

Two key concepts of the society-climate change interface: vulnerability and adaptation*

Alexandre Magnan (IDDRI), alexandre.magnan@iddri.org

Vulnerability and adaptation are two inseparable concepts, each being dependent on the other. Although they are extremely sensitive to the contextual specificities of particular areas, vulnerability reduction and adaptation strategies can only be developed at the interface between different spatial and temporal scales. This leads us to assert that faced with a common threat – climate change –, different types of vulnerability and adaptation exist.

The aim of this text is to provide an overview of two concepts that can no longer be ignored in discussions on climate change: vulnerability and adaptation. These are two pillars for analysing both the potential impact of climate change on societies and regions, and also their ability to live with these consequences. We will begin by describing how the interdependence of these two concepts explains the position(s) of present and future societies in the face of climate change impacts. We will then show that they share certain determinants that may themselves provide an appropriate framework for analysis. Finally, we will insist on the fact that these two concepts nevertheless remain extremely difficult to grasp,

as they require a multi-scalar and multi-temporal approach to regions, which also explains why they are a relevant response to the challenges posed by climate change. The conclusion will call for wider discussion, reiterating that since their nature is fundamentally linked to the diversity and specificities of regions and societies, we must accept the idea that faced with the same threat – climate change – there are different types of vulnerability and adaptation.

The conceptual interdependence between vulnerability and adaptation

The term “vulnerability” is intrinsically linked to that of “risk” as it refers to the factors that constrain a system during a perturbation (Blaikie *et al.*, 1994;

Adger, 2006). This relates to the system's endogenous and exogenous elements that explain the occurrence of a disaster, and the challenge now is to propose a balanced interpretation of the relationship – as it is built and experienced – between the strengths and weaknesses of an area, in other words between the characteristics (environmental, socio-cultural, economic and institutional, etc.) that enable it to resist a perturbation and those that weaken it. From this perspective, the most commonly accepted definition of vulnerability to climate change is the one proposed by the IPCC: *“the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity”* (IPCC, 2007).

If the IPCC links “vulnerability” with “adaptation”, this is because the very essence of analysing the vulnerability of a system is to understand how this system works (what are the risks and challenges? What regulations are needed?), in order to then envisage future scenarios and to propose pragmatic responses (Downing and Patwardhan, 2003). In return, the implementation of adaptation strategies aims to reduce the vulnerability of an area to natural hazards, linked for example to sea level rise (erosion, submersion, salinisation of groundwater, etc.) and/or to changes in temperature and rainfall (heatwaves, droughts, floods, etc.).

Consequently, different schools of thought diverge to make vulnerability a function of societies' adaptive capacity or, on the contrary, to make adaptation a function of the level of vulnerability. Another position consists in the belief that there are two stages of vulnerability depending on whether or not climate change is taken into account. Indeed, irrespective of this concern, an area is subject to certain natural hazards. However, even if climate change may subject the area to new hazards, it should essentially increase its exposure to those that already occur there to some extent. This is typically the case of coastal areas affected by erosion, where the initial cause is often not climatic. Each area therefore presents an “intrinsic” (or “initial” or “original”) vulnerability that climate change will alter. This “resulting” vulnerability will constitute a second stage which, more than the first, will also depend on the types of adaptation implemented by the society, especially with the aim of reducing “intrinsic” vulnerability. Within the framework of

climate change, vulnerability is therefore a good indicator of the effectiveness of adaptation choices, which influence the evolution of the level of vulnerability. A virtuous or vicious circle is then set in motion between vulnerability and adaptation.

The determinants of vulnerability and adaptive capacity

In one way or another, the general scientific consensus therefore makes a direct link between vulnerability and adaptation, with an area's adaptive capacity partly explaining its vulnerability to climate change. Consequently, it is clear that certain factors are common to vulnerability and adaptation; the challenge is to identify them.

In the early 1990s, the “pressure and release” model (Blaikie *et al.*, 1994) was developed based on the idea that a disaster is the intersection between the anthropogenic processes generating vulnerability on one side, and the system's physical exposure to natural hazards on the other. Thus, the human factors explaining a society's weak points correspond to three dimensions that all go progressively back in time. The first characterises the conditions of the system at the time of exposure to the hazard. However, these are partly explained by more underlying causes, in this case the environmental, socio-cultural, economic and political changes of the last few decades. Finally, the third dimension relates to a time scale spanning several centuries through the fundamental values on which society is built: hierarchy, the distribution of power, relationships with natural resources, and economic policies, etc. The advantage of this approach is clearly that it proposes an interpretation of vulnerability that is firmly rooted in the very foundations of society.

Based on this firmly rooted vision, six major factors may be taken into consideration (Magnan, 2009):

- The *spatial configuration* of the region provides a geographical framework that may or may not be restrictive for development.
- The *Environmental sensitivity* supplements this physical dimension of vulnerability by integrating the nature of the existing ecosystems and their potential fragility in the face of climate change.
- The *Social cohesion* characterises the relations between individuals belonging to the society occupying the region in question. Indirectly, it refers to the degree of solidarity, which is

decisive both in crisis situations and in implementing anticipative strategies.

