

DISSERTATION

GOVERNING COMPLEXITY: POLYCENTRICITY AND CUSTOMARY  
PROPERTY RIGHTS IN THE COMMONS

Submitted by

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## ABSTRACT

### GOVERNING COMPLEXITY: POLYCENTRICITY AND CUSTOMARY PROPERTY RIGHTS IN THE COMMONS

Broadly, this dissertation research examines natural resources governance approaches that may facilitate the achievement of desirable social and ecological outcomes. It takes, as its point of departure, a nearly half-century-old concept that is experiencing a renaissance among natural resources governance scholars: polycentricity, a complex and multilevel form of governance comprised of a plurality of semi-autonomous decision makers. Despite its age and apparent popularity, the concept of polycentricity remains conceptually fuzzy and empirically underdeveloped in the commons. This dissertation addresses these deficiencies through conceptual and empirical contributions to the growing scholarship on polycentricity.

In its conceptual contribution, this dissertation develops a theoretical model of a functional polycentric governance system for natural resources governance. For this purpose, “functional” refers to the capacity of the governance system to exhibit particular advantages that are commonly attributed to polycentric governance systems by scholars. In doing so, it builds greater clarity around the concept and the conditions under which it may lead to predicted or desired outcomes. This dissertation then examines the functioning of a polycentric governance system through a qualitative case study of small-scale fishery governance in the Northern Reef region of the Republic of Palau, a small island nation in the western Pacific. Deficiencies in institutional features are identified that partly explain why the governance system does not fully achieve the advantages commonly attributed to polycentric governance systems. In addition, analysis of the historical transition of the governance system from community based to

polycentric reveals that the path to polycentricity, the particular form of polycentricity, and contextual conditions constitute additional distal explanations of deficiencies in functionality. The case underscores the need for more refined theory concerning the emergence and functionality of different forms of polycentricity in various contexts.

In its empirical contributions, this dissertation also speaks to small-scale fishery policy through a finer-scale examination of the social function of customary marine tenure institutions in the Northern Reef state of Ngarchelong. These informal institutions define, among other things, eligibility criteria for those having a recognized right to fish in the state. Flexible administration of customary marine tenure institutions enables Ngarchelong residents to secure material support from nonresident community members and also strengthens social bonds and networks as the community becomes more dispersed in Palau. This research calls attention to the possible social impacts of fishery policies that redefine or formalize fishery access and use rights, and it describes a general approach for better harmonizing fishery policy with local social context and customary institutions.

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## DEDICATION

*I dedicate this dissertation to my parents, Robert and June Carlisle, who always supported my dreams, and to the many outstanding teachers and professors who inspired in me a love of learning.*

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# 1. INTRODUCTION

How do we best go about solving societal problems pertaining to complex natural resource systems, like the degradation of capture fisheries or the pollution of river basins? The question is, in part, rhetorical, as there is no single best approach or panacea – at least not one we have discovered! The answer may depend on the type of resource at issue, the nature of the problem, and myriad other contextual factors. Questions of this sort concern governance, a broad concept that generally refers to the various processes, interactions, and mechanisms by which we seek to solve shared problems, create shared opportunities, or otherwise influence actions and outcomes of shared interest (Berkes, 2010; Lemos & Agrawal, 2006). Institutions – i.e., the formal and informal rules, norms, and strategies that structure human interactions – are part and parcel of how we govern; they constitute, in effect, the “rules of the game” we establish for ourselves (E. Ostrom, 2005a). At the most general level, this dissertation research explores governance approaches and institutions that are theoretically capable of helping us achieve and maintain desired social and ecological outcomes in our use of, or interactions within, natural resource systems. It also more specifically examines governance theory and practice in the context of a particular type of natural resource system, small-scale fisheries, whose contributions to the well-being of coastal communities throughout the world makes them “too big to ignore” (see <http://toobigtoignore.net>).

