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How to create and preserve social capital in climate adaptation policies: A network approach

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ABSTRACT

The processes and impacts of climate change require adaptation through what can be described as horizontal and vertical structures of actors' integration. In climate adaptation and natural resource management literature, this structural component is often related to social capital, which is defined in various ways but usually refers to a public good that is built and fostered within a network of social relations. While hypotheses about social capital in networks are well studied in network literature, here, I argue that they should be reflected and tested in the particular context of climate change adaptation policy. I ask: how do communities affected by climate change and the broad range of actors involved in the design of climate adaptation policies build social relationships? And, how do they manage to maintain those relations over time?

To answer these questions, climate adaptation policies in six Swiss mountain regions are investigated via social network analysis. Hypotheses about the creation and preservation of weak versus strong ties under the particular setting of Swiss federalism and climate-affected local communities are tested. Results confirm that the creation of weak ties, such as one-way information transfer, can lead to the establishment of mutual collaboration relations over time. Such mutual and reciprocal relations can then more easily be activated by local communities to produce both short-term responses and long-term solutions to climate change impacts.

1. Introduction

Climate change adaptation requires a particular policy design because the sources of the problem are often global; however, the effects of climate change are mainly regional and local in nature (Thompson et al., 2006; Wilbanks and Kates, 1999). From a normative point of view, this multi-level nature of climate change necessitates the integration of national, sub-national and local stakeholders regarding the design and implementation of adaptation policies (Roggero, 2015; Corfee-Morlot et al., 2011). The processes and impacts of climate change predominantly require such adaptation through what can be described as horizontal and vertical actors' integration (Arnold, 2015; Ghisetti and Quatraro, 2013). As a result, the question arises of how such multi-level adaptation structures are built and how they should look?

In climate adaptation and natural resource management literature this structural component is often related to social capital, which is broadly defined as a public good that can facilitate the exchange of resources and information among individuals integrated in the same community (Dasgupta, 2003; Ostrom, 1994). Network structures are then said to enhance the building of social capital: an important condition in climate change adaptation, which fosters a community's adaptive capacity by reducing its vulnerability (Sallu et al., 2010; Fleischman et al., 2010; Pelling and High, 2005; Adger, 2003). I follow Coleman's definition of social capital being a resource that is generated by networks of relationships that are characterized through reciprocity or trust (Coleman, 1990). The study of the creation and maintenance of such so-called strong relationships is not new in network sciences (Lazega et al., 2012; Newman and Dale, 2007), but what can be considered to be a research gap is the study of how and when such strong ties establish in the context of policy processes and climate change adaptation. I argue that there are still many opportunities for research to understand and empirically investigate social capital embedded in both network relations and climate change adaptation, and I ask: how do communities affected by climate change and the broad range of actors involved in the design of climate adaptation policies build social relationships? And, how do they manage to maintain those relations over time taking specific institutional and ecological aspects, such as power distribution among actors or the climate affectedness of different actors, into account?

To answer these questions, I adopt a threefold approach: first, I define social capital in climate change adaptation policy via a network perspective and identify actors (nodes) and their engagement in social relations (ties). Second, two crucial characteristics of social capital in climate change adaptation borrowed from social capital, network, and

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climate governance literature are introduced: (1) the establishment of strong (in contrast to weak) ties characterized by trust and reciprocation; and (2) the adoption of a long-term and procedural perspective. More concretely, in network literature (see Agneessens and Wittek, 2008; Snijders and Doreian, 2010; Schaefer et al., 2010) it is often argued, at least as a first step, that the establishment of weak ties (such as one-way information transfer) is easier than the establishment of strong ties (such as mutual collaboration). However, and to establish social capital in the sense of Putnam (2000), weak ties should lead to the establishment of strong ties (characterized by trust and reciprocity), and communities should be able to maintain those relationships over time. If those causalities between weak and strong ties, as well as relational stability, are well studied and established in the network literature, I argue here that they should be reflected and tested in the particular context of climate change adaptation policy. I critically discuss if the institutional and natural setting that climate change policies are embedded in impacts significantly upon tie formation and maintenance over time. Third, six regional climate change adaptation projects in Swiss mountain areas are investigated. This setting appears to be ideal for several reasons: first, those who depend most on natural resources are also most greatly affected by resource degradation, land use and climate change (Reed et al., 2013). Typically, those are local and regional communities, which is why I particularly focus on climate change adaptation policies introduced at the regional level. Additionally, and focusing on mountain regions, I consider a geographical area particularly hit by climate change impacts (IPCC, 2007; Messerli and Ives, 1997). It is furthermore argued that climate adaptation is multi-level in nature (Muñoz-Erickson et al., 2010; Ingold et al., 2010; Hooghe and Marks, 2003), and Swiss federalism accounts for this multi-level structure. Finally, and while keeping the overall institutional setting constant, I investigate the more general validity of the hypotheses by varying regional contexts (Southern versus Western Switzerland), policy domains (flood prevention, agriculture, and land use planning) and climate change impacts (heavy rain falls, floods versus droughts).

