



COASTAL ZONES

SOLUTIONS FOR THE
21ST CENTURY



EDITED BY
JUAN BAZTAN, OMER CHOUINARD,
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JEAN-PAUL VANDERLINDEN AND LIETTE VASSEUR

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Juan Baztan
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Liette Vasseur



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Part I

Facing the Challenges

Chapter 1

Paradigm Shifts, Coastal Zones, and Adaptation to Fast-Paced Change: Moving Toward Transdisciplinary Community-Centered Approaches

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INTRODUCTION

If one projects oneself further into the twenty-first century, taking stock of what is known today about the future, one quickly recognizes the need to develop new strategies to face the rapid changes that coastal areas will be going through. Adaptation, at a pace rarely known to humankind, may very well be the most challenging endeavor for coastal communities.

Using adaptation to climate change as a case study, we argue that a paradigm shift must occur. It is now necessary that knowledge creation transcends the traditional organization of science, and that this transcendence must be locally driven, implemented, and translated into policies.

In order to achieve such a shift, the humanities in general, and environmental humanities in particular, should move to the forefront of adaptation science with, and for coastal communities. This leads to an apparently contradictory situation where the traditional organization of science should be

fading into the background while simultaneously the very categories associated with this organization must be acknowledged in order to mobilize the conceptual tools that were not sufficiently used in the past (e.g., environmental history, eco-philosophy, literature, performance studies, and ethics).

ADAPTATION TO CLIMATE CHANGE AS A CASE STUDY

The fight against climate change and its consequences has long focused on reducing greenhouse gas emissions—that is to say, mitigation. This may have further increased the pressure on coastal areas (e.g., off- or on-shore wind farms, shifts in transportation modes; see chapter 15 from Bremer et al.). However, with the realization that climate change and its impacts are inevitable, adaptation policies are occupying an ever-increasing space both in the science and policy spheres. This raises three challenges: adaptation is (1) a concept of uncertain form (Tubiana et al., 2010), (2) which deals with uncertainty, and (3) which calls for transdisciplinary analysis.

Why is adaptation to climate change still “a concept of uncertain form”? The definition proposed by the Intergovernmental Panel on Climate Change, the more consensual, is very generic and offers neither methodological nor political content: an “adjustment of natural systems or human systems when facing a new environment or a changing environment” (McTeggart et al., 1990), or an “adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities” (Adger et al., 2007).

Adaptation policies are difficult to define for three main reasons. The first refers to the temporal dimension of adaptation, thought to be a long process but which needs to be anticipated by a proactive approach. The second reason refers to the uncertainties surrounding the impacts of climate change, particularly at the local level on the coasts. The third reason refers to the evolutionary nature of the adaptation concept, which assumes a constant evolution, a continual readjustment of knowledge and choices. Beyond these difficulties, the conceptualization of adaptation itself remains unclear: it builds itself following the elaboration of public policies in the framework and modalities of action they put in place, and this empirical definition is often used to avoid a theoretical definition that would clarify its long-term goals. This leads to challenges in planning, and a quagmire of implementation procedures (Simonet, 2011).

Not only is adaptation a concept of uncertain form, it is a concept geared at dealing with uncertainty. One of the key challenges of adaptation is that adaptive actions are rooted in foresight exercises conducted under high levels of uncertainty. As such, these must be, but unfortunately seldom are, framed as part of coastal climate risk governance processes¹ (Renn et al., 2011). When

1. Risk governance may be defined as a systemic approach to the decision-making processes associated with risk (uncertain events associated with potential beneficial or harmful consequences), which seeks to reduce risk exposure and vulnerability by filling gaps in policy.

considered, adaptation becomes a unique locus for negotiating future pathways in order to act under uncertainty. Action under uncertainty involves, for the affected parties, resolving conflicting claims. These claims pertain to the communities' understanding of causal chains, to their assessment of pertinence, and to the expression of their values and norms (Renn, 2008; Touili et al., 2014). The ontology of adaptation is therefore closely linked with the uncertainty associated with the foresight-related content of the concept, and leads to the existence of plural perspectives—all equally legitimate, but none in a position to grasp the concept in its entirety. This reinforces the need for the development of robust conceptual foundations.

