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Rethinking planning hierarchy considering climate change as global catastrophe

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ABSTRACT

This article proposes overcoming the distinction between the effects of climate change and the effects linked to classical disaster hazards by considering Climate Change as global catastrophe. The theoretical approach to combining the two models has until now greatly emphasized the need for further research, but with poor results. Starting from a new conception of climate change as a catastrophe in progress, the paper proposes a revision of local planning hierarchy in order to give a primary role to risk assessment in every sector of local development.

1. Introduction towards the difficult convergence of CCA and DRR

The question of how to prepare our local systems for climate change is becoming a focal issue in governmental science, geography, and urban planning. However, the evolution of these disciplines faces a range of problems caused by the difficulties of ordering the proposals and the different approaches undertaken by experts in the field. This is evident in the lack of cross references between studies on climate change adaptation (CCA) and on disaster risk reduction (DRR). Despite there being a clear overlap between the object of such studies, we face two disciplines and two research communities that rarely speak to one another or share methods, languages, and results (Forino et al., 2015).

Both groups aim to plan and propose new government models for reducing the impact of extreme events. However, the groups' applications and disciplinary traditions are different: DRR experts largely concentrate on a local scale, centred around vulnerabilities and risks in areas with specific populations, oriented towards safety planning via coping-based interventions (Birkmann and von Teichmann, 2010); CCA specialists, on the other hand, often have a much longer-term vision, guided by an awareness that the current urban model will be superseded due to climate evolution, but, at the same time, that it reflects a poor organisational culture and the lack of a consolidated planning model (Gallopin, 2006; Isenhour et al., 2015).

The necessity to integrate these two fields has been ongoing for almost a decade: an article by Jörn Birkmann and Korinna von Teichmann, "Integrating disaster risk reduction and climate change adaptation", dates to 2010. In the paper, the authors report the incommunicability of the two communities of researchers: none of the constituent researchers can autonomously focus on the deep nature of the problem, and therefore they cannot propose effective processes to be applied (Birkmann and von Teichmann, 2010). Likewise, the volume *Hazard Mitigation: Integrating Best Practices into Planning* (2015), by the American Planning Association, describes the lack of communication between planners and emergency managers in a very similar way:

> Emergency managers often lack spatial ordering and community development skills at the planning stage. (Schwab, 2010)

On the other hand, *climate change adaptation planning* is a much more experimental and less structured tool. It generally has a poor relationship with emergency management and often isn't easily able to interpret phenomena at the local scale or anticipate the evolution of specific calamitous events. This is how, in effect,

> emergency managers and planners have different perspectives regarding the products of mitigation plans. Planners are more inclined to look at the long-term consequences of the actions in the built environment, economic development and social fairness. Emergency managers operate mainly in the present to react rapidly to various types of crises. (Schwab, 2010)

Rethinking the relationship between these two communities means imagining a new, integrated approach that recognises ongoing climate change and places it in relationship with the traditional skills of emergency management. This will be possible only if such a

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process will consider social aspects related to community development in the long term, on the one hand, and short-term operating processes gained in the field, on the other.

2. Climate change as an ongoing macro-catastrophe

The term *catastrophe* is used in the meaning proposed by the work of René Thom, and refers to those discontinuities that cause a sudden rupture in the equilibrium of a system, producing a provisional situation pending the establishment of a new equilibrium. The moment the catastrophe occurs is the moment in which a broken stable equilibrium leads a stable system out of a coherent evolution. A catastrophe pushes the system into a situation that, even if expected, could not be considered as continuity.

Thom calls *catastrophe* the discontinuity in which these transformations are recognised.

> In catastrophe theory there is an attempt to describe *the discontinuities* that might be present in the evolution of the system. Intuitively it is admitted that the overall evolution a system shows itself to be a succession of continuous evolutions, separated by brusque very different changes. For every type of continuous evolution, in principle, there is modelling of the classical differential type; however, the changes ensure there is a transition from one differential system to another. (Thom, 1980)

A crisis has a character of "quantitative" evolution, in which a perturbation doesn't change the regulative panel of the system. During a crisis, we can see a coherent evolution of the internal relations of the system that makes it necessary to increase the intensity of the internal administration of the same system. [6: 107] René Thom told us to conceive a catastrophe as a different phenomenon, recognisable by the presence of an abrupt change in system appearance and evolution. [*Ibidem*]

We normally intend and face climate change as a global crisis, that puts us in the condition of searching for new strategies to preserve the linear evolution of the system as we knew it, with its global and local planning and business. Our conception tries to read climate change as an already occurred catastrophe, that brought us into a different evolution model. It's not news that every scientist studying this phenomenon approaches it in this way, but those who deal with planning and emergency management still consider the phenomenon as a crisis.