Many natural resources, like fish, are common-pool resources, a type of good that presents great challenges for public policy because it is difficult or costly to exclude people from using them, and yet one person’s use or consumption of the resource subtracts from the total amount available for others (Andersson & E. Ostrom, 2008). The term “natural resource system,” as used interchangeably in this research with the term “the commons,” refers to the

ecological systems that support or produce a natural resource, the social communities that use or benefit from the resource, and the relationships that connect members of the system to one another. Many natural resource systems are complex in the sense that their constituent social and ecological communities are characterized by a high level of diversity and/or are organized at multiple levels and function across multiple scales (Andersson & E. Ostrom, 2008). This complexity complicates the already challenging task of governance, as it increases the amount of information needed for effective decision making. It also exacerbates uncertainty about the potential impacts of decisions, as attempts to influence one component of a natural resource system may have unanticipated consequences for another.

Small-scale fisheries, generally characterized by fishers' use of less-capital-intensive gear to harvest fish and invertebrates in nearshore coastal waters (Hauck, 2008), are among the most diverse, complex, and challenging natural resource systems for policymakers. Communities of small-scale fishers often exhibit a high degree of heterogeneity, with fishers employing a diversity of gear types and fishing methods to exploit a wide variety of species (Chuenpagdee & Jentoft, 2015). Additionally, targeted fish stocks exist within complex webs of predator-prey interactions that compound the uncertainties concerning the impacts of management actions. Following Rittel and Webber (1973), Jentoft and Chuenpagdee (2009) argue that fisheries constitute a "wicked problem," in the sense that there are multiple, often unclear, social and ecological drivers of resource decline and considerable disagreement about goals and possible solutions. Sustaining small-scale fisheries in the face of threats such as pollution, climate change, and overfishing represents a critically important governance challenge, however. With roughly 90 percent of the world's fishers engaged in small-scale fishing and over 100 million people employed in industries associated with small-scale fishing (e.g., fish processing and trading),

small-scale fisheries make a significant contribution to food and livelihoods security in coastal communities (FAO, 2005).

In rural Africa, Asia, and the Pacific islands, which account for the majority of small-scale fishers (FAO, 2005), the complexity and governance challenges inherent in small-scale fisheries may be compounded by the existence of multiple, overlapping normative or legal systems, a phenomenon referred to as legal pluralism by legal anthropologists and socio-legal scholars (Gupta & Bavinck, 2014). Situations of legal pluralism are especially evident in, though not isolated to, postcolonial societies where imported Western legal systems were superimposed on existing traditional or customary legal systems (Merry, 1988). In such situations, one's right to access or use a resource may be governed by criteria emanating from both formal government law and informal customary institutions. This complicates the task of governance and requires a deeper understanding of local social context because a new policy may prove ineffective or have unforeseen consequences when thrust upon existing, potentially conflicting, institutional arrangements (Moore, 1978). Despite a renewed focus on the part of scholars, governments, conservation NGOs, and funders on the goal of achieving sustainable small-scale fisheries, insufficient attention has been paid to the social consequences of implementing conventional fishery policies in communities where access and use of fishery resources are already governed by informal customary institutions.

Unsurprisingly perhaps, the notion that fisheries and other complex natural resource systems require complex, contextually tailored governance approaches has become increasingly popular among environmental governance scholars (Blomquist, 2009; Gelcich, 2014). Based partly on insights from the natural sciences, a rationale for such an approach is that a governance system should be capable of as much diversity in its actions or policies as exists in the system it

is meant to regulate (E. Ostrom & Janssen, 2004). In this regard, the complex governance concept that has gained the most traction in the commons literature is polycentricity, a multilevel form of governance comprised of multiple and overlapping centers of semi-autonomous decision making (V. Ostrom, Tiebout, & Warren, 1961). In fact, governance arrangements that could be characterized as polycentric are very common, yet the state of knowledge concerning their functioning in the commons remains underdeveloped, with broad theoretical claims about the advantages of polycentricity lacking sufficient empirical grounding and refinement (McCord et al., 2016). In addition, polycentricity lacks conceptual clarity and consensus among scholars on its fundamental characteristics, which has impeded systematic development of theory. Research that advances understanding of complex, polycentric governance of natural resource systems is therefore a priority.

