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The Social Impact of Climate Change: between collapse and social metamorphosis

Mercedes Pardo-Buendía (mercedes.pardo@uc3m.es)
University Carlos III Madrid

Climate change has been regarded as the biggest risk facing contemporary societies. In this article we reflect on its social impact, including institutional architecture and policies, as well as the conceptualisation of vulnerability, resilience, mitigation and adaptation, all key issues in the fight against climate change. Cities play a fundamental role in the fight against climate change but they have not been studied as much as nation states. This analysis will take the form of a kind of reflective essay on some of the aspects of interest for analysing the social impact of climate change, specifying, where possible, the city of Barcelona.

Introduction¹

The sociologist Ulrich Beck (2017) described contemporary societies as societies at risk, not so much from the natural threats and risks that society has suffered throughout its history – an argument counterbalanced by the increase in life expectancy, mainly in the economically developed societies – as by the new types of risk arising from human activity itself. Apart from the risks posed by the nuclearisation of the world – with the capacity to destroy the world in an instant (Robock and Toon, 2010) – climate change (hereinafter CC) – capable of destroying the world as we know it or leaving it seriously damaged in the medium and long term (IPCC, 2014) – exemplifies this type of risk. The evolution of language itself – from *risk to nature* to *climate change* – acknowledges that. Moreover, the global, planetary changes that have occurred since industrialisation and which are affecting the functioning of the planet as a system, have led to our epoch being described as a new geological era, the Anthropocene (Crutzen, 2006).

It is a social fact because it is caused by human activities, more specifically greenhouse gas emissions into the atmosphere, which combine with the natural variability of the climate, and also because of the consequences for societies and all that they need and value for subsistence, namely, nature. Climate change has made it clearer than ever that nature and society are not opposing, antagonistic realities. It is not possible to understand society without taking into account its dependence on the biogeophysical environment. Nor is it possible to understand a biogeophysical environment without considering how societies have historically intervened in it. This is already the first social impact of climate change: the necessary epistemological change that

1. Some of the ideas in this article had been put forward in other works, specifically the "Opening lecture of the 2019-20 academic year – UAB" and "El impacto social del cambio climático: la metamorfosis social como ventana de oportunidad" [The Social Impact of Climate Change: social metamorphosis as a window of opportunity], written with Jordi Ortega, in: Informe España 2018, Universidad Pontificia de Comillas, pp. 365-391.

enables us to understand the problem and, therefore, have better knowledge tools at our disposal for "solving" it.

Furthermore, CC expresses the relationship between local and global like no other social problem. We are talking about a global, planet-wide problem whose causes are to be found at a local level. And here cities take on a special prominence as the cause (because of their economic activities, mobility, population concentrations, consumption of resources, etc.) but also as those who suffer the consequences (pollution, flooding and so on).

Cities are aware of that. As early as 1994, they made it very clear in the Charter of European Sustainable Cities: "We understand that our present urban lifestyle, in particular our patterns of division of labour and functions, land-use, transport, industrial production, agriculture, consumption, and leisure activities, and hence our standard of living, make us essentially responsible for many environmental problems humankind is facing. We are convinced that sustainable human life on this globe cannot be achieved without sustainable local communities"². The point had already been made by Maurice F. Strong, Secretary-General of the United Nations Conference on the Environment and Development held in Rio de Janeiro in 1992, when he declared that the global battle for sustainability would be won or lost in cities.

Barcelona City Council agrees with that diagnosis, not only on the human cause of the problem but also on the solution. On 1 January 2020 it declared the 'climate emergency' (Barcelona City Council, 2020). That municipal positioning is important, since political-institutional leadership is key in the fight against climate change (Barcelona City Council, 2018).

The controversies with the deniers and sceptics have been superseded³. There is now clear proof: an increase in the average temperature of the planet, melting ice caps and rising sea temperatures. The consequences for the planet's biogeophysical system will mean an increase in the number and intensity of extreme meteorological phenomena, including heat waves, storms and hurricanes, among others (IPCC, 2014, 2018). In a nutshell, it is forecast that the Iberian peninsula will be hotter and drier, mainly the southern part, sea levels will rise and it will experience greater meteorological extremes (AEMET, 2019).

