Throughout efficient public-private partnerships, the city managed to invest in mobility and public space design, reconnecting the city to its seafront. For instance, while the Olympic Village and the Cinturó del Litoral ("Coastal belt") were being built, five parks were created on old industrial land in Poblenou: Carles I Park on the new urban plot and, on the coast, Les Cascades Park, Port Olímpic Park, Nova Icària Park and Poblenou Park.

By the time of the Olympics, great effort has been made also in terms of water management. Following the 'Special Sewerage Plan' (PECB) of 1988, created to reduce the possibility of flooding episodes and to improve water capacity and sewage system, 4 retention tanks had been built. From that moment on, a series of improvement in the water management system have been done. In 1997 a new plan (PECLAB) incorporated the previous one and provided for the construction of new retention tanks in the city, together with a series of large collectors at critical points. Subsequently, in 2006 a new plan (PICBA) was elaborated, planning 10 anti-flood tanks, fourteen anti-DSU tanks and two open-air rolling ponds for extraordinary rainfall, as well as eight large collectors.

A great step in terms of sustainability development has been made in 1995, when Barcelona City Council signed the Aalborg Charter and thus created the Commission on Environmental and Sustainable Policy, with the aim of creating a plan in accord with Agenda 21, following the principles of sustainable

development. After an extensive participatory process, Barcelona materialised its Agenda 21 in the 'Compromiso Ciudadano por la Sostenibilidad 2002-2012' ('Charter of European Cities & Towns Towards Sustainability), a widely agreed document that defined the principles, objectives and lines of action, to advance towards a better city.

In the 2000s, the city faced a series of infrastructure failures, such as the collapse of the Carmel tunnel and a massive blackout. For this reason, the city decided to create the 'Catalan Convention for Climate Change' (CCCC, 2007) and to run an assessment of the vulnerabilities (3Ss in 2008). From this assessment several improvement projects were defined and, in order to manage them, in 2009 Barcelona launched the 'Municipal Infrastructure and service boards' (TISU) to encourage stakeholders' engagement and coordinate their work across sectors. This task force comes from the need of collaboration with the private sector and other level of administration to better work on reducing vulnerabilities and improve the performance standards of the city in terms of functional continuity and quality.

From now on, instead of tackling single critical situations individually, the city started planning in a more holistic way, trying to integrate different sectors to address risks.

In this context, in 2013 Barcelona started a formal collaboration with 'UN-Habitat's city Resilience Global Programme', hosting its office as well in the city. In this year Barcelona also joined as a role model city for infrastructures and services the UNDRR's 'Making Cities Resilient Campaign'. Thanks to the conceptual frameworks provided by the UN, the city started working on a broader programme aiming at covering a wider spectrum of vulnerability. Moreover, thanks to this partnership, Barcelona became a pilot city for the 'City Resilience Profiling Programme', gathering data and monitoring, to create indicators and use them to implement future plans. The new scope of work incorporated to infrastructure vulnerability also climate-related hazards, the socioeconomic dimension of risks and how they interplay in the city. In parallel to this, a broader evolution of resilience models and tools have been developed, and these changes were incorporated and consolidated with the creation of the resilience department in 2014, within the area of Urban Ecology.

One year later, in 2015, Barcelona joined the '100 Resilient Cities' (today relaunched as 'Resilience City Network'). Joining this program has been an opportunity to benefit from the networking they offered and contributed to shape the city's resilience path, methodology and achievements, which culminated in the releasing, in 2017, of the 'City Resilient Strategy'. This is a strategic plan to serve as a reference framework and a roadmap, for deploying the main lines of action and proactive resilience measures which, in turn, incorporates the working method and tools. Here, they defined the Barcelona urban resilience model, which consist into three stages to create an improvement cycle for building resilience: risk management, risk analysis, and risk reduction. They tackled climate resilience and adaptation, social resilience, and infrastructures and urban services resilience, but it was not leading to the draft of specific interventions. With this strategy, the city of Barcelona laid the foundations for the development of future plans, especially by keep on collecting data and monitoring. This, as we will see in the next chapter, has progressively pushed planning more and more towards a holistic and integrated direction.

Fig. 16 *Water retention tank in Barcelona*

Fig 17 *Map of water retention tank up to 2018*

NOWADAYS URBAN RESLIENCE

With the collaboration with the UN and entering the 100RC, Barcelona has become one of the leading European cities in terms of urban resilience experimentation. However, as the debate on climate change and the different ways of tackling it increased, Barcelona's approach to foster resilience has changed again in the last five years.

In fact, the city started recognizing in the fight against climate change the main force pushing the city towards transitioning into a systemic new equilibrium. Under the banner of climate change fighting, Barcelona has been trying to tackle vulnerabilities as well as social and gender inequalities, aiming at becoming a better city in general. For this reason, in this chapter I will focus mainly on the steps that led to the draft of the 'Climate Emergency Action Plan' (CEAP, 2021) and on the plan itself, since it has been the main engine pushing Barcelona towards a resilient change.

