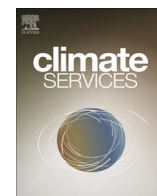




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Perspective

Conditions for a market uptake of climate services for adaptation in France

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ABSTRACT

This perspective paper reports the results of a collaborative survey of French research institutes concerned with environmental issues, which examined the potential for a market uptake of climate services for adaptation in France. The study is based on a review of existing reports on the market of climate services, and on interviews of 68 climate service providers and users in public and private organizations. Although the study does not allow to provide quantified estimations regarding the present and future size of the market, its results offer new perspectives with implications extending far beyond the sole case of France: first, while the market is still in its infancy, significant opportunities exist in sectors such as flooding risks, and, to a slightly lesser extent, hydro and nuclear energy and viticulture. In addition, the study identifies critical conditions for the uptake in climate services: (1) a coordinated delivery of data, information, expertise and training by public research institutes concerned with climate change and its impacts; (2) the inclusion of adaptation in the regulation and in public and private tenders. Finally, (3) uncertainties in climate projections appear as a major barrier to the uptake of climate services. However, ambitious greenhouse gas emission reduction as planned by the COP-21 Paris Agreement contribute to reducing this uncertainties by allowing users to select a subset of climate change projections, avoiding those for which adaptation is most problematic.

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1. Introduction

The fact that climate is changing due to anthropogenic greenhouse gas emissions has now become a consensus shared by a scientific community extending far beyond the sole climate researchers (e.g., Carlton et al., 2015; Cook et al., 2016). Some economic impacts have been observed already, for example in the sector of agriculture (Cramer et al., 2014), and some future impacts are now recognized unavoidable, even if an ambitious mitigation target is met. For example, it is well established that sea-level will continue to rise and increase risks of coastal flooding over the coming decades (e.g., Hallegatte et al., 2013), and that the ocean and coastal ecosystems and services will be severely affected by ocean warming and acidification (Gattuso et al., 2015). With 7bn inhabitants on the Earth, it appears essential to address these challenges seriously and, therefore, to engage ambitious adaptation strategies.

Adaptation to climate change refers to actions either aiming at coping with already ongoing climate change impacts, or focused on the anticipation of future environmental conditions. It not only requires technical infrastructures such as observation systems, climate models and portal, but also a significant amount of economic and human resources. In some sectors such as agriculture, the market has already developed an adaptive capacity to the adverse impacts of climate variability (Porter et al., 2014). However, this capacity remains often reactive and can often not be isolated from an adaptation to other drivers of change (Berrang-Ford et al., 2011). In addition, this adaptive capacity does not guarantee that adaptation to the specific issue of climate change will take place. As a consequence, the present market of climate services for adaptation cannot be considered mature enough to meet the societal needs for adaptation.

To finance this adaptation, a realignment of current investment fluxes is needed. The case of the developing countries reveals the magnitude of the “adaptation gap”, defined as the difference between the needs for investment in adaptation and the actual

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financing of these activities. In developing countries alone, the IPCC has evaluated that the needs for investment of adaptation should be as large as 60–90 billions Euros by 2030 (Chambwera et al., 2014), and might even be underestimated by a factor of 2 or 3 (UNEP, 2016). These figures show that the emergence of a market of adaptation is needed over the coming decade. However, we do not know what form the market for climate services will take. Development aid is clearly a necessary component in the case of the developing countries, which are the most vulnerable to climate change. Conversely, in France and other developed country, the emphasis is put on *creating the conditions* for a market of adaptation to emerge.

“Climate services for adaptation” are defined as all public and private services supporting adaptation to climate change (Hewitt et al., 2012; Brasseur and Gallardo, 2016). While climate services can be provided by both private and public sectors (Tompkins and Eakin, 2012; Bierbaum et al., 2013), environmental research organizations (which are often public) are expected to play a key role in this context: they should provide reliable data, methods and information in support to climate services. They should also support the setting up of new monitoring and modeling infrastructures, the transfers from research to innovation, and contribute to the training of the required human resources. To fulfill these assignments, public organizations need to understand their respective positioning as well as the economic environment in which climate services should emerge.

In 2014, the consortium of French organizations concerned with environmental research (AllEnvi) has mandated its Economic Intelligence department on these issues. This perspective paper reports the major outcome of this study, by examining the conditions under which climate change services could take off in France.