Finally, adaptation calls for transdisciplinary analysis mobilizing environmental humanities. Adaptation's theoretical grounding has revolved essentially around the analysis of potential hindrances to adaptive processes. These challenges include lack of precise knowledge on the future of local and regional climate regimes, lack of understanding of these future climate regimes by local and regional populations, misunderstanding of the economic cost and benefit of adaptation strategies, discrepancies between national governance cultures and local collective action, and "social" limits and values including "fairness." The length of this list, which is by no means exhaustive, may be explained by the fact that almost every discipline may contribute to the understanding of adaptation, thus leading to a constant redefinition of adaptation's conceptual content. This clearly indicates that adaptation as a concept transcends disciplines and calls for transdisciplinary analysis (Blanchard and Vanderlinden, 2010).

These three characteristics indicate that some of the knowledge base necessary to domesticate adaptation is not limited to the natural and social sciences. Philosophy (as the art of inventing concepts and giving them meanings), environmental history (as the source for understanding the historical embeddedness of the dialog between nature and culture), and performance studies (as the study of the deep equivalence of words and actions), to name a few, seem all to be needed in order for adaptation to be thought of in a way that is attuned to its characteristics.

Yet, adaptation to climate and environmental changes has only recently become a research topic relevant to many of the humanities. From the late nineteenth century, the term has primarily referred to biological theories of evolution, meaning the modification of a living organism according to its environment, or its situation (Darwin, 1859). Since then, this concept remains one of the most discussed and complex in biology (Pradeu, 2011). The term, like "resilience," remains borrowed from the natural sciences, and only made a late appearance in the social sciences (late twentieth century). More recent works put climate change in relation to social change, but they rarely use the concept of adaptation, except in the particular case of natural disasters. As a result, hazards are treated as an external feature of societies, avoiding genuine political and social thought about the real meaning of climatic threats in everyday life.

Today is about simultaneously seizing environmental change and social change in their evolutions and multiple interactions. However, the humanities have largely acted with reluctance to this proposal and to the concept of adaptation. Durkheimian sociology was built on the rejection of *circumfusa* and relies on the deeply entrenched belief that only social processes and structures can produce social processes and structures (Durkheim, 1893, 1894). Vidalian geographers and Annales historians avoided anything that might resemble a form of environmental determinism (Friedman, 2004). Yet we argue that now the humanities must be involved.

MOVING TOWARD THIS PARADIGM SHIFT: A GAP ANALYSIS AND ASSOCIATED RATIONALE

In our research, we have identified several key gaps that need to be addressed. The first gap lies within the need to redefine our understanding of how words, speech acts, and a particular category of these—the words and discourse produced by science—change reality upon their utterance. If we want scientific discourses on change (i.e., climate change), to change the way one sees the planet, we must find a way to convey that the planet has changed. We want words to act. How does one “do things with words”? From Austin’s initial lectures (Austin, 1962) and his associated definition of performatives, where “the issuing of the utterance is the performing of an action,” the concept of performativity has been explored in various fields: identity (the most famous instance lies in the works on gender by Butler, 1990, 1997), contextualization of speech acts (Austin, 1962; Searle, 1979), performance studies (Parker and Sedgwick, 1995), and science’s capabilities to influence the world (MacKenzie et al., 2008). If we want the knowledge on changes to convey the changing nature of coastal areas and to act on coastal futures, we need to mobilize the progress made on these fronts within our specific context. The gap we need to fill is thus associated with taking fully into account how knowledge as “embodied performance” (Gil, 2008) may, through the analysis of change, past, present, and future, lead to a dynamic co-evolution of the planet we inhabit and the societies in which we live.