The first step in this direction, after the COP21 in Paris in 2015, was the 'Barcelona Climate Commitment' (CBC). This set the first bases to transform the city to tackle climate change. However, this commitment needed implementations in order to achieve the objectives set up in the 'Covenant of Mayors for Energy and Climate' (2017), an international initiative undersigned by Barcelona City Council that seeks to address both mitigation and adaptation.

For this reason, one year later, the 'Climate Plan' was released. It can be considered as a road map to deal with climate change. The 'Climate Plan' tries to achieve a comprehensive transformation of the city by embedding resilience building and outlining short-medium (2025), and long-term (2030) actions and multi-scalar interventions, that will make the city less vulnerable to climate change impacts, while also guaranteeing the rights of the most vulnerable people and promoting citizen action and engagement.

A year after, on 15th January 2020, Barcelona declared **the climate emergency state** and decided to accelerate a series of changes and implementation. That's why, under the pressure of several civil protests, the city modified the previous 2018 'Climate Plan' and elaborated the **'Climate Emergency Action Plan for 2030' in late 2021 (CEAP)**, which also considered the consequences and the decisions taken due to the post COVID-19 pandemic crisis.

2021 saw also the creation of the Municipal Resilience Committee, a tool aimed at promoting initiatives for proactively reducing risks and focusing on prevention in response to the growing demand for tackling the impact and tensions that have become critical over the last few years, also worsened by the Covid-19 pandemic.

CLIMATE EMERGENCY ACTION PLAN

Fig 18. *Events that led to the CEAP*

The 2021 'Climate Emergency Action Plan for 2030''s aim is to tackle the climate emergency to build a more resilient, equal and environmentally friendly society, fulfilling the commitment made when signing the Covenant of Mayors for Climate and Energy (2017) and the COP21 Paris Agreements. The need of respond to the climate emergency and to accelerate the change is stated in the plan:

"This climate-emergency situation illustrates the need to change the way we live, proposing seven changes of model and two adaptations that will enable a true transition towards a fairer, greener and more resilient economy."

CEAP is an umbrella plan for all the initiatives that the city is fostering on mitigation, adaptation and promotion of social equality in the face of climate change risks. It has a timeframe that runs until 2030, and it includes both short-term (2018-2020) and medium-long term (2021-2030) objectives and strategic measures. However, the climate projections included in the plan arrive up to 2100. It has 4 strategic axes: mitigation, adaptation/resilience, climate justice and the promotion of citizen action. It aims at anticipating climate risks to ensure the city continues to function and improve its response capacity, and at reducing the vulnerability of people to climate change by guaranteeing their health and well-being (CEAP, 2021).

TIME SCOPE	
LONG TERM	2100 Climate projections
SHORT-MEDIUM TERM	2030-2050 Goals and targets 2020-2030 Related actions

TERRITORIAL SCOPE	
MULTI-SCALE	According to each specific issue

COMPETENCE SCOPE	
MULTI-LEVEL AND HOLISTIC	Involving multilevel planning entities and integrating all sectors