Whilst catastrophe theory is a fairly familiar concept to DRR, recognising catastrophe as the event leading a stable system into a state of emergency is not yet a regular tool regarding climate change adaptation studies. In Fig. 1 we see a possible representation of emergency evolution, starting from a catastrophic event that keeps the system out of its continuity. If the emergency management fails, the evolution will keep the system over the line of disaster, in a state that is not self-sufficient.

In our opinion, regarding climate change as a global catastrophe that has already occurred and keeps every local system in an emergency state could form a bridge connecting the two disciplines. The proposal advanced here intends climate change to be a vast, ongoing catastrophic process on an all-embracing scale, with obvious repercussions at every lower scale. We assume ongoing climate change to be a macro-catastrophe that moves a stable system towards a future unexpected system.

We can in fact define climate change as the process by which environmental standards, defined in terms of rainfall, temperature, and correlated effects, are transforming our urban systems with increasing impact and in a recognisable but not altogether anticipated manner.

If we input climate change in the previous scheme as a factor that makes every catastrophe more severe, we can see how it affects the local system by increasing the effect of every event. In this way, we can describe climate change as the first of a series of events, able to induce the ones that follow, exactly as we observe in a multi-event emergency (i.e. the Fukushima submarine earthquake, a tsunami,

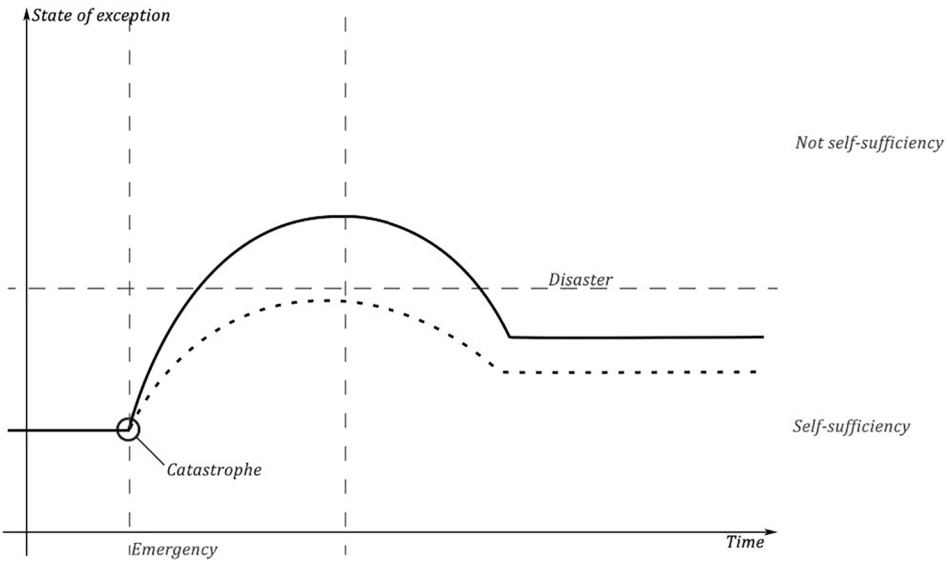

Fig. 1. Evolution of disaster from catastrophe to recovery. The black line represents the worst-case scenario, and the broken line represents the best case (Bertin, 2018).

or a nuclear accident).

Can we adopt the definition established by René Thom as the litmus test for recognising the catastrophic nature of climate change? (Fig. 2).

This belief could have an innovative role for the relationship between CCA and DRR: by intending climate change as a macro-catastrophe we can record a large number of events caused by intense wind, rain, snow, fires, and high temperatures in a single matrix. This operation forces DRR to acknowledge the different and increasingly frequent catastrophic events as manifestations of a single overall phenomenon and, consequently, to rethink its operating and planning method on the basis of a persistent and already ongoing event, rather than on a multitude of partial, episodic events.

Rethinking DRR starting from the acknowledgement of climate change as an ongoing process would make it possible to study apparently separate events as intertwined phenomena, and to act effectively to contain them. We believe that this approach will be increasingly common in tackling disasters. In his seminal work *Waking the Giant, How Climate Triggers Earthquakes, Tsunamis and Volcanos*, Bill Maguire advances the hypothesis of interconnected events that we explore in this paper (Maquire, 2013).

Considering local disaster risk reduction as part of ongoing emergency management allows to us rethink rebuilding and resilience strategies in preparation for and in response to disaster. The first step triggered by this operation is the inclusion of climate change as another parameter in the calculation of local risk; this allows for redesigning danger and vulnerability maps and, therefore, rethinking safe areas and intervention strategies. The second step involves reinterpretation of the governance local map to face forthcoming manifestations of this ongoing emergency.

