



Linking multi-level governance to local common-pool resource theory using fuzzy-set qualitative comparative analysis: Insights from twenty years of biodiversity conservation in Costa Rica



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ABSTRACT

Understanding the relationship between multi-level institutional linkages and conditions influencing the likelihood of successful collective action has practical and theoretical relevance to sustainable local resource governance. This paper studies the relationship between multi-level linkages and local autonomy, a facilitating condition found to increase the likelihood of local successful collective action. A technique known as fuzzy-set qualitative comparative analysis (fsQCA) was applied to a longitudinal comparative data set. In the context of the decentralization of a protected area system in Costa Rica (1986–2006), it traced the emergence and endurance of autonomy among local institutions for biodiversity conservation. The technique illustrates which set of multi-level linkages combined in different ways, and at different points in time, to reach the same outcome (local autonomy). The findings show that a unique set of combinations of multi-level linkages led to the emergence of local autonomy among institutions for biodiversity conservation governance. In contrast, a more diverse set was associated with the endurance of local autonomy over time, suggesting that institutional diversity may play a more prominent role in the maintenance of institutional robustness than in processes of institutional emergence.

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1. Introduction

Over the last twenty years, scholars have made great strides toward identifying facilitating conditions for the emergence and robustness of successful collective action for local common-pool resource (CPR) governance (Agrawal, 2002). This quest has important implications for our understanding of processes of local and global change, such as the sustainability of vital ecosystem services on which humans depend for their livelihoods (Ostrom, 2005; Persha et al., 2011; Rockström et al., 2009). In moving forward, CPR scholars have pointed toward two areas in need of knowledge development. The first calls for a better understanding of how determinants of emergence and robustness of successful collective action combine with each other in particular contexts (Agrawal, 2002). Ostrom (2009), Rudel (2008), and Young (2002b), among others, have argued that scholars and practitioners need to think less about specific necessary conditions and more about

combinations of necessary and sufficient conditions in a diagnostic fashion. The second area of investigation seeks to understand how multi-level institutional arrangements (i.e., multi-level linkages) affect processes of local institutional change, such as emergence or robustness (Adger et al., 2005; Berkes, 2002; McGinnis and Ostrom, 2008; Young, 2002a).

This paper addresses both of these knowledge gaps by empirically examining how multi-level linkages can facilitate local processes of institutional change using a technique known as fuzzy-set qualitative comparative analysis (fsQCA) (Ragin, 2000). fsQCA allows the investigator to examine many combinations of multi-level linkages as potential conditions of necessity and sufficiency. I illustrate the approach through a longitudinal comparative study of the emergence and endurance of local autonomy for biodiversity conservation among local protected areas in the Central American country of Costa Rica.

Costa Rica is an ideal setting to study multi-level governance in the context of biodiversity conservation because of its demonstrated creativity in developing innovative relationships between local, national, and international institutions for biodiversity conservation purposes for more than twenty years (Boza et al., 1995; Evans, 1999; Gómez and Savage, 1983; Steinberg, 2001). For ten years, the central government promoted the decentralization

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of their protected area management system. In the subsequent ten years, the central government engaged in a recentralization effort. This policy change permitted an assessment over time of how multi-level institutional arrangements affected local institutions' efforts to develop and sustain their local autonomy, a factor often associated with successful resource self-governance.

This paper starts by reviewing insights from CPR theory leading to calls for developing diagnostic assessments, then provides key definitions describing measures used in the analysis and exploring the potential value of fsQCA as a diagnostic analytical tool. The findings provide an account of the types of multi-level interactions in Costa Rica that led to the emergence and endurance of local autonomy across time. Finally, the discussion focuses on how does a configurational analysis contribute to a better understanding of processes of institutional change and, what multi-level interactions influenced biodiversity conservation efforts in Costa Rica.

1.1. Theoretical background

1.1.1. Institutional change as processes of emergence and robustness

In the context of CPR theory, institutions are defined as shared understandings among actors about enforced prescriptions concerning what actions (or outcomes) are required, prohibited, or permitted (Commons, 1924; Ostrom, 1980). Institutional emergence involves the adoption or formalization of rule structures that only existed previously as norms or rules-in-use (Ostrom, 2000) or the adaptation or shift from an existing institution to a different or new institution (Ostrom, 1999). In institutionally robust or long-enduring settings, resource users usually have institutional arrangements in place enabling them to constantly fiddle and modify rule structures over time to adapt to changing conditions (Anderies et al., 2004; Janssen et al., 2007; Shepsle, 1989; Wilson, 2006). Institutional robustness does not imply that resource users will create optimal rules that remain unchanged over time (Ostrom, 1999).