Fig 19. *CEAP scopes*

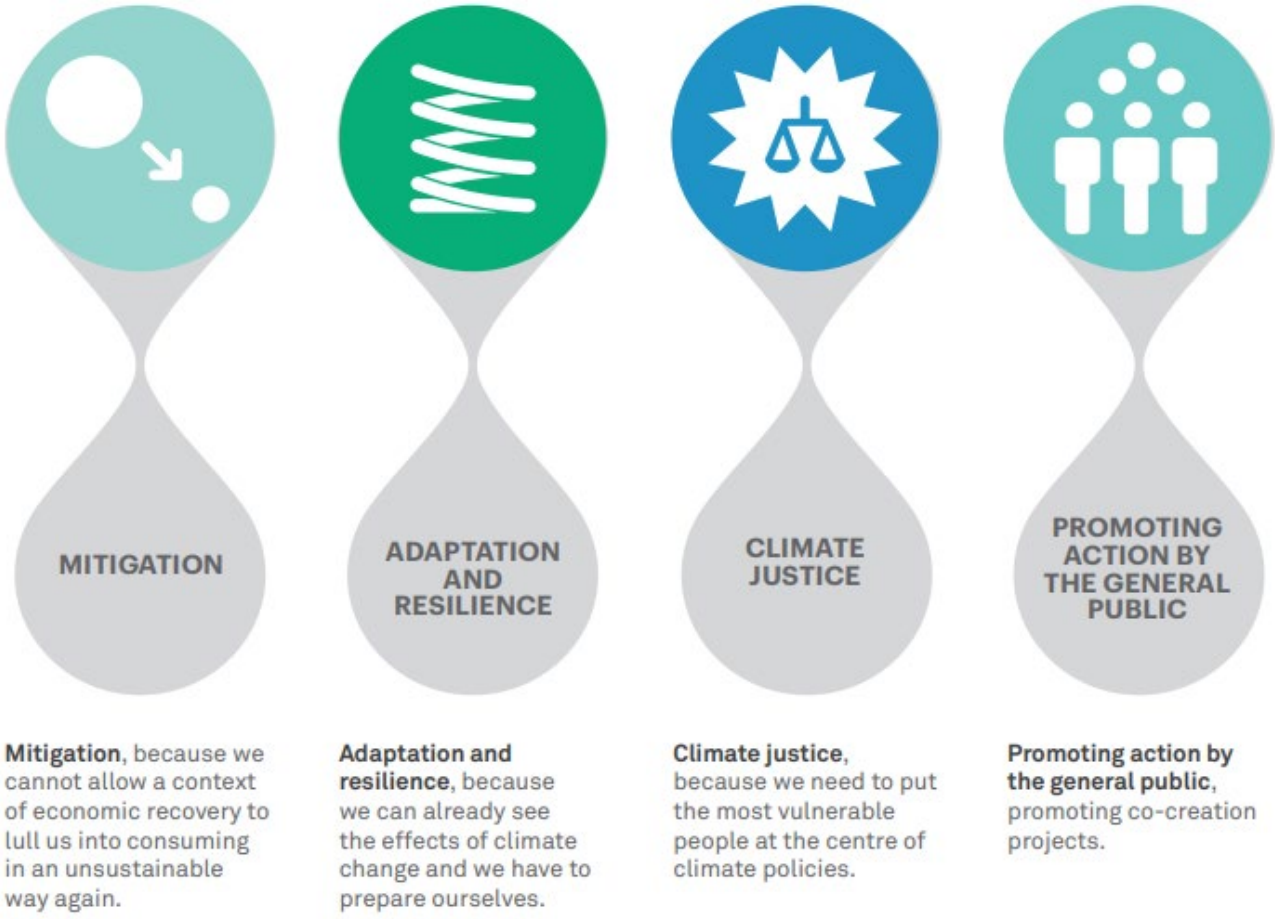


Fig 20. *Climate Emergency Action Plan. Strategic lines*

AN INTEGRATED PLAN

To talk about the CEAP, we have to take into account that this plan is the result of the updating of the measures that have been shaped in the original Climate Plan (2018). It is the result of a work promoted through citizen initiative, participation and co-production, by encouraging citizens to express their opinion. This long process consisted in the collection of contributions from individuals and organizations, four face-to-face sessions and the launching of a new online platform: “Decidim Barcelona”. 199 organisational representatives took part to it, and over 100 proposals have been collected, 85% of which were incorporated. After this co-creation experience in 2018, the municipality decided to create a new line of subsidies to present projects to keep encouraging participation and co-creation, and creating in 2019 the Climate Emergency Board, regarding the achievements of the Climate Plan goals.

One of the aims of the CEAP is to reduce GHG emission of 50% - compared to 1990 - by 2030. Regarding this, they defined two possible future scenarios, one considering the application of the CEAP measures and the other one not (Action and Trend scenario respectively). Based on data coming from the

'RESCCUE European project' (González A. et al., 2020), they highlighted the urge of implementing the action scenario.

Subsequently, the plan analyses each aspect of the effects of climate change on the health of the citizens today and in the two defined scenarios, and the measures implemented so far. To achieve the ambitious targets, and thus to tackle the consequences of climate change, the plan aims at nine model changes for a transition in every area relating to the city. (fig. 20)