### **1.1 Research Gaps Addressed by Dissertation**

The research presented in this dissertation responds to three gaps or needs identified in the preceding discussion:

- 1) The need for conceptual clarity in regard to polycentricity, including better understanding of the conditions associated with achieving the normative functioning predicted by scholars;
- 2) The need for more empirical research to ground and refine the broad theoretical propositions concerning polycentric governance of natural resource systems; and
- 3) The need for research that examines the role and policy implications of customary institutions in legally pluralistic small-scale fisheries.

Research and knowledge on these fronts are advanced through one or more of the three manuscripts that comprise this dissertation. The first manuscript, Chapter 2 of this dissertation, is

conceptual in nature and formulates a theoretical model of a “functional” polycentric governance system based upon a synthesis of multiple bodies of literature concerning the form and function of polycentricity. The other manuscripts, Chapters 3 and 4, are empirical case studies pertaining to the governance of small-scale fishing in the Northern Reef region of the Republic of Palau, a small island nation in western Micronesia. The first case study assesses the functioning of the governance system against theoretical predictions for polycentricity, and in doing so, suggests potential refinements to theory. The second examines the social function of customary marine tenure institutions in one Northern Reef state and explores how implementation of conventional, state-based fishery access policies may impact customary institutions and the social benefits they provide. The manuscripts, including the specific research objectives of the research, are described in greater detail in subsection 1.3.

## **1.2 Theoretical Foundation**

### **1.2.1 Polycentric governance**

This dissertation draws from a large and multidisciplinary body of literature on governance and natural resource systems, including, in particular, the work of Vincent and Elinor Ostrom and colleagues at the Bloomington School (Aligica & Boettke, 2011) in the fields of public administration and common-pool resource theory. As noted, the first two manuscripts of this dissertation are concerned with polycentric governance, a concept conceived in a seminal 1961 paper by Vincent Ostrom, Charles Tiebout, and Robert Warren concerning the delivery of public goods and services in metropolitan areas. The paper was a response to the then-prevailing view that overlap and redundancy in the delivery of public goods and services in metropolitan areas results in inefficiencies that may be remedied through consolidation in a centralized agency (V. Ostrom et al., 1961). The authors draw upon market analogies to argue that polycentric

arrangements, with multiple, overlapping decision-making centers, can achieve order and efficiency if, in delivering public goods and services, decision makers take one another into account in relationships characterized by cooperation, competition, conflict, and conflict resolution (Ibid.). When they function in this manner, they constitute a polycentric governance *system*, exhibiting self-regulating tendencies and coordination, similar to the market's "invisible hand" (Ibid., p. 832). The theoretical claims concerning polycentric governance systems in metropolitan areas benefited from strong empirical support in the 1970s. Over the course of a decade, Elinor Ostrom and colleagues at Indiana University undertook a rigorous and systematic study of police services in 80 metropolitan areas, finding that those characterized by polycentricity regularly exhibited greater efficiency and effectiveness than those characterized by centralized service delivery (E. Ostrom & Parks, 1987).

In the 1980s, Elinor Ostrom turned her focus to the study of common-pool natural resources where she sought to understand how humans achieve and maintain self-governance in the context of complex and dynamic social and physical environments. She challenged conventional discourses and policy prescriptions rooted in the logic of the tragedy of the commons, which was based upon the presumption that individuals in collective action settings are independent, rational decision makers who pursue their own self-interest at the expense of group welfare (Schlager, 2002). She proposed a second-generation theory of collective action that, while still based upon methodological individualism (McCay, 2002), posits individuals as boundedly-rational, fallible learners who follow norms, such as reciprocity, in decision making (E. Ostrom, 1998). Her research program demonstrated that under certain circumstances, communities of resource users are capable of developing enduring institutions for sustaining common-pool resources (E. Ostrom, 1990).

