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Research paper

The interplay between social learning and adaptive capacity in climate change adaptation: A systematic review

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ABSTRACT

Successful implementation climate change adaptation depends to a large extent on the capabilities of individuals, organizations, and communities to create and mobilize the adaptive capacity (AC) of their socio-ecological system. Creating and mobilizing AC is a continuous process that requires social learning (SL). Although rich with empirical cases, the literature theorizing and empirically investigating the relationship between AC and SL is highly fragmented. This paper aims to critically examine the peer-reviewed literature that focusses on SL and AC in the context of climate change adaptation (CCA). Special attention is paid to the interplay between the two. Understanding this interplay can help improve our understanding of how CCA takes place in practice and advances theoretical debates on CCA. Systematic review methods are used to analyse 43 papers (1997–2016). Our findings reveal three perspectives that each play an important role in different contexts: an AC-focused perspective, a SL-focused perspective, and a hybrid perspective. These differences in conceptualizations of the relationship between SL and AC may seem trivial at first, but they have consequences for the design of learning-based interventions aimed at helping communities respond to climate change. It appears that such interventions need to be preceded by an analysis of the climate change context in order to decide whether to emphasize AC, SL or both simultaneously.

1. Introduction

In both the world of policy and academia there is an increased recognition that adaptive capacity (AC) is crucial for societies to prepare for the adverse impacts of anthropogenic climate change (Williams et al., 2015). An integral part of the resilience of human systems is the AC of individuals, organizations, and communities to deal with stress. AC can be broadly understood as the ability of people and institutional systems to cope with incremental and rapidly changing conditions (Smit and Wandel, 2006). AC shapes, for example, actors' abilities to plan and to implement adaptation, as well as their capacities to overcome various types of socio-political constraints (Biesbroek et al., 2013). Successful implementation of adaptation depends heavily on the AC of individuals and of a community as a whole (Adger et al., 2005). Several authors, including Pahl-Wostl (Pahl-Wostl, 2009), argue that improving AC requires first and foremost the engagement of stakeholders at multiple levels and in different contexts to learn how to improve their AC.

Processes of social learning (SL) have been intensively studied in the natural resource management literature, particularly in relation to collective action problems (Keen et al., 2005; Pahl-Wostl et al., 2007; Wals and Rodela, 2014). For example, Christmann et al. (Christmann et al., 2015) showed that SL is crucial for facilitating and building community capacity. Because collective action problems require the involvement of multiple stakeholders with a diversity of values and perceptions across scales (Ostrom, 2007), the emphasis is often on forms of collective learning rather than on individual types of learning. We can broadly define SL as "…the process by which societal actors interact and develop alternative perspectives on a societal issue" (Bos et al., 2013, p.399).Various related concepts used in the literature, such as collective learning, joint learning, or group learning, refer to similar mechanisms for helping multiple stakeholders understand and utilize one another's viewpoints, values, resources, and ideals with regard to collective actions. Ison (Ison, 2010) argues that SL at the collective level is considered particularly suitable for situations where the issues at hand are dynamically complex and about which there is systemic uncertainty. This is certainly true for efforts to adapt to the impacts of climate change.

There is a general consensus and convincing empirical evidence that AC and SL are intricately linked (Yuen et al., 2013; Raymond and

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Cleary., 2013). However, the current knowledge about the nature and influence of the interplay between AC and SL is fragmented across academic scholarship. Several studies have already demonstrated that increasing AC in practice is limited by knowledge gaps (e.g. Williams et al., 2015), and the lack of a sound conceptual base to understand learning in multilevel governance regimes complicates theoretical and practical advancements (e.g. Medema et al., 2014). A better understanding of the interplay between SL and AC can help to strengthen both. This is of particular importance in low and middle income countries where levels of both AC and SL tend to be low but are needed most, as many such countries are severely affected by climate change (Pelling and High., 2005; Adger, 2010).

This study therefore aims to critically examine the interplay between SL and AC in the context of climate change adaptation (CCA). A better understanding of this interplay in a practical sense can help determine whether emphasis needs to be placed on SL, AC, or both simultaneously. Understanding this interplay can also help to elucidate how CCA takes place in practice and to advance theoretical debates on adaptation issues (Swart et al., 2014). Three research questions (RQs) are central in our review of the literature:

a How are the concepts of SL and AC understood in the literature on CCA?
b How is the interplay between SL and AC conceptualized in this literature?
c Are there conditions which favour a particular type of interplay?

A systematic review method is used to explore the interplay between SL and AC as well as to find the implications of different types of interplay to help communities to respond to climate change. The paper is organized as follows. Section 2 outlines the methodology of our systematic literature review and illustrates the different steps in implementing the review of scientific peer-reviewed articles. Section 3 presents the key findings. This is followed by a discussion in Section 4. The paper ends with a conclusion and highlights implications for future research and practice.

