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Factors affecting rural landholders' adaptation to climate change: Insights from formal institutions and communities of practice

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ABSTRACT

This study explores the factors affecting rural landholders' adaptation to climate change from the perspectives of formal institutions and communities of practice. Semi-structured interviews were conducted with formal institutions (e.g. South Australian government agencies) and communities of practice (e.g. farm systems groups) within two natural resource management regions in South Australia. Both groups noted that rural landholders autonomously adapt to a variety of risks, including those induced by climate variability; however, the types and levels of adaptation varied among individuals as a result of variety of barriers to adaptation. The lack of communication and engagement processes established between formal institutions and communities of practice was one major barrier. The paper presents and discusses a model for transferring knowledge and information on climate change among formal institutions, communities of practice, trusted individual advisors and rural landholders, and for supporting the co-management of climate change across multiple groups in rural agricultural areas in Australia and elsewhere.

1. Introduction

The extent to which climate change adaptation is occurring in society is a topic of current interest to global change scientists and practitioners. For the purpose of this study, adaptation is defined as "adjustments in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities" (IPCC, 2011, p. 72). There is some evidence to suggest that adaptation is occurring in human systems, encouraged by research and the development of strategic plans, networks and legislation, awareness raising and training programmes in sustainability (Karl et al., 2009; Lemmen et al., 2008; Tompkins et al., 2010). However, the vast majority of studies report on incremental changes (Park et al., 2012), characterised by short-term and small-scale actions that reduce the losses or enhance the benefits of variations in climate (Kates et al., 2012; Pelling, 2010). Scientists and policy makers are now calling for transformational adaptation, which include those actions which are adopted at a much larger scale or intensity than current action, and those that are new to a region (Kates et al., 2012). The components of transformation may include technological innovation, institutional reforms, behavioural shifts and cultural changes (O'Brien, 2012).

To realise such transformational change, greater emphasis needs to be placed on the factors which encourage or discourage the implementation of adaptation measures across multiple groups and scales of management, including at a place, in a region, or by a sector (Arnell, 2010). Whilst significant research attention has been paid to the individual barriers and drivers of climate change adaptation (e.g. Lorenzoni et al., 2007; Moser and Ekstrom, 2010), few studies have considered how adaptation occurs across multiple levels in society (Berrang-Ford et al., 2011). A collective approach to adaptation across different actors in society is important considering that barriers to adaptation to climate change are prevalent across multiple actors, including individuals, groups and institutions (Adger et al., 2009).

Two actors of interest here are formal institutions and communities of practice. Formal institutions are groups which follow rules and procedures that are created, communicated and enforced through channels widely accepted as official, such as courts, legislatures and bureaucracies (North, 1990). A government agency responsible for regulating natural resource management is one example of a formal institution in this context. This definition of institutions contrasts with that in the complex literature on socio-ecological systems, which defines it in terms of a set of rules defining specific actions, outcomes or states (see Ostrom, 1986). A community of practice refers to informal structures brought

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together through the social construction of knowledge (Buysse et al., 2003; Nicolini et al., 2003). Building upon seminal work by Wenger (2000), Koliba and Gajda (2009) suggest that a community of practice exists when: members share a similar set of interests, expertise, roles and goals; opportunities exist for members to interact with one another through both formal and informal spaces; and groups share a common practice or set of practices.

Farm system groups are one example of communities of practice. They exist to trial new agricultural technologies and disseminate agricultural research and development findings to their members (Gianatti and Llewellyn, 2003). Members pay a nominal annual fee to attend monthly meetings and social gatherings, and receive the best available knowledge of farm improvement technologies including new crop varieties, soil moisture tests, new machinery, and animal and plant control measures. Each group generally employs at least one project officer to coordinate field trials and to be the conduit between the group's board and its members. Research generated through these groups is perceived to have relevance to increasing its effectiveness and value, as opposed to generalised information found, for example, on the internet (Llewellyn, 2007). Hereafter, this paper uses farm system groups and communities of practice interchangeably.