The second gap, closely associated with the first one, is the need to re-explore the way science-based scenarios, as “narratives giving a memory of the future” (Rasmussen, 2008) may be framed as stories and turned into performance, thereby modifying the very fabric of our world. Scenario planning has a long history, and has focused through time on building narratives geared at giving people and institutions a window on the unforeseeable future (Vanderlinden, 2015). Scenarios are hybrid forms; they are rooted in science, but are carried by hypotheses that do not need to be scientific per se, and conveyed by stories, or narratives. Some scenario exercises lead to genuine changes in policies, changes in daily practices, or enhanced adaptive capacities; others fail to do so. How can a science-based—but not only science-based—scenario push people to move today? How can a science-based scenario enable people to grasp the need to

change and act? How can a science-based scenario change the world? What are the characteristics of “successful” narratives of change?

A third gap lies in the mobilization of environmental history. One of the central shortcomings of most approaches dealing with the analysis of change and human society’s responses to change may lie in the great nature–culture divide. Environmental history is one field of the humanities closing this divide through extensive bridge-building between natural sciences and the humanities (e.g., [Quenet, 2015](#)). The systematic mobilization of environmental history will lead us to collectively see adaptation as a capacity of translation and enrollment, of connecting environmental changes and social changes thanks to multilateral negotiations in a material field of constraints. This will give us a window on the past that is precisely attuned to the challenges of adaptation for the future.

Finally, combining the three elements presented above leads us to a final gap, which lies in the empirical application of the promises associated with Latour’s “Compositionist manifesto” ([Latour, 2010, 2011](#)). Rooted in the fact that the divide between nature and society (matters of fact and matters of concern) cannot be taken for granted anymore, compositionism stresses that things have to be put together while retaining their heterogeneity. If nature is not already assembled, the scientific facts of the matter have to be constructed and an assembly is necessary to compose a common world through arts and politics.

IMPLEMENTING SUCH A PARADIGM SHIFT: THE ARTisticc PROJECT

This gap analysis led the authors and several other colleagues to develop a project geared at initiating the process: the ARTisticc² (Adaptation Research: A Transdisciplinary Community and Policy-Centered Approach) project. ARTisticc has been designed to experiment with the paradigm shift described above in seven coastal communities: Uummannaq (Greenland), Tiksi (Sakha Republic/Russian Federation), Wainwright (Alaska, USA), Cocagne-Grande-Digue (New Brunswick, Canada), Bay of Brest (Brittany, France), Mbour (Senegal), and the Kanyakumari district and Nagapattinam regions (India). At these sites, the communities themselves will assess their science-based scenarios of the future. For each field setting, current adaptation will be identified with the participating coastal communities, and the analytical focus will be on the evolution, or lack thereof, of local institutions intertwined with noninstitutional or nonlocal forcing. Within each community, a past adaptation will be analyzed through the lens of environmental history. Depending on local specificities, a local artist or craftsperson will translate the scientific results into meaningful local artwork (through storytelling, playwriting, photography, local crafts, film, etc.). All of

2. ARTisticc is funded through the participation of the Belmont Forum International Opportunity Fund, and national funding agencies from France, USA, Canada, Russia, and India. Their contributions are gratefully acknowledged.

the project's outputs will thereafter be assembled, and composed, in order to confront policymakers with the results achieved.

CONCLUSIONS

The pace of change that coastal communities will be facing later in the twenty-first century calls for a shift in the way we construe, scientifically and socially, the adaption discourse. While natural and social sciences have been used in the past, the humanities and arts have been somehow less present. We argue that this is a major shortcoming of adaption as a scientific subject. Solutions to twenty-first century coastal challenges should, and hopefully will, include the arts and humanities.