Because these two broadly encompassing processes of institutional change affect the governance sustainability of common-pool resources, there has been significant interest in identifying conditions that can increase the likelihood of emergence and long-term robustness of institutions (Axelrod, 1984; Baland and Platteau, 1996; Berkes, 1989; McCay and Acheson, 1987; Olson, 1965; Ostrom, 1990; Wade, 1994).

Ostrom (1990, 2000) argued that a number of characteristics of the common-pool resource and of its appropriators are associated with an increased likelihood of the emergence of self-organization. Characteristics of the CPR included: feasible improvement, presence of indicators, predictability, and spatial extent, while characteristics of the appropriators included: salience, common understanding, low discount rate, trust and reciprocity, autonomy, and prior organizational experience and local leadership (see Schlager, 2004 for definitions). Alternatively, Ostrom (1990) proposed a different set of conditions (known as Ostrom's eight design principles) that could influence the likelihood that self-governing arrangements would be long-lasting: (1) clearly defined boundaries or exclusion rights, (2) congruence between appropriation and provision rules and local conditions, (3) most individuals affected by the operational rules can participate in modifying rules affecting them, (4) presence of monitoring arrangements where monitors are accountable to the appropriators or are the appropriators, (5) graduated sanctions applied to rule-breakers depending on the seriousness and context of the offense, (6) availability of rapid and low-cost conflict-resolution mechanisms, (7) the rights of appropriators to devise their own institutions without being challenged by external governmental authorities, and (8) appropriation, provision, monitoring, enforcement, conflict resolution, and governance activities are organized in multiple layers of nested enterprises.

Other scholars have identified different and somewhat overlapping sets of facilitating conditions (Agrawal, 2002; Pagdee et al., 2006; Cox et al., 2010; Gutierrez et al., 2010). Despite increased interest in the facilitating conditions for institutional emergence and robustness, there is still significant confusion about which facilitating conditions are necessary or sufficient, and in which particular contexts (Agrawal, 2002). Notwithstanding explicit warnings that policy solutions found in particular contexts do not constitute panaceas (Ostrom, 2007), conditions for the emergence and robustness of self-governance are often interpreted as necessary conditions or "blueprints" (i.e., they all need to be present or absent for the outcome to occur). As a way to move away from this "checklist approach," Young et al. (2008a) and Agrawal (2002) proposed focusing instead on *how different factors combine with each other in particular contexts*. Young (2002b) argued that an institutional diagnostic should be capable of treating each environmental problem as a unique case without losing some generalizability. The idea of a diagnostic approach has been embedded and developed further into a multi-tiered framework for the study of social-ecological systems (Ostrom, 2009). The social-ecological system (SES) framework can highlight the role that multi-level linkages play in generating CPR dilemmas, and the processes of collective action that can address those dilemmas (Heikkila et al., 2011).

Advancing understanding of the role that multi-level linkages play in the management of local CPRs requires better understanding of how such linkages interact with facilitating conditions (e.g., Ostrom's design principles) influencing the likelihood of collective action for institutional emergence and robustness. This is the goal of this paper. Further, I suggest that to adequately do the above, we also need to move away from the interpretation of facilitating conditions as conditions that must be present or absent for the outcome to occur – and toward the study of configurations of conditions. While the call for the study of configurational institutional analysis is not new (Cox, 2011; Heikkila et al., 2011; Rudd et al., 2003; Rudel, 2005; Schlager, 2002), the approach illustrated here relies on fsQCA – a tool designed to study configurational relationships.

1.1.2. Local autonomy

This paper examines how multi-level linkages affect local autonomy. Local autonomy is the key outcome of interest and particularly useful for our purposes because it is one of the conditions that is both mentioned as important for the emergence of self-organization as well as for it to be long-lasting (Hayes and Persha, 2010; Ostrom, 2005; Schlager, 2002). As a condition that can increase the likelihood of the emergence of self-organization, autonomy is defined as appropriators' ability "to determine access and harvesting rules without external authorities countermanding them" (Ostrom, 2000, p. 40). As a condition for the robustness of institutions, autonomy is defined as "the rights of appropriators to devise their own institutions [without being] challenged by external governmental authorities" (Ostrom, 1990, p. 90). The close relationship between both definitions makes it feasible to use autonomy as a dependent variable to study how multi-level linkages affect emergence and robustness (i.e., endurance herein) of local institutional autonomy. However, in itself, autonomy is not an indicator or measure of emergence or robustness of institutions.

In arguing how autonomy affects individual incentives to engage in the design and endurance of institutions, Ostrom (1990) pointed at how local appropriators' autonomy affected the costs of transformation to change their own rules; that is, the amount of resources devoted to the process of considering a rule change (Buchanan and Tullock, 1962). "The transformation costs of setting up a strictly private association of appropriators to discuss common problems are considerably less than the transformation

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