

## **Social Learning for Climate Change Adaptation – Knowledge and Action across Scales and Levels**

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### **Abstract**

#### **Objectives**

The increasing emphasis of adaptation on the climate change policy agenda brings to the forefront the need for approaches of developing useful knowledge about local climate impacts and suitable adaptation strategies, and successfully transferring this understanding into practice. One key challenge of such efforts is the need for bridging various scales (e.g. the spatial, temporal, institutional, knowledge, and management dimensions of climate change adaptation) and levels along these scales. For example, developing suitable adaptation strategies requires complementing information about climate change impacts from global and regional assessments with local knowledge. Correspondingly, place-specific implementation most often relies on higher level institutional, scientific, and financial support.

The concept of social learning arguably has large potential for understanding and advising upon approaches for effectively facilitating such cross-scalar and multi-level co-production of knowledge and action. However, scientific inquiry at the interface between social learning and the issue of scale in climate adaptation is only just emerging.

This paper intends to contribute to these issues by shedding some light on two key questions: (1) how can social learning for bridging scales and levels be conceptualized, and (2) which lessons and guidelines can be provided for future initiatives for climate change adaptation?

#### **Methods**

To answer these questions, we develop a conceptual framework of social learning for bridging scales and levels in climate change adaptation, drawing on literature on learning in environmental assessments, sustainability science, and climate change adaptation, in particular. Additionally, we were interested in identifying key barriers for such bridging, and propositions for how they could be overcome.

The concept was applied in an empirical case study of the transdisciplinary development and implementation of a climate change adaptation strategy in the coastal region of the Broads, United Kingdom. The case study methods included document analyses and semi-structured interviews with representatives of the main stakeholders groups. The gathered empirical data allowed us to identify and map crucial incidences of knowledge co-production and application across scales and levels. From this “local adaptation narrative”, we assessed if and how social learning occurred, and success factors and barriers for overcoming the challenges for bridging identified in the literature.

#### **Results and Conclusions**

Social learning for climate change adaptation can be conceptualized as a long-term process of co-producing substantive and procedural knowledge by actors from different disciplinary backgrounds, scales, and levels. Key barriers for bridging scales and levels can be summarized as ignorance, mismatch, and plurality. Social learning can be initiated and supported through communication, translation, and mediation between the various relevant stakeholders and involves sensible management of the professional, administrative, and personal boundaries.

The landscape of the Broads, UK, is dominated by fens, marches, shallow lakes, and rivers, and exhibits a mosaic of land uses for agriculture, tourism, industry, and housing. The landscape's

high ecologic and recreational value and the large contribution of land-use and water-based activities to the local economy make the area very vulnerable to the assumed effects of climate change, including a temperature increase by 2-3 degrees within the next century, sea level rise, and derogations of sensitive freshwater habitats due to saltwater intrusions.

Our in-depth analysis of the climate change adaptation process of the Broads suggests that social learning across scales and levels has taken place within the last decades. Results of this learning include improvements in the available knowledge about possible local impacts and appropriate adaptation measures as well as working mechanisms for communication and collaboration. However, the case also supports findings reported elsewhere that social learning requires much time and resources.

The problems of mismatch, ignorance, and plurality improved through social learning, but more systematically targeted approaches are needed to make further progress. Institutional arrangements like the Broads Authority that both provide room for actors from various backgrounds to jointly collaborate in local adaptation efforts and bear decision making responsibility may play the crucial role of “boundary organizations” for facilitating learning. Key actors for managing the boundaries between domains and individuals seemed to be local leaders like scientists and managers who are well aware of emerging knowledge and policy initiatives at higher levels, and at the same time deeply rooted in local governance structures.

The paper closes with a reflection on key requirements that such boundary management institutions and individuals should fulfill, and proposes questions for future research.