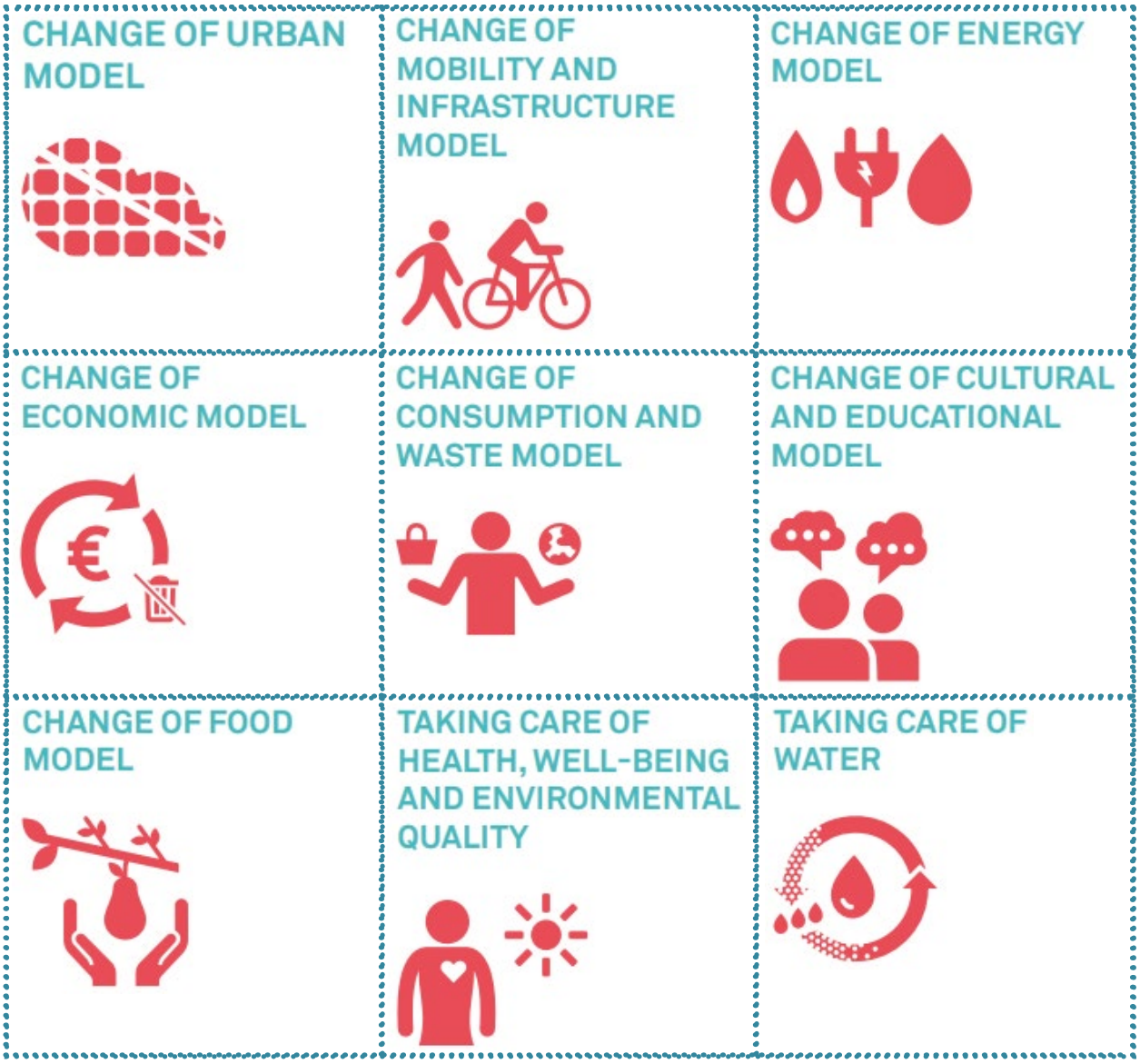


Fig 21. *Climate Emergency Action Plan. Model changes, adapted from the author*

The CEAP redefined 2018 Climate Plan's strategic goals by prioritizing some and reformulating others, also based on what learnt after the COVID-19 pandemic. These goals have been organised into **five areas** and **eighteen lines of action**. Each one of these areas has a set of quantitative and therefore assessable targets. A total of 234 measures have been drafted, and each of the lines of action contain:

- Goals
- Their justification and expected benefits
- Initiatives already provided for in existing plans.
- Priority initiatives in the post COVID-19 scenario.
- Initiatives that need launching. Each initiative states the main players involved and the expected date for its implementation, either short-term (2018-2025) or medium-and-long-term (2025-2030)
- One initiative by way of example
- Strategic areas of the plan it has an impact on
- The values covered by the plan
- Monitoring indicators
- Associated lines of action

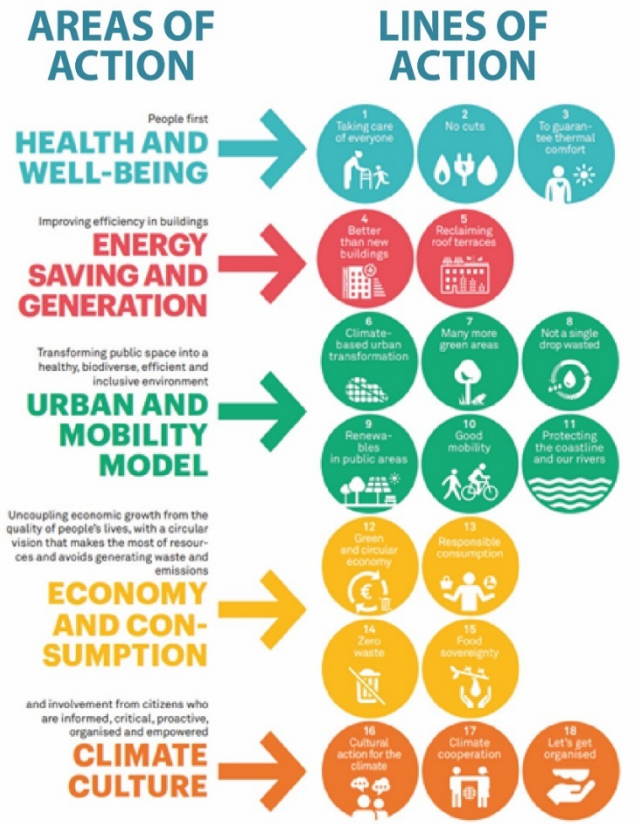


Fig 22. *Climate Emergency Action Plan. Areas and lines of action, adapted from the author*

For how it is structured, the CEAP results credible, even if, as some Friday for Future activists stated (ACN, 2019) regarding the previous 'Climate Plan' (2018-2030), some of the proposed measures might look vague. Overall, the tentative to create a comprehensive plan hosting and incorporating all the previous interventions, could make the focus appear blurry and not very specific. Moreover, general fundings and financial estimations are missing; however, these are stated in each specific sectorial plan. In (Fig. 23) an overview of the considered government measures and strategic plan is shown, to explain the multi-sectorial comprehensive nature of this planning document.