The paper is structured as follows: first, social capital is defined and its relevance to climate change adaptation is discussed. Then, the reasons for adopting a relational approach are outlined and hypotheses are deduced from the literature. In the following section, cases, data and methods are introduced and, in the analysis section, the results are presented. The paper concludes with a discussion of the hypotheses and the broader impact of social network analysis when investigating social capital over time and space.

2. Relevant Concepts

One reaction to climate change impacts is the creation of adaptation strategies and the introduction of political instruments and measures. Policies, political programs and projects can then take various forms, such as new infrastructure for flood prevention, irrigation plans, early warning systems for extreme events, or land use maps. But how, and via what type of decision-making and implementation processes, can these policies and measures be best designed and why does social capital seem to matter in this regard? Hereafter, I first outline the link between social capital and climate change adaptation policies before defining social capital through a network perspective and introducing the hypotheses.

2.1. The Relevance of Social Capital in Climate Change Adaptation Policies

Adaptation is made up of actions throughout society, by individuals, groups and governments. It can be motivated by many factors and can occur in different spheres, such as government or market spheres (see Adger et al., 2005: 77). The political system typically tries to produce adaptation strategies that aim at altering individuals' behavior and enhancing a society's adaptive capacity. Adaptation policies can be very different in nature, can be proactive or reactive; and introduced at the national, regional or local levels (Paavola and Adger, 2006). Here, I am interested in the processes of adaptation policy design and, more concretely, in the question about how to shape decision-making and implementation processes in a way that fosters the production of effective adaptation solutions that reduce communities' vulnerability and enhances their resilience (Reed et al., 2013). It is argued that all this is facilitated by social capital, which is conceptualized as exchanges, social networks and actions among individuals and organizations (Adger, 2003; Smit et al. 2001). The establishment of social capital in communities affected by climate change effects can serve as an important condition when creating adaptation strategies; it becomes particularly crucial when defining social capital as social relations (see next section), which can be mobilized to facilitate action (Adler and Kwon, 2002).

While most climate change adaptation is, at first glance, designed as short-term reactive policy, it's impact and perspective are intended to be long-term and strategic (Fleischman et al., 2010; Smit et al., 1996). Different climate adaptation studies (see Pelling, 2002; also Adger, 2003) have shown how the mere conceptualization of social capital incorporates this longitudinal perspective: the development and coevolution of social networks and norms – therefore processes, rather than snap-shots – fosters adaptive capacity and reduces a community's vulnerability. Timing appears to be crucial when one tries to observe positive impacts from social capital on the creation of effective adaptation policies: given prevailing uncertainties, only a longer-term perspective might be able to produce enough flexibility to adapt and re-adapt political interventions (Fankhauser et al., 1999: 68).

At this stage, one can conclude that social capital seems to be relevant in processes of adaptation, policy design and implementation. The above introduced literature further emphasizes the positive role social capital can play for the effective and efficient production of adaptation policies, mainly under two conditions: when social capital is (1) understood as network relations and social interactions among the actors included in climate adaptation policy design and implementation, representing various decisional levels and sectors; and (2) taking into account one longitudinal perspective needed to allow short-term reaction, but also long-term planning to cope with climate change impacts.

2.2. The Definition of Social Capital Adopting a Network Perspective

As mentioned above, social capital can be defined as a public good that can reduce transaction costs and facilitate the exchange of resources and information among individuals integrated in the same community (Melé, 2003; Dasgupta, 2003; Ostrom, 1994). It seems to be a crucial concept when one seeks to understand a community's development and the collective action of societies (Mohan and Mohan, 2002; Woolcock, 1998). But, as several authors have argued, the closer one looks, the more slippery or elastic its definition seems to be (Lappe and Bois, 1997: 119; see also Hirsch and Levin, 1999).

One method of enhancing clarity about the concept is to first define the level or perspective one adopts: while some scholars see social capital as a purely individual or intra-organizational concept (Agneessens and Wittek, 2008; Portes, 1998; Krackhardt, 1994; Coleman, 1990); others explore it on the collective level (Bourdieu, 1984). Putnam (2000) even tried to bring both perspectives together and defines social capital as mutually supportive relations in communities, which can serve as a valuable means of combating many social disorders (for more recent applications of this combined approach see, again, Agneessens and Wittek, 2008, and also Huitsing et al., 2012). Following this definition, social capital provides benefits to actors by enabling them to participate in social networks and larger structures (Newman and Dale, 2007). Those networks, besides being characterized by relations of trust and exchanges of resources and information, follow common rules, norms and sanctions (Lazega et al., 2012; Pretty, 2003).

Most social capital research that adopts a network approach concentrates on bonding or bridging ties (Newman and Dale, 2007; Sekhar,