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Outlook

WEAVING KNOWLEDGE: ROLES INVOLVED IN COORDINATING THE SCIENCE OF CLIMATE CHANGE ADAPTATION

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The sixth report of the Intergovernmental Panel on Climate Change (IPCC) (2022) states that the political commitments made at the Glasgow United Nations Convention on Biological Diversity (COP) in November 2021 are insufficient to contain global warming to the level of the Paris Agreement (below 1.5 °C). Beyond this threshold, our societies' will be progressively less able to cope with the impacts of a destabilized climate. Yet the international scientific consensus points to a range of adaptation and mitigation options whose feasibility and relevance have been demonstrated. How can we explain this discrepancy between ever more precise knowledge of present and future perils, and the actions actually taken to transform our societies? This pitfall, well identified in sociology, is being explored on several fronts, leading to the deconstruction of the representation of linearity between science and action.

One of these is the study of science–society interfaces, and more specifically, of the knowledge issues and relationships that arise and unravel at these interfaces. This article takes this perspective by showing, firstly, how "knowledge is not action" and why it's important to let go of a view that separates knowledge rather than weaving it together to respond to multidimensional problems. Secondly, based on the experience of a team[1] responsible for coordinating climate change adaptation science, we will highlight how the function and work of coordination helps weave knowledge that is conducive to action. In particular, we will discuss *coherence* and *mediation* roles that this implies. We will then look at this coordination as a process of *translation*, i.e., a shared cross-fertilization of the protagonists' interests in light of a common problem, which can lead to agreement if successful. Finally, this article argues in favour of professionalizing the coordination role and recognizing the expertise of its members.

1. This text has been proofread by the entire Ouranos adaptation science coordination team, whom I would like to thank.

Overcoming the Illusion of Linearity Between Science and Action

KNOWLEDGE IS NOT ACTION

Several scientific communities are increasingly producing precise and detailed knowledge of the causes and impacts of climate change. Climatologists, who are among the most active, have demonstrated the accumulation of greenhouse gases (GHGs) and their impacts on atmospheric temperature. This led to the establishment of the IPCC in 1988 and to the United Nations Framework Convention on Climate Change (UNFCCC) in 1992. Since then, warnings have been issued one after the other, and the economic, social, and environmental impacts have been quantified. It would be wrong to say that nothing has been done or that no action has been taken. For example, at this early stage of the climate problem, governments have agreed on a system of financial compensation from countries that have historically emitted GHGs to those at the front line of the impacts. However, the level of action undertaken since then has neither sufficiently reduced the causes of the problem (mitigation) nor protected human and non-human societies by anticipating the consequences of climate disruption (adaptation). Knowing does not imply acting accordingly, so this is a problem that calls into question the linearity between science and action.

Before the climatologists, another community was confronted with this stumbling block: alter-globalists, ecologists, and environmental scientists have long denounced the expansion of a development model based on natural- and energy-resource consumption and worker exploitation. Their experience, particularly in the field of environmental education, confirms that changing the practices or behaviours of a sector, profession, territory, or nation cannot be achieved by a one-off information transfer, even to a decision-maker (Ardoin et al, 2020). The main reason for this discrepancy between scientific knowledge and the effectiveness of action taken lies in the implications of environmental action as climate action. This is not just a matter of science but also of political choices, and it raises democratic issues, such as deciding who will bear the brunt of the effort and how constraints will be applied. Does this mean scientific knowledge is useless in the arena of implementation?

WEAVING KNOWLEDGE TOGETHER RATHER THAN SEPARATING IT

It is acknowledged that with a multidimensional problem such as climate or the environment, the challenge lies in weaving together the different types of knowledge

that will enable us to understand needs, seek operational responses, gain partners' support, and ensure that the end goal—the environmental or climatic ambition—is not lost from sight (Salles, 2006).

Among the obstacles to such knowledge weaving that have been identified are the deeply rooted cleavages, particularly in Western societies, for instance between theory and experience or science and action, which lead to the exclusion of scientific knowledge from the arena of implementation debates (by confining it to a diagnostic stage, for example). It also leads to a refusal to take into account actors' knowledge, thereby closing the door to scientific reflection. This separation of knowledge is often accompanied by influential presuppositions, such as that of conferring neutrality on certain types of knowledge (notably knowledge that is quantitative or derived from the physical and natural sciences), while a form of suspicion prevails about "non-academic" knowledge, such as that of Indigenous peoples, users, or professionals, which is relegated to the opinion level. One possible way of building links between forms of knowledge is to focus on developing "how to do—

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what to know" relationships (Schmitt and Avenier, 2007), which places the coordination function at the heart of the process.

Building Knowledge at the Borders of Communities

Ouranos[2], the Quebec consortium on regional climatology and adaptation to climate change, has chosen to dedicate a particular team to this coordination function. This team is responsible for maintaining the coherence of the organization, whose activities take place over different timeframes, and for providing interdisciplinary mediation to give substance to the science of adaptation. We will explain these two roles, of *coherence* and *mediation*, and then propose a complementary reading of this coordination work around a *translation* role. These three approaches show how knowledge is woven and constructed at the borders of communities of practice and research.

THE COORDINATION FUNCTION AT OURANOS: STRIVING FOR COHERENCE

The primary role of the Ouranos Adaptation Science Coordination (ASC) team is to maintain the organization's coherence. Indeed, the field of adaptation to climate change involves working on a wide range of subjects and in multiple configurations. Ouranos stands at the crossroads of different communities, and its mission is to bring these communities together on several occasions: as part of its structural scientific programming, during short-term projects, and sometimes in the wake of crises.