The projections for Barcelona to 2100 (AEMET, 2020) are an increase in temperature, more hot and torrid nights, as slight reduction in rainfall and a greater frequency and intensity of extreme weather events. To those projections we need to add the current "heat-island" effect (Arellano Ramos and Roca Cladera, 2016; Martín-Vide, 2017) and the risk of a rise in the sea level, resulting in receding or disappearing beaches, flooding and the corresponding impact on port and coastal infrastructures (Barcelona Regional, 2017). This is not a new phenomenon. The city has already suffered significant contemporary experiences of heat waves, water stress and flooding that will foreseeably increase with climate change.

That is the framework for the analysis of the social impact of climate change in Barcelona, both in terms of its negative aspects and those with the potential for its social transformation to a city based on sustainable development. This analysis, by way of reflection, moves from the global to the local, given we are dealing with a problem where, as we said earlier, global and local are connected in the causes and the consequences.

1. The social impact of climate change

The benchmark report by the Intergovernmental Panel on Climate Change⁴ (IPCC) has diagnosed the problem on a planetary level, located the causes and projected the probable consequences. We are talking about a problem of global environmental change affecting the whole of the Earth in

2. http://www.sustainablecities.eu/fileadmin/repository/Aalborg_Charter/Aalborg_Charter_English.pdf

3. There are important differences between deniers and sceptics but they do not affect the central issue of this article.

4. Commissioned by the United Nations Programme for the Environment (UNEP) and the World Meteorological Organisation (WMO). <https://www.ipcc.ch/> [retrieved on 26/4/2020].

how it functions as a system, and which will have – already is having – consequences, to a greater or lesser extent depending on the location, but inevitably for all humankind, with catastrophic global risks if the average temperature of the Earth's surface increases by more than 2° C (IPCC, 2014, 2018).

Citizens, economists and politicians have been slow in recognising and taking on board the importance and urgency of a problem that climate scientists have been reporting on for decades. The Paris Agreement (UN, 2015a), despite its limitations (Clémenton, 2016), has given an unprecedented political impulse to global, worldwide action in the fight against climate change. The 190 plans for fighting CC put forward by the ratifying countries must be reviewed every five years (starting in 2023). Whether that will be enough to achieve the Agreement's goals and targets is questionable. Either way, in a world where sovereignty is in the hands of nation states, entailing severe limitations on global agreements, the world's climate now matters. However, that is the space of politics, necessary but not enough in the workings of complex societies like those of today.

1.1. Impact on recognising science as a reference

That has been one of the first, important, social impacts of climate change. World science, through the IPCC, is playing a central role in the world's and countries' political decisions. The Paris Agreement (UN, 2015) set a target of not exceeding an increase of 2° C, and if possible 1.5° C, in the Earth's average temperature, based on the analyses of the IPCC (2014). In the post-truth era, that is no trifling matter.

Although science is now internationally connected, climate change science has some unique characteristics. The IPCC is a global panel that synthesises scientific knowledge by means of a meta-analysis of scientific literature. Not only that of climate science but also natural and social sciences – rather more limited in the latter sphere. This is another important characteristic: an interdisciplinary approach, which is necessary for achieving a better understanding of the biogeophysical and social reality of our planet and finding solutions to the problem.

In addition, there are the benchmark reports of the IPCC which, despite being a panel that only scientists sit on, is a framework for interaction with governments.⁵ That structure is necessary for discussing issues relating to the impacts, adaptation, vulnerability and mitigation of climate change.

In short, it is a panel capable of synthesising global knowledge on this issue, of doing so with an interdisciplinary approach and through dialogue with governments. Regardless of the critical aspects (Trainer, 2017) any one of those areas could be subjected to, the existence and work of the IPCC is proving key in the fight against climate change.

Barcelona has recognised that. Climate change is a reality and the IPCC is the benchmark scientific body (Barcelona City Council, n.d.).

The credibility achieved by the IPCC's reports is extremely noteworthy and very rare in science or politics and key in the fight against climate change.