Much of the early common-pool resource research focused on small-scale, community-based governance systems for theory development, in part, because governance processes are easier to observe in less complex systems (Berkes, 2006; E. Ostrom, 1990). Theory developed from the study of small-scale systems is not directly applicable to complex governance arrangements, however. Over the last decade, there has been growing interest in complex, multilevel governance arrangements and a developing research agenda for polycentric governance of complex natural resource systems (e.g., Marshall, 2005, 2009, 2015; Andersson & E. Ostrom, 2008; Newig & Fritsch, 2009; Pahl-Wostl et al., 2012; Gruby & Basurto, 2013; da Silveira & Richards, 2013; Pahl-Wostl & Knieper, 2014; McCord et al., 2016). Whereas efficiency was a major preoccupation of public administration scholars who studied polycentric governance, commons scholars have been more concerned with the information challenges posed by the management of complex natural resource systems and the notion that governance systems capable of drawing upon diverse sources of knowledge and policy design may be better suited to the task (e.g., Andersson & E. Ostrom, 2008). This dissertation advances the research agenda on polycentricity through conceptual research and theoretically driven empirical research that draw from related literatures, including social-ecological systems literature on adaptive governance (e.g., Folke et al., 2005) and institutional fit (e.g., Folke et al., 2007). The empirical research, through its historicized case study approach, also responds to a critique that commons scholarship often fails to give adequate consideration to the historical context within which institutions are embedded (Agrawal, 2003; Mosse, 1997)

### 1.2.2 Legal pluralism

The final manuscript (Chapter 4) in this dissertation examines complex governance through a finer-scale lens to explore the functioning of a particular set of institutions – customary marine tenure – within a complex governance system characterized by legal pluralism. This research speaks primarily to practice and policy, and it uses legal pluralism as an analytical lens rather than an explanatory theory to identify which statements of authority tend to be treated as binding by which individuals and for what purposes (Berman, 2009). Legal pluralism emerged from the fields of legal anthropology and socio-legal studies, and there continues to be significant disagreement concerning the contours of the concept. Scholars differ, for example, about which term is most appropriate for describing a particular complex of laws – e.g., “legal order,” “legal mechanism,” or “legal system” (see Griffiths, 1986). There is also no consensus about the meaning of the term “law.” Most scholars agree that “law” includes certain norms and informal rules, but they differ on which norms and rules amount to law and which do not (von Benda-Beckmann, 2002; Merry, 1988). Moore (1978) suggests that what counts as law may depend upon what one is trying to emphasize for analysis. Similarly, Franz von Benda-Beckmann (2002) proposes that the appropriate unit of analysis – e.g., the social field, a particular situation, or society itself – depends upon the question one is trying to answer. While this flexible approach has generated a large body of empirical studies, it has not led to a great deal of theoretical development (Gupta & Bavinck, 2014). The utility of using legal pluralism as an analytical lens in empirical governance research – particularly research concerned with policy and practice – is that it directs the researcher to consider the relationship between rules-in-form and rules-in-use. Questions of *why* and *how* particular rules are ignored, invoked, or reinterpreted are a central concern (Meinzen-Dick & Pradhan, 2002), and the answers to these questions can

inform more equitable and effective policy that accounts for local norms and notions of fairness and recognizes the strategies individuals rely upon to secure resource access.

### **1.2.3 Customary marine tenure**

In using the lens of legal pluralism to examine the social function of customary marine tenure in Ngarchelong State in Palau, this research also draws upon a large and multidisciplinary body of research concerning customary marine tenure, and customary property rights more generally, in the Pacific (e.g., Carrier, 1987; Hviding, 1998; Aswani, 2002; Wagner & Talakai, 2007). Though customary marine tenure systems vary in form and function throughout the region, common features or principles of such systems emerge from this literature and inform and ground the discussion in Chapter 4 of customary marine tenure in Ngarchelong. These features include flexibility in administration (e.g., Kittinger et al., 2014) and use rights based upon culturally specific social criteria, such as clan affiliation (e.g., Ruddle, 1996). Aswani (2017) conceives of customary marine tenure systems as “‘messy’ and ‘contested’ social spaces that are continually evolving” (p. 5), though not necessarily for the purpose of conserving marine resources. In this regard, Foale et al. (2011) note that there is evidence that in many Pacific island societies, customary marine tenure evolved, not in response to resource scarcity, but to manage relationships between social groups (Foale et al., 2011). The types of social benefits or functions identified by scholars include conflict minimization (Johannes, 1981), promotion of group cohesion (Ruddle, 1996), and redistribution of resources (Hviding, 1998). Chapter 4 similarly characterizes customary marine tenure in Ngarchelong as a social system, finding that it serves critical social functions and contributes to the rural community’s continuing viability. This characterization helps highlight the potential social consequences of simplifying, redefining, or “fixing” through statutory law the rights of fishery access and usage.