Moreover, Ouranos was founded following two major consecutive crises that made an impression on people as the 2000s approached: 1) the Saguenay deluge, a major moisture-laden low-pressure system that dumped more than 250 mm of rain in 48 hours on the regions surrounding the Saguenay River, and 2) the ice storm, a weather disturbance that lasted five consecutive days and dumped more than 100 mm of freezing rain in places, causing accidents and power outages. These events resulted in loss of life, physical, and psychological injuries, and considerable material losses. Confronted with this powerful reminder of the vulnerability of Quebec society, the Quebec government, Hydro-Québec, and Environment Canada created Ouranos. Their aim was to understand the role played by climate change in such events and to take advantage of the anticipatory capabilities of climate research tools to help prepare and protect Quebec society. Today, two types of funding guarantee its operation: core funding, which supports the consortium's orientations and personnel, and project-specific funding, which develops around research program's areas of focus[3]. This economic model enables the organization to absorb the time differences between its various activities, for example between the ongoing work of fundamental research in climatology and the support or consultancy projects commissioned by ministries or cities. As the organization grows, the ASC team's role in ensuring coherence becomes increasingly important.

COORDINATION : ACTING AS MEDIATOR

The ASC team (6 to 10 people) was formalized when the Ouranos scientific program was renewed in summer 2020, but their professional identity was built up over the years within the Vulnerability, Impacts and Adaptation Department that had coordinated the previous program.

2. This article is based on a research residency carried out in the ASC team at Ouranos, between September and November 2023.

3. 2020–2025 Adaptation Priorities| Ouranos

One of the key skills developed by its members is associated to a scientific mediation role, with climate science and political and socioeconomic partners, which are the two facets of interdisciplinarity that are essential to provide a science–society interface.

When it comes to adapting to climate change, building a continuum between climate science and public and private strategic decision- or choice-making seems obvious. However, it is still rare for political investment and planning to be based on different warming or impact scenarios. In France, it is only with the forthcoming energy-climate programming law that there are plans to integrate at least two IPCC scenarios[4].

As seen earlier, Ouranos' original purpose was to produce knowledge and tools from the climate sciences to address the concerns of communities of practice. To make sure we don't miss this target, the ASC team positions itself as the common interlocutor for these two hubs and facilitates discussion in a number of ways. One way is to link the climate science strategy to the adaptation programming developed with partners. Another takes place in "adaptation priority" consultation committees, which are made up of stakeholders outside academic research and include a climate scientist, paired with the person in charge of that priority from the ASC team. In this way, the science–society interface captures the stakeholders' initial concerns in their initial formulation. Then, the coordination team mediates to reformulate them into research needs or it serves as a space to learn theoretical elements from academic work.

THINKING ABOUT COORDINATION: A TRANSLATION ROLE

The two previous roles show how the function and work of coordination is exercised. We now focus on the expertise developed by coordinators, to emphasize that "experts are not simply users of knowledge, but transform the knowledge they mobilize, or even help to construct new forms of knowledge more suited to action" [*Translation*] (Crespin and Henry, 2015). To grasp how knowledge is transformed, particularly during the implementation of adaptation to climate change, the conceptual approach of translation in sociology (Callon, 1986) can provide elements. In summary, translation in this framework is defined as a process linking a problem to its resolution through a set of moves that the parties involved can agree to. These moves are the actors' re-readings of their own interests as discussions progress. In France, for example, such moves were documented in the case of the Rhône River's ecological restoration (Guerrin and Barone, 2020). This highlighted how protagonists with divergent interests, representing hydroelectricity, tourism, the environment, navigation, local authorities, and state agencies, came to agree on the idea of ecological restoration. The idea was proposed by one of the driving forces (the French Water Agency), without however setting a framework or strict rules, leaving space for *translation*. Taking on a translator's role means speaking several disciplinary languages and the language of communities of practice, to help decipher the problems to be solved. This entails a degree of diplomacy and trust, which the protagonists must be willing to allocate to the interpreter of their points of view, before they themselves, in the event of agreement, adopt the proposed interpretation and act as spokespersons for their peers. Acknowledging this aspect of the job could help improve the transition to action on climate change adaptation (and mitigation), as it involves bringing out formulations of the problem at the heart of social, economic, and natural realities. What's more, keeping a record of the paths taken by heterogeneous stakeholders toward a meaningful agreement could track the links between the initial interpretations of adaptation to climate change and the action actually taken, with a view to evaluating and analyzing the conditions for success or failure.

Conclusion

Fighting climate change means imposing a drastic and lasting constraint on the socioeconomic activities around which industrial societies have organized since the 19th century. This constraint will have to be negotiated, guided, and constructed with the help of knowledge weaving to ensure its relevance and deployment. One challenge in this process is coordination, as a means of making or breaking links between multiple, entangled interests. This resonates with analyses of *boundary planners* (in English in the text) (Goodrich et al, 2020), which point out that this coordination function is often performed as a task implicit in a core activity, without specific, meaningful, and collegial support (the Ouranos experience is original in this respect). Recognizing this role, particularly through professionalization, could be an important lever for effective collaboration between communities of practice and knowledge networks. Similarly, developing and recognizing the expertise and roles of these professionals, which goes beyond simply supporting the activity, will enhance their legitimacy and the chances of success of the processes they support.

4. L'adaptation entre dans une nouvelle ère - I4CE

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