1.2. Impact on the important role of the United Nations as a global institution

As a global problem affecting the planet, climate change must be addressed globally (IPCC, 2014). In a world organised around nation states, global agreements and globally coordinated decision-making are no easy task.

With regard to climate change, despite having different responsibilities, all societies have some level of responsibility in its causes and solutions (United Nations Framework Convention). The United Nations has been a key player in coordinating and reaching agreements on the fight against climate change. Said agreements are difficult and complex. Countries participate not so much

5. <https://www.ipcc.ch/about/structure/>

because they consider the climate to be a global asset, a common good, but to project their particular, one could say selfish, national interests in the global sphere (Nava Escudero, 2016; Pardo and Ortega, 2018).

1.3. Impact on the important role of the European Union

The European Union is at the forefront of international efforts on the climate. At the end of 2014, it was the first big economy in the world to present its 2030 commitment (EC, 2019) to reduce greenhouse gas emissions by 40% compared to the baseline year of 1990, with a view to increasing that target to 50%-55% in the recent European Green Deal (CE, 2019), aimed at reconciling the economy with taking care of the planet. Other targets have been set too, namely to have a renewable energy share of at least 32% and a 32.5% improvement in energy efficiency.

This leadership, with the capacity to change the coordinates of geopolitics (Oberthür, 2016), is another of the results of CC, in a political context where there is a lack of interest on the part of the United States⁶ in this matter and the emergence of China as an important player in world climate policy (Hilton and Kerr, 2017). The fight against CC therefore has the potential to be a kind of European identity, at a time of crisis for that identity (Kaina and Karolewski, 2013) with some member states questioning their membership of the EU, as well as the UK's Brexit.

Barcelona has aligned itself with the EU's commitments to reduce greenhouse gas emissions by 40%-45% by 2030.

Leadership and political consensus is a key question in the fight against climate change. The European agreement and the corresponding national and local ones are, therefore, other positive aspects that need highlighting.

1.4. Impact on the role of cities in the fight against climate change

Cities have a central role in the fight against climate change (Rosenzweig *et al.*, 2010). More than 70% of carbon emissions can be attributed to urban areas (Bazaz *et al.*, 2018), involved in a process of economic and population growth, even with the "temporary" standstill caused by the COVID-19 pandemic.

Traditionally the focus has been on nation states which, in many cases, have been incapable of tackling the fight against climate change extensively and effectively (Rosenzweig *et al.*, 2010). Cities, on the other hand, are emerging as important players, carrying out risk assessments and drawing up climate change mitigation and adaptation plans. However, cities have largely been ignored in research on climate change until very recently (Rosenzweig *et al.*, 2010).

International political landmarks for cities include the Paris Agreement (UNa, 2015) and the Sustainable Development Goals (SDGs from now on) – the so-called 2030 Agenda – (UNb, 2015), as well as the United Nations' New Urban Agenda (UB, 2016). In Spain this has taken shape in a Ministry of Social Rights and 2030 Agenda with the rank of Deputy Prime Minister. As a municipality, Barcelona has committed itself to the SDGs of the 2030 Agenda. (Barcelona City Council, 2020b).

The next step is to go from targets to action. It's high time to take climate change seriously! Nevertheless, it is important to make clear the radical change that is required to achieve those targets. Decarbonising cities means mobilising large-scale investment in renewable energies, public transport, energy-efficient buildings and solid waste management, among other areas. But reversing the historical trend that has produced climate change will require much more than policy change or infrastructure investment. It is necessary to give shape to cities so they satisfy the needs of their inhabitants, reduce their consumption of resources and maintain economic development. It requires breaking down the cultural and mental barriers that support the *modus operandi*.

6. The United States has not ratified the Paris Agreement, although many of its States, counties and municipalities have set ambitious targets in that regard.

However, cities cannot do all this alone. Regional and national governments need to create their own frameworks for that, helping the different players to coordinate their efforts. (Broekhoff *et al.*, 2018). For example, private investment is probably a key question for satisfying the deficit in infrastructure investment. (2017).