This study aims to explore the factors which encourage or discourage rural landholders' adaptation to climate change from the perspectives of formal institutions and communities of practice, and then to use the results to build upon Berkes' (2010) model of devolution and adaptive co-management (Fig. 1) which can be used for engaging multiple actors in adaptation planning. It is guided by the question: what characteristics of individual or group dynamics discourage or encourage adaptation to climate change within the agricultural sector? To enable a broad spectrum of viewpoints, semi-structured interviews were conducted with formal institutions and communities of practice involved in the primary production sector in the Eyre Peninsula and Northern and Yorke natural resource management regions of South Australia. Actors from formal institutions included representatives from South Australia government departments, agronomy agents and consultancies, and financial institutions, and representatives of communities of practice included independent farm consultants and community-based farm systems groups with a known interest in or influence on climate change adaptation policy and programmes. Grounded theory analysis was employed (Strauss and Corbin, 1990), reflecting the lack of concrete theory for measuring constraints to and opportunities for climate change adaptation from the perspective of these two groups. NVivo8 qualitative analysis software was used to code interview responses into constraints and opportunities in relation to the creation and sharing of knowledge and information on climate change.

1.1. Barriers to climate change adaptation

Barriers are "obstacles that can be overcome with concerted effort, creative management, change of thinking, prioritisation, and related shifts in resources, land uses, and institutions" (Moser and Ekstrom, 2010, p. 2027). They can be broadly categorised as normative; cognitive, and; institutional structure and governance (Jones and Boyd, 2011). Normative barriers relate to the ways in which cultural 'norms' influence how individuals respond to climate stimuli, such as persistence with traditional forms of coping (Jones and Boyd, 2011). Cognitive barriers refer to how psychological and thought processes influence how individuals react to existing or anticipated climate (Jones and Boyd, 2011). They include: denial and apathy, helplessness, uncertainty and acceptance (see Adger et al., 2009; Stafford-Smith et al., 2011; Wolf et al., 2010); a lack of trust in and respect for experts and authorities (Gifford, 2011), and; lack of knowledge of climate change impacts and adaptation responses (Lorenzoni et al., 2007; Moser and Ekstrom, 2010). Institutional and governance barriers relate to how the organisation and structure of interactions influence how individuals are allowed to adapt to climate variability and change (Jones and Boyd, 2011). In this study, we argue that communication and engagement processes which exist between individuals, institutions and communities of practice are an important consideration in the institutional and structural barriers to climate change adaptation. In the following section we present a co-management framework for considering these processes.

1.2. A co-management framework for addressing barriers to climate change adaptation

Gupta et al. (2010) suggest that engagement factors relating to the provision of a variety of problem frames and the involvement of different actors, levels and sectors in the governance process are crucial to facilitating adaptation to climate change, in addition to leadership and financial and human resource factors. Involvement of different actors provides the basis for sharing of different forms

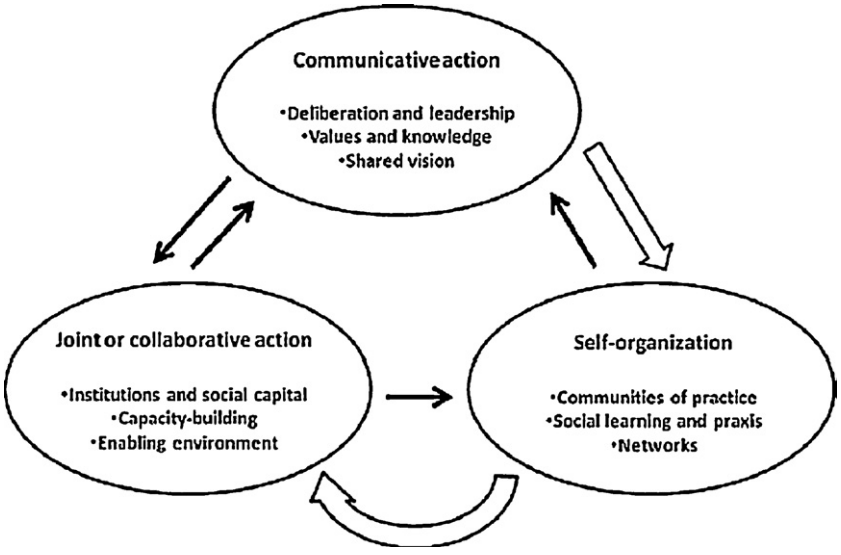

Fig. 1. Model showing the links between devolution of responsibility and co-management of natural resources (from Berkes, 2010).

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