To what concerns social and gender justice, one interesting strategic plan, included in the CEAP and that is worth to mention in this report, is the Plan for Gender Justice in Barcelona 2021-2025 (PGJB), which follows and modifies the previous one (2016-2020). It is a long-term plan setting out a series of objectives to enhance the feminist transformation of the institution. Social resilience is tackled under different perspectives. The PGJB defines four main strategic axes:

- **Institutional change**, aiming at promoting good governance in terms of gender equality
- **Economy for life and the organisation of time**, with the goal to achieve a fairer and more socially and environmentally sustainable economic model
- **City of rights**, dealing with policies that have an impact on the economic, social and cultural aspects in which gender inequalities are produced, setting objectives and promoting actions for redistribution, representation and recognition of women within the framework of the city
- **Close-knit and suitable neighbourhoods**, which is focusing on promoting, from a feminist and intersectional perspective, urban spaces to make them more just, egalitarian, safe and sustainable.

Same as per the CEAP, the PGJB is a broad plan whose objectives are implemented by several sectoral plans and programmes. It is divided into two implementation programs (2021-2023 and 2023-2025). In the plan, post COVID-19 pandemic consequences are well considered and tackled in each strategic axis. What is interesting in the new PGJB plan is the evaluation of the previous strategy (PGJB 2016-2020), assessing the goals achieved, and taking into account important aspects to be encouraged and implemented. For instance, following the 2016-2020 positive experience, a well organised participatory process for shaping the plan has been done with an intersectional perspective, considering the gender equality from different aspects (economic, social, environmental, spatially).

The governance of the plan is organized in three organs, structured in such a way to encourage co-production and co-responsibility, while at the same time defining specific tasks and functions. Regarding implementation and monitoring, a yearly report on the city's actions is planned. Moreover, another evaluation is envisaged at the end of the plan's validity period, carried out by an external entity with experience in public policy evaluations from a gender perspective. This evaluation is based on both performance and results indicators, as well as qualitative information, and the final report will be presented to the Plenary of the City Council.

This plan is generally well defined, they create resilience by trying to reach a societal change in terms of gender equality but considering also all the interdependencies to this.

To conclude, we have seen how the approach of the city nowadays is trying to work transversally on every aspect of the city functioning, pushing for a systemic improvement under the banner of climate change.