Milestones have included the creation of the Covenant of Mayors, promoted by the European Commission, in 2014, and now called the Global Covenant of Mayors for Climate and Energy (which rewarded Barcelona for its Climate Plan in 2018); recognition by the Paris Agreement (2015) of the importance of non-signatory interested parties: cities and other sub-national administrations, civil society and the private sector, among others; the Summit of Cities and Regions at UN COP23, in 2017, inaugurated by Barcelona's mayor, Ada Colau⁷, where cities called for national governments to give them the tools to fight against CC, and the Spanish Network of Cities for the Climate under the framework of the Spanish Federation of Municipalities.

While the United States often fail to see the risks, as Beck (2017) pointed out, in relation to CC, cities are in a better position to see the opportunities. Climate change could be inverting the state-city relationship to the extent that cities are becoming pioneers in this important matter. A good example is the role cities are playing in turning the energy model towards local, renewable energies or transforming urban planning from an infrastructure-based model to an ecosystem-based one (Rueda, 2016; López *et al.*, 2020).

It is no longer a question of just having top-down vertical structures and action – global, national, local – but horizontal as well, in this case between cities, whether they are local, national or international. And, most important of all, given globalisation and that horizontality, cities are becoming global players, global cities, seeking partnerships between institutions, civil society and businesses. It is a question of developing the opportunities for horizontal alliances with other cities (spaces of freedom, autonomy and innovative leadership) as the protagonists. This global cooperation between cities has the potential to be a vital lever in advancing the fight against CC.

Cities now have the opportunity for a transformation, a metamorphosis towards sustainability with a forward-looking approach. As we were saying, they can be the producers of their own energy with renewable energies, of a new, ecosystemic urbanism and buildings that take CC into account (López *et al.*, 2020), urban mobility based on collective transport and shared electric cars, freeing up space for other public uses, smart water and waste management in a circular economy, citizen participation in city management, and so on.

1.5. Impact on the awareness of opinion leaders and society

Environmental values and awareness, whether they be precursors or normalisers, are necessary for social behaviour and action in relation to climate change (Pardo, 2006). The fight against CC requires the participation of all social sectors, not only top-down but also bottom-up, not just vertical but horizontal too.

There has been an exponential increase in societal awareness of the risks of climate change in recent years. This is illustrated by the *Laudato si* (Praise be to You) encyclical of Pope Francis⁸, with its message for humanity to proceed with modesty in the face of arrogance that ignores long-term effects, or the “Muslim Declaration on Climate Change”⁹, calling on people not to endanger the planet's delicate “balance” (*al-mizan*). But above all there has been the emergence of a global social movement, mainly of young people, such as the Climate Fridays or Extinction Rebellion¹⁰ launched by the Swedish teenager Greta Thunberg, which has succeeded in putting the climate

7. <https://ajuntament.barcelona.cat/premsa/2019/09/20/ada-colau-presideix-a-nova-york-la-inauguracio-de-la-cimera-mundial-de-grans-ciutats-per-lemergencia-climatica/>

8. http://w2.vatican.va/content/francesco/es/encyclicals/documents/papafrancesco_20150524_enciclicaudato-si.html [retrieved on 26/4/2020].

9. <http://www.ifees.org.uk/wp-content/uploads/2017/04/ICCD-Spani-Full.pdf> [retrieved on 26/4/2020].

10. <https://www.fridaysforfuture.org/> (retrieved on 10/9/2019). <https://rebellion.earth/> [retrieved on 26/4/2020].

emergency on the political and economic agenda. A movement that is not merely ideological but more profound, a movement of action.

Barcelona's citizens are not immune to that social conscience. Some 800 citizen organisations have made their commitment to the climate (Barcelona City Council, n.d.) explicit with specific projects to be carried out.

It is a starting point for fostering a global-local climate-conscious citizenry, which not only requires a process of information and communication but a training and participation process as well.

The planet is a limited, "closed" system. Societies, on the other hand, are open systems which, as such, have seen how the climate and environmental crisis has revealed the urgent need to not exceed those limits. A citizenry that is organised, committed and active in defence of the common good – the environment, the climate – has the potential to support and drive social changes that turn "bad things" into "good". Thus climate change amounts to a metamorphosis of society and politics.