REFERENCES

- Adger, W.N., Agrawala, S., Mirza, M.M.Q., Conde, C., O'Brien, K., Pulhin, J., Pulwarty, R., Smit, B., Takahashi, K., 2007. Assessment of adaptation practices, options, constraints and capacity. In: Parry, M.L., Canziani, O.F., Palutikof, J.P., Van Der Linden, P.J., Hanson, C.E. (Eds.), *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, pp. 717–743.
- Austin, J.L., 1962. *How to Do Things with Words: The William James Lectures Delivered at Harvard University in 1955*. Oxford, Clarendon.
- Blanchard, A., Vanderlinden, J.-P., 2010. Dissipating the fuzziness around interdisciplinarity: the case of climate change research. *Surv. Perspect. Integr. Environ. Soc. (S.A.P.I.E.N.S)* 3 (1). Available from: <<http://sapiens.revues.org/990>> (03.02.15).
- Butler, J., 1990. *Gender Trouble: Feminism and the Subversion of Identity*. Routledge, London.
- Butler, J., 1997. *Excitable Speech: A Politics of the Performative*. Routledge, London.
- Darwin, C., 1859. *On the Origin of Species by Means of Natural Selection*. John Murray, London.
- Durkheim, E., 1893. *De la Division du Travail Social*. Félix Alcan, Paris.
- Durkheim, É., 1894. Les Règles de la méthode sociologique. *Rev. Philos.* 37 (38), 465–498.
- Friedman, S.W., 2004. *Marc Bloch, Sociology and Geography. Encountering Changing Disciplines*. Cambridge University Press, Cambridge.
- Gil, S.P., 2008. Knowledge as embodied performance. In: Gill, S.P. (Ed.), *Cognition, Communication and Interaction*. Springer, Berlin, pp. 3–30.
- Latour, B., 2010. An attempt at a “compositionist manifesto”. *New Lit. Hist.* 41 (3), 471–490.
- Latour, B., 2011. *Waiting for Gaia. Composing the Common World through Art and Politics*. Lecture given for the launching of SPEAP. French Institute, London.
- Mackenzie, D., Muniesa, F., Siu, L. (Eds.), 2008. *Do Economists Make Markets? On the Performativity of Economics*. Princeton University Press, Princeton.
- Mctegart, W.J., Sheldon, G.W., Griffiths, D.C. (Eds.), 1990. *Climate Change: The IPCC Impacts Assessment*. Australian Government Publishing Service, Canberra.
- Pradeu, T., 2011. Philosophie de la biologie. In: Barberousse, A., Bonnay, D., Cozic, M. (Eds.), *Précis de philosophie des sciences*. Vuibert, Paris, pp. 378–403.
- Parker, A., Sedgwick, E. (Eds.), 1995. *Performativity and Performance*. Routledge, London.
- Quenet, G., 2015. *Versailles une Histoire Environnementale*. La Découverte, Paris.

- Rasmussen, L.B., 2008. The narrative aspect of scenario building—how story telling may give people a memory of the future. In: Gill, S.P. (Ed.), *Cognition, Communication and Interaction*. Springer, Berlin, pp. 174–194.
- Renn, O., 2008. *Risk Governance: Coping with Uncertainty in a Complex World*. Earthscan, London.
- Renn, O., Klinke, A., Van Asselt, M., 2011. Coping with complexity, uncertainty and ambiguity in risk governance: a synthesis', *AMBIO. J. Hum. Environ.* 40 (2), 231–246.
- Searle, J., 1979. *Expression and Meaning: Studies in the Theory of Speech Acts*. Cambridge University Press, Cambridge.
- Simonet, G., 2011. L'atelier « H » ou la représentation de l'adaptation dans l'élaboration du plan climat de Paris. *VertigO* 11 (2).
- Touili, N., Baztan, J., Vanderlinden, J.-P., Kane, I.-O., Diaz-Simal, P., Pietrantoni, L., 2014. Public perception of engineering-based coastal flooding and erosion risk mitigation options: lessons from three European coastal settings. *Coastal Eng.* 87, 205–209.
- Tubiana, L., Gemenne, F., Magnan, A., 2010. *Anticiper pour s'adapter. Le nouvel enjeu du changement climatique*. Pearson, Montreuil.
- Vanderlinden, J.-P., 2015. 'Prévoir l'imprévu' *Ceriscope Environnement et relations internationales*. Available from: <<http://ceriscope.sciences-po.fr/environnement/sommaire>> (28.02.15).