## **1.3 Chapter Summaries and Contributions**

### **1.3.1 Chapter 2: Conceptual polycentricity**

The concept of polycentric governance, while popular among commons scholars, lacks conceptual clarity and systematic development in the literature. The chapter addresses the former, and in doing so, facilitates the latter, by synthesizing the literature on polycentric governance and formulating a theoretical model of a functional polycentric governance system for natural resource systems. “Functional” for this purpose refers to the capacity of the governance system to comport with three claims commonly made by commons scholars: (i) polycentric governance systems exhibit greater capacity to adapt to actual or anticipated social and ecological change than more centralized forms of governance (Folke et al., 2005), (ii) polycentric governance systems are capable of producing institutions that are a good fit for complex natural resource systems (Folke et al., 2007); and (iii) polycentric governance systems mitigate the risk of institutional failure and resource losses on account of their redundant decision-making centers and institutions (E. Ostrom, 1999). The theoretical model is comprised of attributes, which constitute core, definitional elements of the concept, and enabling conditions, which specify additional institutional features that may be necessary or conducive for achieving these advantages in the commons. The model takes the concept a step further towards specificity without sacrificing the generality necessary for contextual application and further development. In doing so, it builds greater clarity around the concept of polycentric governance and the conditions under which it may lead to predicted or desired outcomes in the commons.

### **1.3.2 Chapter 3: Polycentricity case study**

Much has been written about the potential advantages offered by polycentric governance systems in the commons, but there has been comparatively little empirical research to investigate and ground the claims (McCord et al., 2016). The research in this chapter makes an empirical contribution to the developing scholarship on polycentricity in the commons through an in-depth, qualitative case study of the governance of small-scale fishing in the Northern Reef region of Palau. The objective is to understand whether the governance system exhibits the normative functioning predicted for polycentric governance systems, and if not, to explain why it diverges. This research engages with the theoretical model developed in the preceding chapter to systematically evaluate the extent to which the governance system can be characterized as polycentric and to assess the presence of institutional features associated with functionality. In doing so, deficiencies in institutional features are identified that partly explain why functionality is not fully achieved. Analysis of the historical transition of the governance system from community based to polycentric reveals that the path to polycentricity, the particular form of polycentricity, and contextual conditions constitute additional distal explanations of deficiencies in functionality. The findings suggest that transition from community-based to polycentric governance risks conditions conducive to crowding-out and erosion of rule compliance where the form of polycentricity entails primarily higher-level government decision makers with insufficient capacity for rule implementation. The case underscores the need for more refined theory concerning the emergence and functionality of different forms polycentric governance systems in various contexts.

### **1.3.3 Chapter 4: Customary marine tenure case study**

The final chapter of this dissertation examines the form, function, and policy implications of a set of customary institutions concerning fishery access and resource usage in Ngarchelong State in the Northern Reef region of Palau. The institutions at issue are the contemporary successor to historical customary marine tenure (“CMT”), a situation where a group controls access and use of marine resources on traditional nearshore fishing grounds (Johannes, 2002). Scholars and conservation practitioners increasingly advocate reviving or incorporating CMT principles into fishery policy to address resource decline in the Pacific (Kittinger et al., 2014; Aswani, 2017). Often overlooked, however, is that existing CMT institutions may provide social benefits to present-day fishing communities, and policies that formalize or redefine fishery access and use rights may undermine those institutions and the social function they serve (see Ruddle & Satria, 2010). This research speaks to policy and practice by calling attention to CMT as a social system. Its objective is threefold: (i) to describe the informal customary institutions that govern resource access and usage in Ngarchelong’s marine territory – i.e., present-day CMT; (ii) to examine the social function of CMT in Ngarchelong; and (iii) to explore the implications of the findings for fishery policy in Ngarchelong and the broader Pacific region. This research finds that CMT institutions in Ngarchelong exist in a state of legal pluralism, which expands the normative space for asserting and contesting fishing privileges. Flexible administration of CMT institutions provides valuable benefits to the resident community, including material support from nonresidents and the strengthening of social bonds and networks. A fishery permit policy under consideration in Ngarchelong would redefine fishery access as a privilege granted by government, thereby potentially impacting the social benefits supported by the community’s administration of CMT. This research concludes with a discussion of the broader implications of

this research for fishery policy and describes a general approach for better harmonizing fishery policy with local social context and customary institutions.