- The *Economic diversification* also plays a structuring role in the sense that an area built according to a single activity model will struggle more to recover from a crisis that seriously affected the dominant sector as there are no other economic sectors that could offset this activity.
- The *Political-institutional structuring* refers to the mechanisms that govern the way a region operates and that explain the extent to which the different areas it covers (coastlines, hinterlands, urban areas, etc.) are closely linked to one another. Here, reference is made to the concept of regional coherence.
- Finally, by reflecting *living conditions*, the general level of development provides an overall framework for studying vulnerability. This level may be appreciated using characteristic elements of demography, housing, education, employment, health, access to transport and the type of energy sources used on a daily basis by households. However, to avoid the classic misconception that the richer a society is, the less vulnerable it is (an assumption that was demolished, for example, by Hurricane Katrina in New Orleans), we should remember that this “living conditions” factor is not enough in itself, as the way in which it affects vulnerability remains ambiguous and highly dependent on contextual specificities, hence the importance of linking it to the five other factors.

Furthermore, it may be considered that the last four factors influencing vulnerability also explain a society’s adaptive capacity (Magnan, 2010), even if geographical and environmental aspects indirectly affect the adaptation strategies that are developed. Table 1 summarises this and shows the strong links between vulnerability and adaptation in a different format.

Table 1. The major influencing factors for vulnerability and adaptive capacity

Influencing factors	Vulnerability	Adaptive capacity
Spatial configuration	X	
Environmental sensitivity	X	
Social cohesion	X	X
Economic diversification	X	X
Political-institutional structuring	X	X
Living conditions	X	X

The spatial and temporal dimensions of vulnerability and adaptation

The existence of influencing factors that are common to both vulnerability and adaptation implies two common dimensions, one linked to spatial scales, and the other to time scales.

We have seen that the six aforementioned factors are closely linked to the specific conditions of the society in question. This means that vulnerability itself is firmly rooted in the characteristics of the area. In other words, the way in which a community is vulnerable is not automatically the same as that of its neighbouring community. This is particularly evident when we compare a Southern community with a Northern one, but is also often true within these regions themselves. First, because the natural hazards incurred are not necessarily the same, since local characteristics may shape the consequences of the major climate trends – which generally cover fairly large regions – in a very specific way. Next, because communities will not inevitably have the same reaction since this depends on their spatial organisation, their relationship with the area, and their experience of the hazard, etc. Thus, not all communities will be as resilient, either in terms of their effectiveness or their mechanisms. In the same sense, the ability of communities to think ahead, and therefore to develop and implement adaptation strategies, may vary greatly over sometimes relatively short distances. This is typically the case in urban systems, where population groups with very different characteristics live side by side. It is also the case in a number of archipelagos. But, paradoxically, the specific vulnerability of a local area and its adaptive capacity also depend partly on development choices and decisions made at a higher level, generally either regional or national. Factors such as economic diversification, political-institutional structuring or living conditions: all convey this idea. We must therefore conclude that the vulnerability of a specific community, and even more so its adaptation strategies, are linked to a number of spatial scales. It is therefore counter-productive to plan adaptation in a particular area without considering macro-level patterns, just as it is pointless to plan adaptation at a macro level while disregarding local specificities.

The other common dimension concerns time scales. As we have seen, the level of vulnerability may vary over time, due not only to changes characterising the

natural hazards, but also to the implementation of effective adaptation strategies. Thus, analysing the vulnerability of an area at a given time means that findings must be put into a historical context, into a certain temporal depth, since for the same level of vulnerability, the threats will be different in a society whose vulnerability has been increasing for several decades and in one where efforts are reducing vulnerability over time. This observation is all the more true for adaptation, since a solution that may seem appropriate today in view of climate change may not necessarily be so in the long-term (because it generates additional greenhouse gas emissions, for example). Conversely, a long-term strategy based on an economic transition, for example, may appear in contradiction to short-term objectives since the issues at stake may be different. This long-term strategy nevertheless remains essential to anticipating the consequences of climate change. The main challenge for adaptation therefore lies in the ability of an area to find a compromise between the short term and the long term, in other words to make clear-cut choices and to stick to them over time.

Conclusion: different types of vulnerability, different types of adaptation

Three major conclusions may be drawn from this text: *(i)* vulnerability and adaptation are inseparable concepts, *(ii)* their mechanisms are based on contextual specificities, and *(iii)* the implementation of vulnerability reduction and adaptation strategies covers many different spatial and temporal scales.

Indeed, it is necessary to *(i)* simultaneously develop strategies for vulnerability reduction and adaptation to climate change, as they interact considerably, each being the subject of the other. Moreover, given the fact that vulnerability and adaptation are influenced by common factors, *(ii)* the specificities of local areas must be taken into account

when planning adaptation. Experience in many different fields, from the transfer of competence to the importation of exogenous models, has now largely shown its limitations, and the prospect of adaptation to climate change clearly provides an opportunity to avoid repeating past mistakes. Finally, although it may appear to contradict the previous point, *(iii)* any action in favour of vulnerability and adaptation is based on the ability of planners to put case studies into a broader spatial and temporal context. This can only be achieved by putting into perspective first local specificities in relation to regional and national or even international patterns, and second, short-term challenges in relation to long-term ones and vice versa.

With this in mind, we believe it is not necessarily judicious to systematically attempt to compare different situations, even if in certain contexts, such as international negotiations or national public policy-making, the comparative approach has its advantages. It is nevertheless also important to be aware of its limitations, which are not necessarily contradictory given that they actually concern different levels for addressing vulnerability and adaptation issues. Beyond this methodological aspect, the other advantage of accepting the fact that there are different types of vulnerability and adaptation is to counter the widely held view that communities in developing countries are more vulnerable to climate change than those in developed countries, largely because they have lower adaptive capacities. This is in fact a purely economic and technological approach to the question of adaptation, which is not in line with the diverse range of influencing factors highlighted in this document. This diversity implies on the contrary that developing and developed countries do not have the same type of adaptive capacity, and there is nothing today to say which is generally speaking the more robust. ■

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