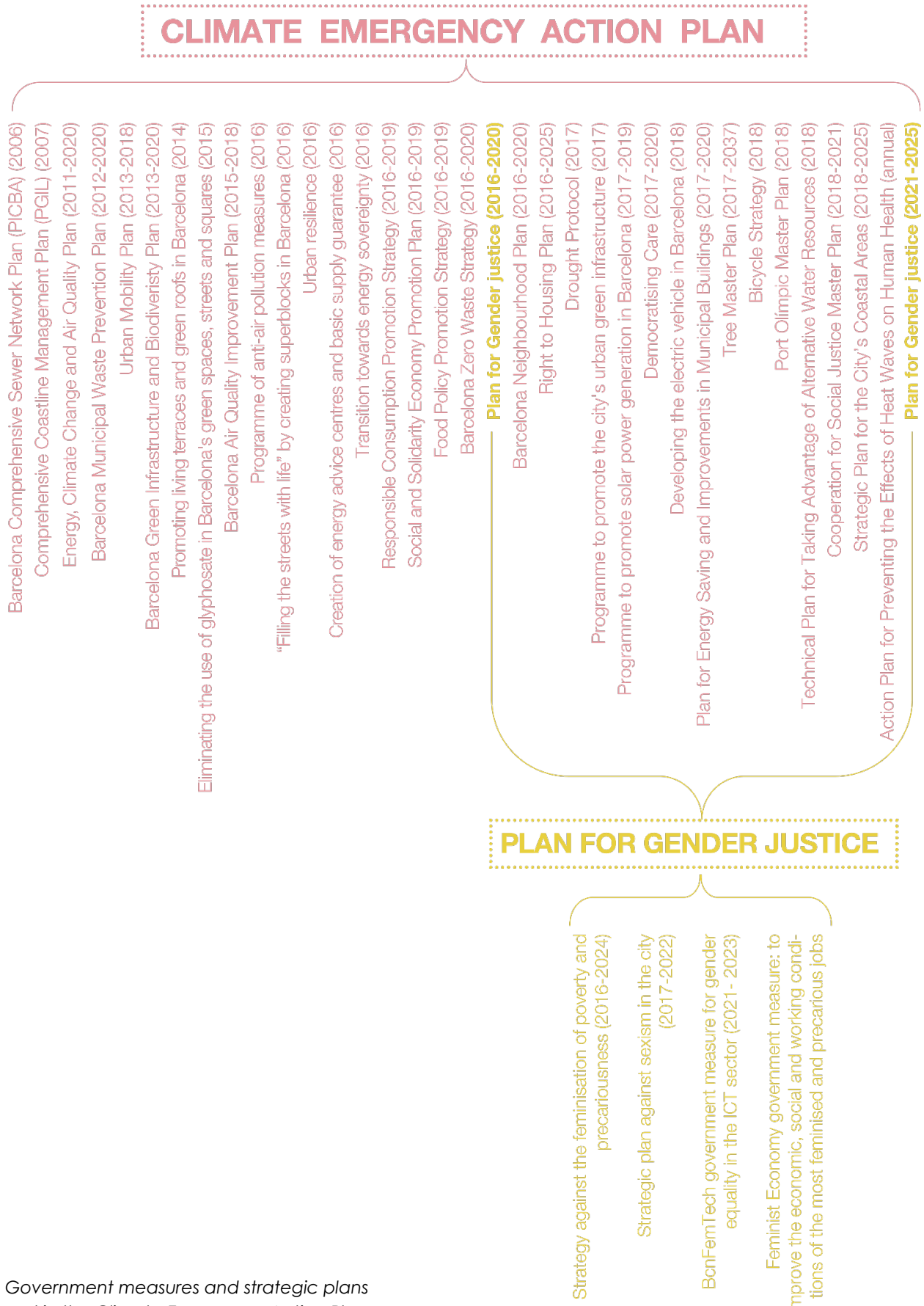


Fig 23. *Government measures and strategic plans considered in the Climate Emergency Action Plan*

DISCUSSION AND CONCLUSION

Towards a new city model. Climate change pushing for a systemic shift

To recap briefly Barcelona's pathway towards building resilience, we could say that there have been four different phases:

- **before 2009**, in which resilient capacity -even if this specific term hasn't been used by any plan or measure yet- have been built with sectorial individual plans, to address specific problems related to floods.
- **From 2009 to 2013**, mainly due to infrastructure failures, coordination between stakeholders in risk management have been the main the goal to achieve, and that's the first time resilience concept enters the game.
- A third stage, **between 2013 and 2017**, saw Barcelona building several partnerships among which is important to mention the one together with the UN-Habitat - hosting the Headquarters of the City Resilience Hub, and becoming a pilot city for the City Resilience Profiling Programme (CRPP) -, the one with 100RC and several other research institutes and industry partners. This phase was thus oriented to developing Barcelona's Resilience Profile, enhancing cooperation, and capturing and exporting lessons learned from other partner cities, including the city's model and the working methodology to start building up a more holistic approach. Moreover, monitoring and collecting data have become increasingly important in this period.
- **From 2018 on**, all the data and experience accumulated from monitoring led to the release of the Climate Plan, that, after the 2020 declaration of 'Climate Emergency State', have been replaced and integrated into the Climate Emergency Action Plan 2030, in order to speed up the implementation of some of the initiatives already noted in the Climate Plan, and adding new ones as well, In light of all the lessons learned because of the COVID-19 pandemic. It is a roadmap to deal with climate change, **where the fight to climate change seeks structural changes and therefore resilient capacity is fostered**.

The city proved to be a leader in terms of urban resilience, and this has meant that experimentation has been encouraged. One of the highlights is surely the partnership made with UN-Habitat, joining the C40 network, and become one of the 100 Resilient Cities. These partnerships encouraged the city to take very bold steps in terms of actions and planning. For instance, becoming part of the CRPP (City Resilience Profile Programme), allowed the city to be constantly evaluated, leading to the creation of the resilience atlas - in which all the studies and analyses carried out have been and will be collected and made accessible - and the development of a methodology for analysing critical events affecting the system. Overall, positioning itself centrally within the networks of resilient cities, Barcelona ensured mutual learning and the availability of continuous comparison and case studies. All of this contributed to

the shaping of the recently approved Climate Emergency Action Plan, which, as previously described, is trying to quickly tackle problems of the (near) future.

A possible consideration about this could be that, in order to achieve this systemic change quickly, there could be the risk that the solution implemented could be poorly developed and therefore not effective or leading to unexpected consequences. There is the feeling that there is a trade-off between acting quickly and acting good. However, this is partially true, and it is mainly linked with the measures that have been taken before an acute shock arrive. If the city of Barcelona has reacted to the Climate Emergency and to the Covid-19 pandemic with an efficient plan (as the CEAP), it is because it has already been ready for it, mainly due to the monitoring conducted in the past and the continuous implementing of measures. This is the demonstration that the city of Barcelona has already built a resilience capacity.

