Social-ecological modelling as a boundary object to implement inter- and transdisciplinary approaches of forests in transitions

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Résumé

French forests are at the crossroads of multiple dynamics and expectations: while they are supposed to be managed to ensure multifunctionality, national policies mostly focus on their role of carbon sink as a remedy for climate change mitigation. Simultaneously, French forests are increasingly impacted by on-going climate change (droughts, heat waves, bio-aggressors, fires), which alters their functioning and survival – and raises adaptation issues. As a result, forest management is currently facing a key challenge: how can we promote forests' ability to maintain wood production and carbon sequestration, without impacting their other contributions (such as providing biodiversity habitats, air and water filtering, soil protection, leisures...), while also considering their sensitivity to climate change? This is the question addressed by the FISSA project (ForecastIng forest Socio-ecosystems' Sensitivity and Adaptation to climate change) – whose ultimate aim is to test complex forest management scenarios at national and local levels within three regional natural parks (Pyrénées Ariégeoises, Luberon and Morvan) – in a context of climate change.

FISSA has been designed to enlighten ongoing controversy, in this context of tensions between mitigation and adaptation strategies, between our multiple expectations regarding forests' roles, and regarding the practices to promote to respond to such a challenge. To do so, it relies on an interdisciplinary approach: while social sciences inform dynamics of discourses and practices through social surveys at both national and local levels, natural sciences assess the effects of different forest management and climate scenarios on forests' contributions through process-based models of forest dynamics and functioning. At the interface, transdisciplinary approaches are implemented to collectively define the management scenarios to be implemented both at local and national levels.

In this presentation, we highlight how inter- and transdisciplinarity are promoted in the project, and how they can shape the original assumptions of modelers. First, we discuss how this project ensures the inter- and transdisciplinary dialogue through diverse boundary objects, both conceptual (social-ecological system), methodological (participatory modelling) and practical (common field work and promotion of dialogue among the participants). Second, we illustrate the changes in the modelling process brought by inter- and transdisciplinary contributions. Qualitative surveys, focus groups and dialogue have shown that expectations

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towards modelling are multiple depending on the territories, the stakeholders involved and the considered scale: (i) nourish a scientific and societal debate and controversy around adaptation and mitigation, but also (ii) respond to an extreme and unknown event such as major forest diebacks; or (iii) anticipate a shift from traditional sylvicultural practices and inherited forests towards more desirable practices in the face of environmental and climate urges. We conclude on the interests and limits of participatory social-ecological modelling approaches to promote collective action in a context where uncertainties and tensions are unavoidable.

Mots-Clés: modelling, interdisciplinarity, participatory approach, multifunctionality, climate change.