Social participation, in a process of constructing "ourselves", is the necessary tool for said training and social transformation. The success or failure of the fight against climate change depends to a large extent on what this climate citizenship is like.

1.6. Impact on health, the economy and infrastructures

The threats posed to Barcelona by climate change have already been identified (Barcelona City Council, 2018): a rise in the temperature and more extreme weather phenomena mean risks for human health¹¹ and economic activity and infrastructures worthy of consideration. However, the consequences of these risks go much further and have the potential to affect virtually each and every one of the spheres that make up a society – social, economic, political, institutional, biophysical and so on.

Future scenarios are based on two perspectives: the passive scenario and the committed scenario. For Barcelona (Barcelona City Council, n.d.), with a baseline year of 2015, the respective data in 2100 would be: higher temperatures, +3° C and 1.7° C; less rainfall, -26% and -14%; a rise in the sea level, between 64 cm and 133 cm and between 46 cm and 115 cm; 16 times and 8 times as many heat waves; 6 times and twice as many torrid nights (more than 25° C).

Based on those two scenarios, the Barcelona study indicates the following effects (Barcelona City Council, n.d.): "People's health will be affected by heat, insect-transmitted diseases and lower water availability [...]. Inequalities will become more evident with more social conflicts as well [...]. The supply of basic resources such as energy or water will not always be guaranteed [...]. The cost of living will be directly affected by possible increases in the price of fossil fuels – those we still depend on – and derivative products or those transported over long distances [...]. The city's biodiversity and nature, both flora and fauna, will be affected by the expected climate changes".

In other words, even in the committed scenario, the social impacts of climate change will leave their mark on health, infrastructures, social vulnerability and the economy. Mitigation and adaptation measures are key.

Recognising CC as a social fact has far-reaching implications for all the spheres that make up a society, because it would mean the solution to the problem does not lie in nature itself but in society. The social impact of climate change will depend on what society does or doesn't do. The risk and its social significance are not static questions. The impact is the result of the danger – in this case, climate change – in its interaction with the environment, in this specific case, Barcelona's physical and social environment. In sum, threats, dangers, what type they are, represent a risk for societies which, depending on the characteristics of said societies and the measures taken, will

11. The heat wave that hit Europe in the summer of 2003 produced around 70,000 deaths, direct or induced.

have a greater or lesser, negative or positive impact, with more or less possibilities for mitigation or adaptation in a dynamic process. It is important to stress this, as it implies putting the emphasis on action, on social change, on transforming the systems that make up Barcelona in line with the fight against climate change.

1.7. Mitigation and adaptation to climate change

Mitigation and adaptation to climate change comprise the tools for combating it (IPCC, 2014). By *mitigation* the IPCC (2018) means human intervention aimed at reducing greenhouse gas sources or enhancing their sinks. *Adaptation* in human systems, is understood as the process whereby societies adjust to the actual or expected climate and its affects, in order to moderate harm or exploit beneficial opportunities. It also adds an adaptation gradient: incremental adaptation which maintains the essence and integrity of a system or process at a given scale. In some cases, incremental adaptation can accrue to result in a transformational adaptation, that is, one that changes the fundamental attributes of a socio-ecological system in anticipation of climate change and its impacts.

In this framework it remains to be written how exactly CC is changing or transforming society. Social scientists have a responsibility to contribute knowledge here but are late in doing so. In the opinion of the sociologist Ulrich Beck (2017), climate change has the potential not only to produce social change but a social metamorphosis, which he regards as the opposite to social change. Change refers to society's ongoing evolution, while metamorphosis means a radical change, a historical change in our world view. This could be summed up as what was impossible yesterday is real today. Apart from the harm they can do, disasters can also serve as a catalyst for change, for social transformation (Birkmann *et al.*, 2010), in the different parts of a society, on an economic, political and social level, in this case due to climate change. We are talking about a civilising change in the relationship societies have with nature, with the planet as a biogeophysical system that makes human habitation possible.