In fact, Barcelona has put in place a model that is designed to constantly improve, which is per se a resilient approach. The city has built tools to learn from past shocks in order to be ready to react to future ones - of different kinds, predictable or not. For this reason, what Barcelona has been doing great, is to forecast that one of the best ways to achieve this is through data collection, monitoring and assessing. The city has therefore made huge strides in the area of resilient design, and it is significant that it has built the foundation for a process that will continue to improve over time. An important lesson is that continuous monitoring and reviewing is an indispensable tool in the development of a resilient vision, and in order to begin a speed-up process of continuous improvement.

Part of this improvement process has gone through the involvement of the population, that became from passive observer to active engine of urban change. Because of the lack of focus on the social aspect of resilience, Barcelona tried to engage and foment participation through a dedicated plan and the creation of a platform (Decidim Barcelona); moreover, social aspect was also the cornerstone of part of the Climate Emergency Action Plan, focused on gender equity and social justice. From related to risk reduction measures, the concept of resilience has been switched to include economic and social aspects. (Chelleri 2018)

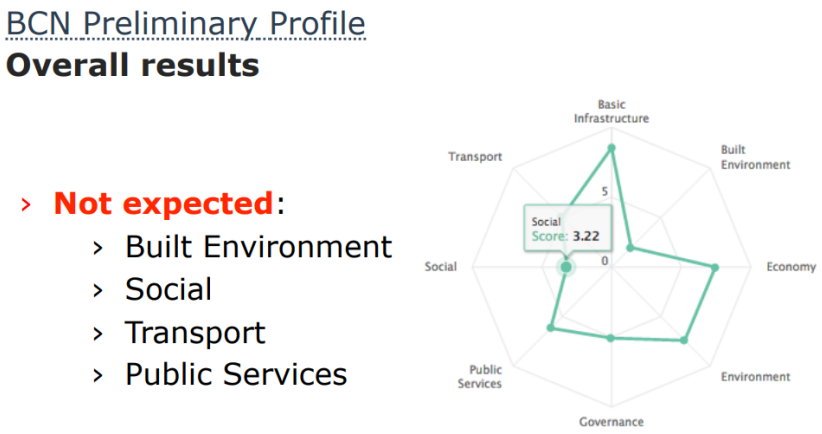


Fig 24. *Evaluation of data from Barcelona preliminary profile, 2017*

The fact that the city has made itself available to listen to city pressure, and thus to declare a state of climate emergency, indicates the willingness of local institutions to take a stand and improve, following challenges that are no longer relegated to maintaining the city and its status quo. Indeed, the action of proposing a plan that from the analysis of a global trend comes to transpose its results on the city, and consequently on its population, is an act of desire to transition towards a regenerative approach. Although many of the interventions are not yet fully geared towards an actual change of trend but rather towards sustainability, this does not mean that the right dynamics are not in place. In terms of urban design, Barcelona is increasingly turning towards an inclusive city and is once again moving towards a new model. As has already been discussed, major changes have taken place in the past in response to increasingly pressing needs. The main one has been for sure the battle against climate change, together with all the doubts that rose up after the Covid-19 pandemic.

It now seems that approaching the issue of climate change is becoming a reason for the city of Barcelona to undertake further change, as already widely described in the previous chapters. The city has begun to tackle - and in some cases anticipate - the challenges of the present and the future, particularly regarding the climate. A consistent example of this was the acceleration of the Superilla Barcelona project, which for the sake of space has not been deepened in this report but deserves a brief mention. Despite of numerous criticisms (Urbamóbil, 2018), this project tries to implement a change in the urban model, making it healthier (by giving the streets back to pedestrians) and therefore decreasing emissions in the city. This is also a good example about the effect that the Covid-19 pandemic has had on the city planning in Barcelona. In fact, the pandemic has contributed to speed-up many processes (including Superilla project) and to change priorities in the agenda of the Climate Plan.

To conclude, great global changes are on the verge of happening, on a societal, economic, climatic and therefore physical level. Just as the famous transition of the urban form of the city from a more 'medieval' layout - enclosed and protected by walls - had to give way to the model of the industrial city, today we are probably approaching a change that will also involve the shape and organisation of cities. Whether the change will take place in a programmed way and accompanied by intelligent planning or not is the challenge of today's cities, and Barcelona seems to be actively trying to deal with it. It is a field of experimentation, which will probably also mean encountering inadequate models, but the continuous monitoring put in place is certainly helping to ensure that a planned scenario can change and adapt and possibly produce new ones, which in itself is a symptom of resilience. In fact, as defined by Meerow in 2016, resilience is "*… the ability of an urban system-and all its constituent socio-ecological and socio-technical networks across temporal and spatial scales-to maintain or rapidly return to desired functions in the face of a disturbance,* ***to adapt to change, and to quickly transform systems that limit current or future adaptive capacity.***"