2. The French Common Strategic Analysis (FCSA) on climate services: Outlines

The economic system of climate services can be divided into several components (Fig. 1). First, “Data providers” deliver the fundamental observations and modeling results allowing the evaluation of past, present, and future changes. These datasets can be used directly by public authorities to raise awareness on climate change impacts and to favor adaptation. Between *beneficiaries*

and *data-providers*, the products delivered by *in-sector providers* can be sorted in three categories:

- (1) organizations designing added value products such as portals and tools providing impact assessment results (e.g., Lémond et al., 2011; Kjellström et al., 2016);
- (2) design of adaptation strategies and support for decision making on adaptation (e.g., Ranger et al., 2013);
- (3) education and professional training, which is expected to provide the human capacity to adapt to climate change and perform the transition to an economy more respectful for the environment (e.g., Gornish et al., 2013; Brasseur and Gallardo, 2016).

The FCSA first analyzed the two components of the ecosystems of climate services: service providers and users (Fig. 1). Then, it examined under which conditions the market of climate services could emerge in France. The sources of information are public reports and scientific articles, as well as two sets of interviews: (1) within 16 institutes that are members of AllEnvi in order to analyze the current offer; (2) within the semi-public and private sector in order to analyze the potential of a market uptake (39 interviews in 11 different European countries plus the USA). Finally, a more detailed analysis is performed for a selection of 4 sectors and 8 subsectors: Energy (including hydro, nuclear and renewable energies), management of the risks induced by flooding, agriculture: (viticulture and forestry) and transport (road and aerial transport).

The energy and transport sectors were selected because of their high level of connectivity to other economic sectors in France and the European Union. Any reduction of their productivity would propagate through the European economy. In addition, the risks due to water have the potential to have major impacts in the economy (Hallegatte, 2008; Hinkel et al., 2014). Finally, the viticulture sector is selected based on cultural and economic considerations. The sector of water resources was not directly analyzed despite its recognized importance for Europe (Kovats et al., 2014). However, it is indirectly considered through the analysis of agriculture and energy. This analysis is however not exhaustive and other sectors will be impacted as well (Arent et al., 2014). For example, the sector of tourism needs to adapt to reduced snow cover and increasing rates of sandy beaches erosion, however not necessarily

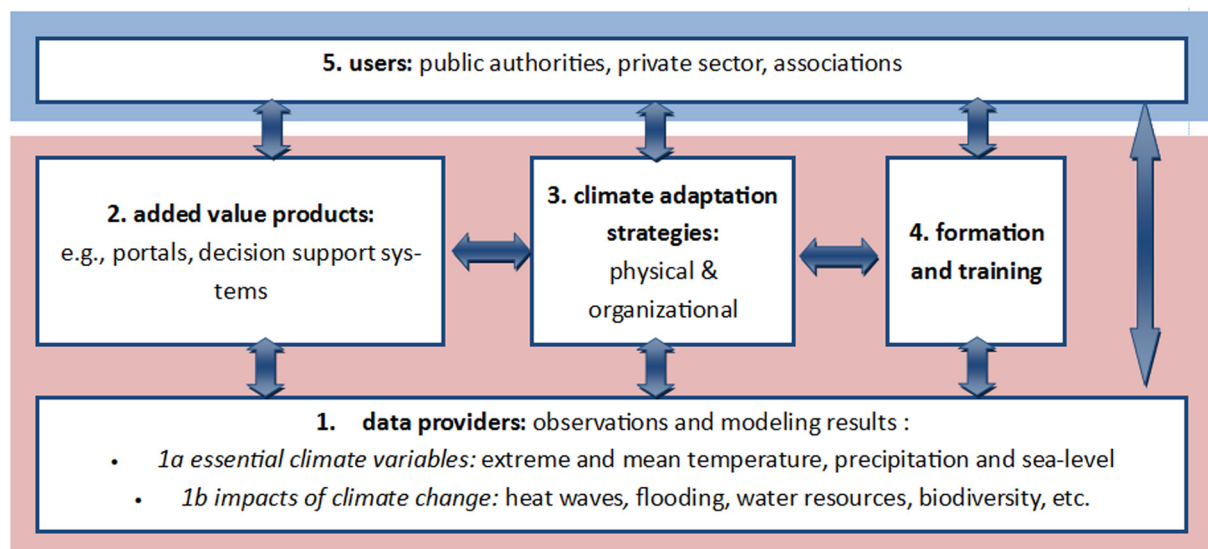


Fig. 1. Climate services providers and users and their interactions: simplified scheme after JPI-Climate (Monfray and Bley, 2016).

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