3. A new planning hierarchy

In 2017, Georgia Butina Watson, in *Designing Resilient Cities and Neighbourhoods*, suggests the hypothesis of directing the integration of the DRR and CCA cultures with a view to 'promoting economic security and social inclusion, for physical and social resilience' (Butina Watson, 2017). The practical expression of this proposal could correspond to bringing CCA knowledge and approaches inside emergency management practices, and to use them as part of a focus on community development in urban transformation and risk assessment.

We suggest applying this approach by considering climate change as a global, ongoing catastrophe that has to be read as a driver in evaluating risk and planning emergency management.

This process can provide those who deal with climate change with a good grounding for shaping the strategies and methods of governance and participation that are typically used in local catastrophe management.

We consider that this approach can lead to a more radical consideration of climate change issues in local government, fostering new awareness and practices of care of the local territory.

If we are living in a system that is not coherent with the past, we have to rethink how our world is changing to another equilibrium. Usually the urban planning hierarchy considers land use planning as a platform for every sectorial plan. Every plan has its traditions, rules, stakeholders, and professional authors. If we really are living in an accelerating evolution in local systems, we need to rethink how climate change merges with traditional risk and how this mix will operate on every sector of a territory.

The urban planning hierarchy normally considers land use plans as a base on which to organize emergency planning and climate change adaptation planning, by different sectors of public administration, connected to different scientific communities which

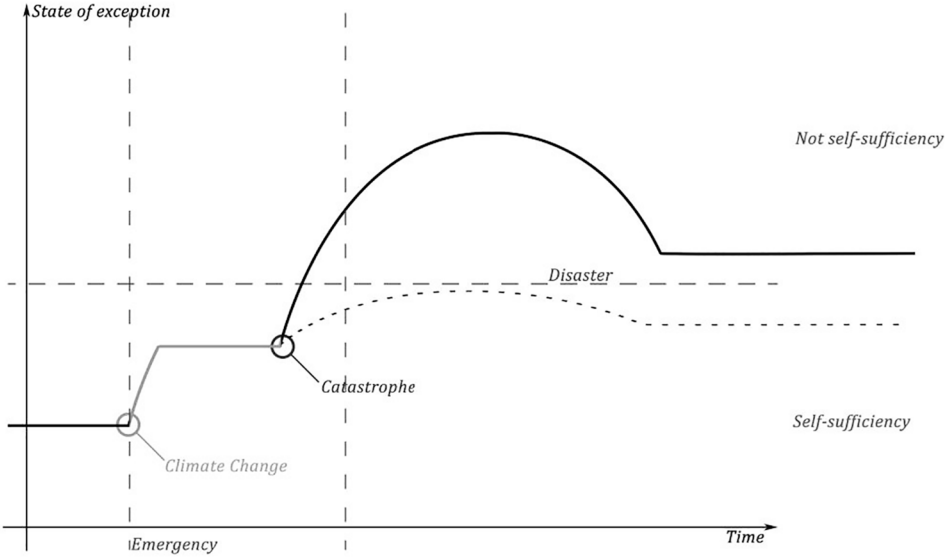

Fig. 2. The effect of climate change as an ongoing catastrophe.

currently are not sharing data and methodologies (Fig. 3).

Rethinking the planning hierarchy by considering climate change as an already occurred catastrophe means rethinking the relationship between these two communities. To do so we have to imagine a new integrated approach that recognises ongoing climate change and places it in relationship with the traditional skills of emergency management. This will be possible only if such a process will consider the social aspects related to community development in the long term, on the one hand, and short-term operating processes gained in the field, on the other.

This model tries to consider climate change effects not just as a collection of imminent emergencies but as drivers affecting all aspects of city life: production, attractiveness, mobility, health, and lifestyles. However, we can re-orientate urban planning only if we really understand where and how impacts could change a local system (Fig. 4).

In this, the contribution of emergency planning could be of great help. Whereas we said that classical emergency plans and emergency management science have forgotten about climate change evolution processes, it is also true that they are carriers of a wide number of theories, case studies, and experiences.

'The primary objective of communal emergency planning is to avoid that a catastrophic event leads the system to find a condition of non-autonomous governability. It have to avoid that state of profound discontinuity in the territorial perception and governance, capable of creating disorientation, in order to permit a rapid regeneration of socio-economic relations' (Bertin, 2018).

It has by now been established that the socio-economic dimension is the primary dimension able to guarantee local continuity. DRR studies interpret this requirement based on a governmental vision of the emergency as a complexity to be deconstructed, and not simplified (Wagensberg, 2000). It is a strongly political task and is closely linked to the planning of a community, to where Lewis and Mioch state that 'community development and reduction of vulnerability are two aspects of a single process' (Lewis and Mioch, 2005). It is a 'multi-disciplinary activity with the aim of training all the organisations involved in facing a given crisis in the face of the occurrence of a catastrophic event in a given area' (Menoni, 2013) that must involve the subjects called upon in the management of the event 'in every phase of the process' (Menoni, 2013).