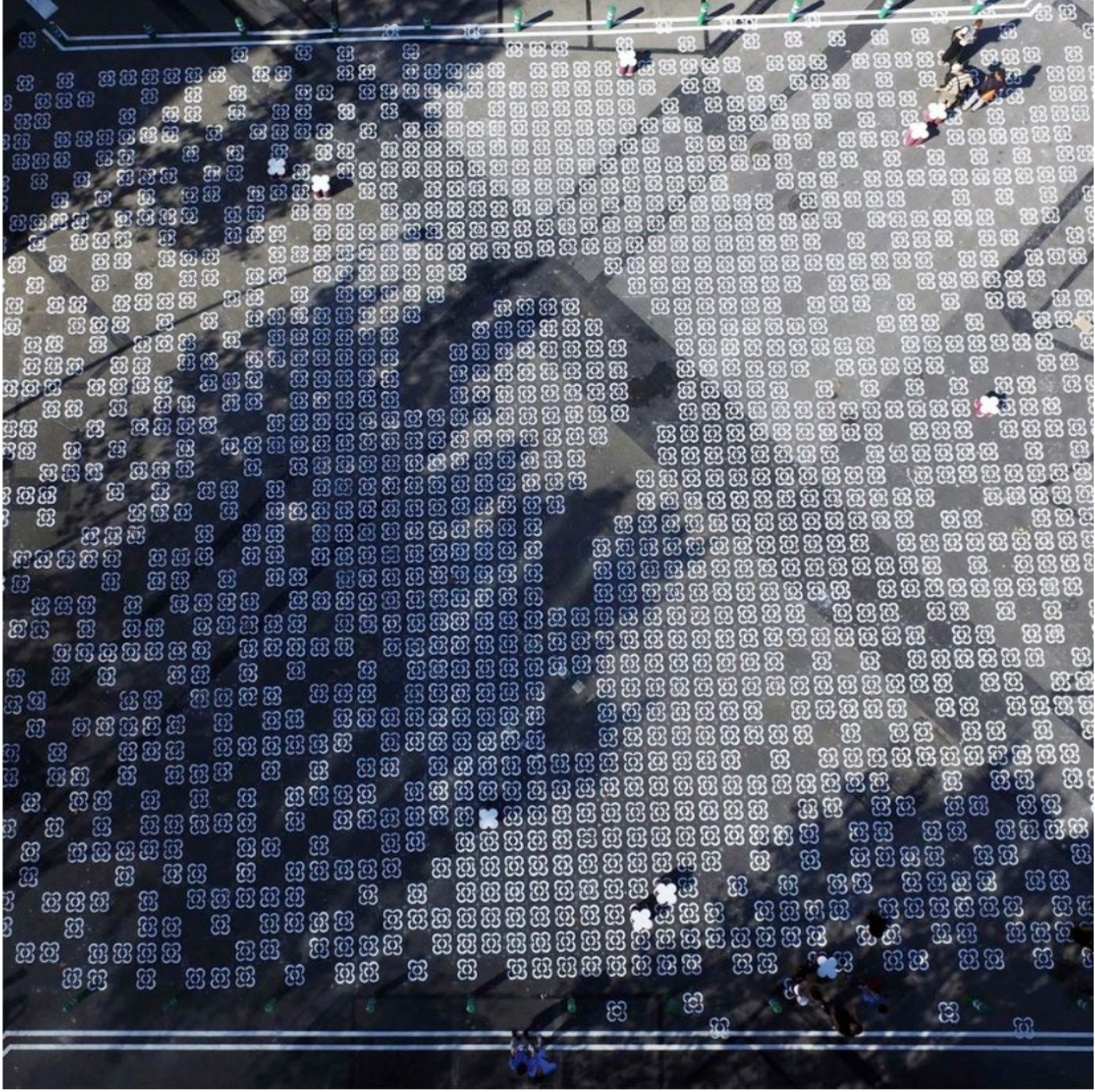


Fig 25. *Superblocks, Barcelona*

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List of figures

Graphics, which are not explicitly mentioned in the list of figures, were created by the author.

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Fig 21. Climate Emergency Action Plan. Model changes, adapted from the author. Climate Emergency Action Plan 2030

Fig 22. Climate Emergency Action Plan. Areas and lines of action, adapted from the author. Climate Emergency Action Plan 2030

Fig 24. Evaluation of data from Barcelona Preliminary Profile, 2017
http://capacitybuildingunhabitat.org/wp-content/uploads/workshops/2017-foundational-training-course-climate-compatible-sustainable-and-resilient-cities/Day%204_%20Resilience%20_%20KACST/Module%205%20-%20Barcelona/201712_BCN_ResilienceProfile.pdf

Fig 25. Superblocks, Barcelona.
https://lapinyabarcelona.com/blog-archive/superblocks

Exploring Urban Resilience Pathways
Barcelona, Spain
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