Key issues in this metamorphosis include the vulnerability, resilience and strength of cities' social, economic, political and institutional structures to prevent, mitigate and adapt to climate change and, more specifically, to the actual, aforementioned increase in heat waves and night-time temperatures, as well as the increase in the heat-island effect, flooding and possible situations of water stress. The Barcelona Climate Plan includes mitigation and adaptation measures, and Barcelona is one of almost 80% of European cities with over 500,000 inhabitants that have already drawn up plans in that regard (Reckien, 2018).

On that path, it is important to clarify and specify the concepts of vulnerability, resilience and strength, as these are the frameworks on which mitigation and adaptation to CC are based.

Although there is no universal definition for the concept of vulnerability and, moreover, it is a very complex question, for the purposes of this article we will follow the definition of the IPCC (2018:92), according to which "vulnerability encompasses a variety of concepts including sensibility or sensitivity to harm and lack of capacity to cope and adapt, in this case to climate change". Somewhat broader is the definition of Wisner *et al.* (2004:11), who refer to it as "the characteristics of a person or group and their situation, which influence their capacity to anticipate, deal with, resist and recover from the impact of a threat". Phillips and Fordham (2009), for their part, add that social inequality (economic, cultural, etc.) is a key factor in vulnerability which, moreover, is embedded in the social structure. In other words, vulnerability is not merely associated with the conditions of specific individuals but also those of the environment in which their lives develop. All that gives us a body of elements that are relevant to an analysis of social vulnerability in Barcelona in relation to climate change.

Regarding risk in relation to climate impacts, the IPCC (2018:89) defines it as "the potential for adverse consequences from a climate-related hazard, or from adaptation or mitigation responses to that hazard, for livelihoods, means of subsistence, health and well-being, ecosystems and species, economic, social and cultural assets, services (including ecosystem services) and

infrastructure. Risks derive from the intersection between vulnerability (of the system affected), exposure over a long period of time (to the hazard), the (climate-related) hazard and the likelihood of it happening".

Note that the risk will have a greater or lesser impact depending on the vulnerability and hazards derived from climate change. Once again, insisting on the importance of identifying, eliminating or reducing the vulnerabilities, in this case of Barcelona, is key in the fight against climate change. Furthermore, insofar as a risk is a social construct, both this and vulnerability can be interpreted in different ways that have to be taken into account to understand them and act.

The other side of vulnerability is the social category of resilience. It has been adopted from social psychology and is used a great deal in analysing environmental stress of the physical environment. Attempts have been made for decades now to include social dimensions in the concept of resilience (Folke, 2006). It is another concept with a range of definitions. The question of cities' resilience is not new. Pickett *et al.* (1992) discussed the difference between definitions that consider resilience in equilibrium or in non-equilibrium. For the general purpose of this article, we take the distinction made by Cartalis (2014:1); "in the first (equilibrium) the city must design and plan to avoid reaching a terminal point. In the second view (non-equilibrium), the city needs to define multiple (internal) states and ensure that the interaction of the processes will facilitate its stability".

This is what the IPCC (2018:88) has done in its analyses, where it defines resilience as "the capacity of social, economic and environmental systems to cope with a hazardous event, trend or disturbance, responding or reorganising in ways that maintain their essential function, identity and structure while at the same time maintaining their capacity for adaptation, learning and transformation". It is a concept that has come to be implemented in action structures, as in the case of Barcelona City Council's Urban Resilience Department.

In reality, vulnerability, risk, adaptation and resilience are not separate issues but closely related, so their analysis requires a holistic framework to know and understand them better (Birkmann *et al.*, 2013), in a context of multi-risk management in contemporary societies.

Having included these categories in the analysis of societies, that analysis is sometimes carried out as if society was a homogeneous whole, with no analytical breakdown of significant socio-demographic variables. Yet gender, economic status, age and education, among others, are variables that enable us to study the vulnerability, risk and resilience of societies in more depth.

Although gender has been recognised as an important factor in developing public policies, it seldom features in climate change analyses (Pearse, 2017), with some recent exceptions, such as the one for Latin American countries (Aldunce *et al.*, being printed). The IPCC (2014) believes it is highly likely that the effects of CC will be different for reasons of gender. Regrettably it does not say much more.