Specifically, it can be useful in emergency plans as the first widespread tool for approaching the sharing of the vulnerability analysis and governance model.

In the *risk assessment,* this approach could gather the expected effects of climate change on the territory. Addressing territorial risks through a classical risk analysis model unaware of climate change effects could not only undermine the work but also be counterproductive, for example by proposing safety limits that may no longer be appropriate (Ruiz Sánchez et al., 2017). A new interpretation of the dangers and vulnerabilities should be undertaken to force administrators and intervention agencies to reconsider their vision of local risks.

The plan must therefore elaborate in depth the spaces and the situations most at risk according to the new analysis. This will give us a more realistic image of local evolution in the coming years and could help us discover a different city from what citizens are accustomed to.

To do this we have to understand which actors are involved in urban emergency governance and adaptation, and which are the norms to be merged, so as to construct a new vulnerability multi-hazard map of the city (Butina Watson, 2017).

A revised flow chart for urban planning and emergency management should merge climate change effects with hypothetical ones coming from dangers in multi-hazard maps. At the same time, we have to bring together climatic evolution governance panels and

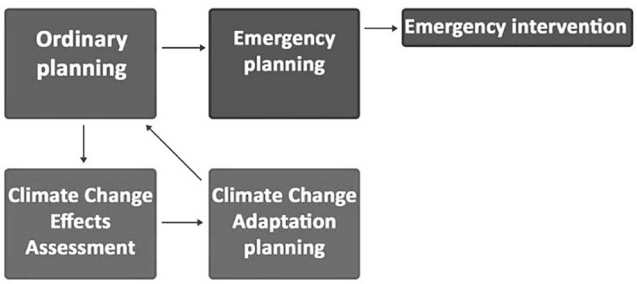

Fig. 3. Typical urban planning hierarchy.

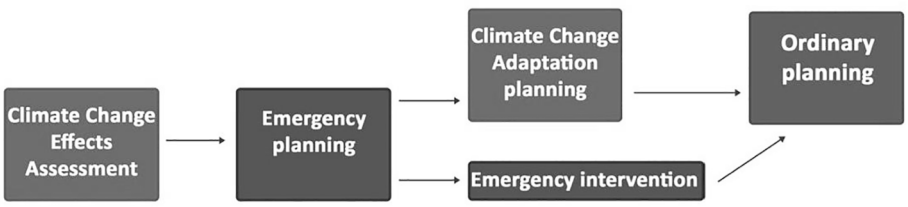

Fig. 4. Proposed urban planning hierarchy.

stakeholders involved in emergency management and planning. This first phase will conclude with the description of the expected effects and subjects involved, able to give a clear overview of ongoing climate change to public administrations. Unavoidably a similar approach implies to rethink the relationship between departments, starting from a new common knowledge of these issues.

The second phase is to create a solid copying strategy, without which the system could be overwhelmed by dangers for which it is unprepared. This is a matter of management and long-term intervention. If we can rely on a good organization to face imminent dangers, we have more possibilities to complete the adaptation process, and we can also be supported by a better prepared local community involved in emergency management and aware of the risk.

To plan adaptation objectives, measures, and timelines, we can work with partners to rethink local evolution in all the sectors potentially affected by climate change. We would have more time because immediate intervention would be covered by a well-prepared emergency system, and adaptation planning could produce a resilient city.

After this part we will integrate adaptation planning and high-risk areas recognized in emergency planning in land use planning. This will create wide-ranging tools that meet the challenges of climate change—considering them not as an exit strategy but as foundational instruments for a new order in which to plan for the collective welfare.

4. Conclusion

The goal of the vision is a reorganized urban planning hierarchy. Considering climate change as a global catastrophe means considering urban spaces as systems in transition, in which every part of local life is affected by changes that have to be taken into account in sectorial planning. To really face climate change as an ongoing global emergency resulting from an already occurred catastrophe, we have to rethink how and when the planning tools are produced and revised. Redesigning the local planning hierarchy could provide a practical solution for the limits we are recognizing in the intents of merging CCA and DRR.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Mattia Bertin*, Francesco Musco, Lorenzo Fabian
Epic – Earth and Polis Research Centre, Department of Architecture and Arts, Università IUAV di Venezia, S. Croce 1957, 30135 Venezia, Italy

* Corresponding author.
E-mail address: mattia.bertin@iuav.it (M. Bertin).