2. Systematic review methodology

Systematic literature reviews are common in many fields of inquiry, most noticeably in health research, and have increasingly been used in environmental studies on issues such as water policy (Gallego-Ayala, 2013), CCA (Ford et al., 2015), and food security (Candel, 2014). Compared to traditional methods, systematic reviews allow for more transparency and reduce reviewers' selection and interpretation bias (Petticrew and Roberts, 2006). We have drawn on the methodologies of, e.g., (Ford et al., 2011; Biesbroek et al., 2013; Candel, 2014) to construct our systematic review methodology. Fig. 1 shows the different steps undertaken in this review; these are briefly discussed below. More details of the review methodology can be found in the supplementary material (SM).

2.1. Selection of search terms and databases

To identify the key search terms, we carried out an initial search for publications that mentioned both SL and AC. From this, we identified a number of concepts that are strongly related to SL, AC, and climate change (see SM 1). The academic literature was searched using combinations of these search terms in the databases of Elsevier Scopus, Thomas Reuter Web of Science (WoS), and CAB Abstract. These databases were included because of their coverage across the subjects and to prevent either European (Scopus) or American (WoS) bias in the selection of reviewed articles (Biesbroek et al., 2013). The search configurations were designed on the basis of specific database characteristics (Table 1).

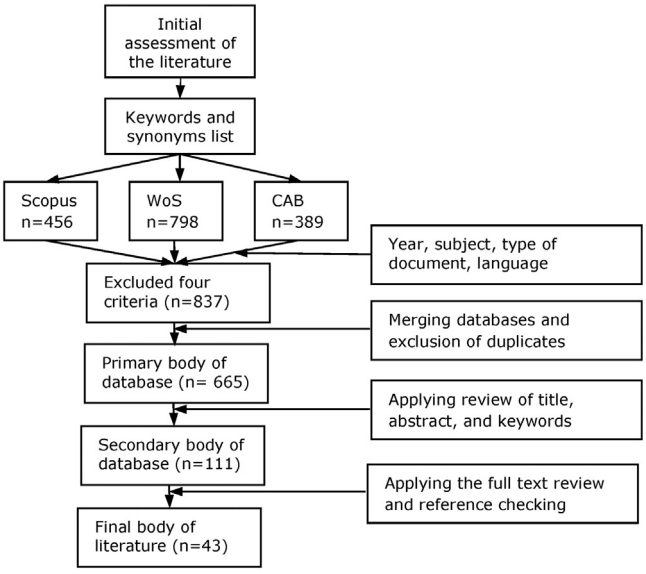

Fig. 1. Data collection for the systematic review process.

2.2. Inclusion and exclusion criteria

Several inclusion and exclusion criteria were used to limit the scope of the search. Firstly, the inclusion of eligible papers was limited to the period between 1997 and 2016. The year 1997 was selected as the starting point because the Kyoto protocol was adopted that year, and around that time, some of the first articles using SL and AC building in the context of natural resource management appeared. Secondly, subject areas included only environmental and social sciences. Thirdly, only peer-reviewed and electronically available journal articles written in English were selected. This means that articles in other languages or in the form of books, book chapters, or grey literature were in principle not included. When the results from the searches in the three databases were merged and overlaps between Scopus, WoS, and CAB Abstract were excluded, the database contained 665 articles.

In the next step, manual scanning of titles, abstracts, and keywords allowed us to progressively focus. Articles relating to SL and AC in the context of CCA were included. Articles not relating to CCA were excluded, for example papers on mitigation, REDD, energy, tourism, industry, health, or environmental modelling (Table 2). This resulted in 111 possibly eligible articles, of which the full texts were downloaded and read. We then narrowed down the sample size some more by including only papers that focused on SL at the *collective* level: articles that targeted the *individual* level, such as formal learning, individual learning, or cognitive learning, were removed. These criteria resulted in 33 relevant articles. To ensure that our search included all key papers, we applied forward and backward reference checking (Candel, 2014), and this led to 10 more articles. Therefore, the final selection yielded 43 articles for this review. This was a time-intensive process, but it ensured a rigorous step-by-step analysis of the literature.

2.3. Data extraction and evaluation of review findings

The full texts of the resulting 43 articles were re-read and hand-coded using a data extraction protocol (see SM 2): 1) each article was classified in terms of general information (author, year of publication, regional focus, thematic scope, level of research, orientation of research); 2) the dimensions of SL and AC (definition, key influential factors reported); and 3) the way of presenting the interplay between SL and AC, as well as the enabling and constraining conditions. The data extraction table (see SM 3) presents the results literally to ensure that all the summary descriptions of the reviewed articles can be traced (to one single document source) in an easily accessible manner (Candel,