The still scarce literature on CC and gender has mainly revolved around two thematic axes: women as vulnerable and women as virtuous, showing good behaviour, in this case in relation to climate change (Arora-Jonsson, 2011). Vulnerable mainly in the South, due to their poverty, and virtuous in the North for their environmental awareness. A critical analysis of that classification is beyond the scope of this article. We merely note as a hypothesis the rigidity and, probably, error of those two thematic axes.

The vulnerable connection stems from the close relationship between poverty and vulnerability and the fact that women as a social group are poorer and have less power than men. Good behaviour in relation to CC is associated with the fact that women use public transport more, mostly carry out the domestic tasks, and therefore influence the consumption of water, power, food, etc., and, in short, with the close connection between gender and productive and reproductive activities (Pardo, 2002; Pearse, 2017).

A bibliographic review on gender and climate change concludes that "literature has established that gender relations are an integral feature of the social transformations associated with climate change. This poses a challenge to gender-blind social research into climate change. Without gender analysis, we omit key aspects of social life in a changing climate. It is vital that the gendered character of climate change is recognised and further explored in the social sciences and humanities" (Pearse, 2017:1).

In Barcelona's case, the Climate Plan (Barcelona City Council, 2018) includes the gender variable mainly with regard to two questions: gender justice and gender vulnerability.

In the still scarce body of research on gender and CC, particularly with regard to the specific contributions women make and can make in relation to adaptation measures, Barcelona has an opportunity to develop further these analyses and proposals, which complement the identification of women's vulnerabilities in social inequality and injustice.

2. Conclusion

Contemporary societies will have to live with multi-risk situations and environmental conditions that are constantly changing, often at great speed, such as some of the consequences of climate change, among others, and many with a high degree of uncertainty.

Climate change is a worldwide, global change and, as such, it requires global governance. Major progress has been made in this area in recent decades, where the United Nations has been a key player and the IPCC a benchmark scientific body with the capacity to influence public policy. Global institutional architecture and the agreements on fighting climate change, implemented at national and local levels, represent a solid foundation. The credibility of science and international organisations is an important matter and it must be maintained and reinforced.

However, this internationalisation is not always governed by the common good, the Earth's climate. Often countries come together to pursue their own particular interests. While that attitude has its logic, the gravity of the problem requires them to overcome their "short-sightedness". Disasters, climate change provide an opportunity for educating political, economic and social leaders on the nature of vulnerability faced with the risk of disaster and, therefore, on the importance of reinforcing social systems to make them more resilient. The policies of mitigation and adaptation to climate change are ideal frameworks for that.

Moreover, disasters, in this case climate change, can serve to bring about changes in the very structures that have led to the problem, a social metamorphosis, an opportunity for social transformation.

Climate change expresses the relationship between local and global like no other issue. And cities have a key role to play in that regard. As a global city, Barcelona has a hand in creating the climate change problem (due to its economic activity, mobility, dense population, consumption, etc.) but also in solving it, or, at least mitigating and adapting to it. The strategic plans, programmes and actions drawn up by Barcelona City Council, despite the controversies, make the city, its institutions, organisation and citizens an active player in combating climate change.

Various issues have been identified as possible steps in those processes. Analyses of vulnerability and resilience require society to be broken down into meaningful social groups. It is not enough to analyse it as if it were homogeneous.

Adaptation and mitigation should be considered together, to help identify the synergies they share, positive and negative. This is especially important for cities, where these factors are closely intertwined. In those synergies, it is necessary to take into account the impact that mitigation and adaptation measures can have on meeting the Sustainable Development Goals. Not everything goes in the fight against climate change, which must be geared towards achieving sustainable cities.

Urban planning will have to be linked to climate change issues in a cross-cutting manner. Cities will be safe if, in their risk reduction assessment, they consider climate change and disasters together.

Finally, and running through all the aspects mentioned previously, there is a need for scientific knowledge to be more closely linked with the needs and requirements of city planners. For science to be useful in combating climate change, it has to be interdisciplinary and transdisciplinary. The social impact of climate change is very complex and to be understood it requires interactive research and action on the part of both natural and social sciences, as well as citizen science.

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