## **1.4 Methodology**

### **1.4.1 Chapter 2**

The research methodology for chapter two of this dissertation (conceptual polycentricity) is a literature review and synthesis. Using electronic databases, I identified and retrieved books and journal articles concerning the form and function of polycentric governance in multiple contexts dating back to the concept's inception in 1961. I uploaded the literature into QSR NVivo 10 and coded it for themes, such as "definitions" and "benefits," which enabled me to trace the concept's development and distill common claims concerning its functioning in the commons. By deconstructing the claims concerning the posited advantages of polycentricity, I identified institutional features or conditions that, according to the literature, may be necessary or conducive to achieving these advantages. The claims and the associated institutional features informed the design of the theoretical model developed in this chapter.

### **1.4.2 Chapters 3 and 4**

The research methodology for Chapters 3 and 4 is a qualitative case study (Yin, 2003). This methodology was chosen because the research objectives require in-depth and contextualized understanding of governance processes, rules-in-use, and subjective perceptions of resource users and decision makers. I collected data for the chapters while living in Ollei Hamlet in Ngarchelong State during a 7-month period in 2014 and during a brief follow-up visit to Ngarchelong in January 2017. As described in greater detail in each of the manuscripts, data collection methods were ethnographic in nature and included semi-structured and informal interviews, participant observation, and document analysis. The use of multiple data collection

methods enhances the credibility of the data and also allows for a more holistic understanding of governance processes and the larger context within which they are embedded (Yin, 2003). With regard to semi-structured interviews, a single interview guide was used to collect data for both case studies, as there was significant overlap in the relevant data and phenomena of interest. The research guide was piloted in advance with several residents of Ollei Hamlet to determine the most appropriate formulation of questions to elicit the information sought. Additionally, the sampling method was purposeful in order to maximize the richness of the data, taking into account that this research is qualitative and interpretive and not intended to be statistically generalizable (DiCicco-Bloom & Crabtree, 2006). I recorded notes after interviews concerning participants' nonverbal communication – e.g., apparent uneasiness or discomfort with particular questions – in a research journal and on a separate spreadsheet where I logged interview information. These notes provide a fuller picture of the interview and help to ensure that my subsequent interpretation and analysis are more trustworthy. I also recorded notes from participant observation and informal interviews in the same research journal, which totals 273 pages of field notes.

In data collection, I used a combination of deductive and inductive processes that allowed me to investigate existing theory and predetermined questions or concepts of interest, while also leaving room for the development of new or broader theory and the investigation of contextual factors that emerged during data collection. Consistent with a deductive approach, data collection efforts were informed by institutional analysis, theory on polycentricity, and the objective of documenting and understanding rules-in-use for the fishery. As I gained additional insights in the field, however, I used iterative processes in which I continually analyzed data and revised collection efforts to reflect my evolving understanding of each case study. To test the validity of

my interpretations, I integrated a process of member checking in the field whereby I shared emerging themes and interpretations of data with key informants to gain their perspectives (Cresswell & Miller, 2000). I recorded my reflections on these processes in my research journal.

All interviews were transcribed and uploaded, along with my research journal and other data, into QSR NVivo qualitative analysis software for thematic coding and interpretive analysis. As with data collection, my approach to coding incorporated both deductive and inductive processes. For each case study, I formulated codes in advance that corresponded to concepts and questions of interest, but as additional patterns (e.g., similar responses to a question) and themes (i.e., broader topic areas) emerged during analysis, I assigned them to newly-created codes. This flexible approach allowed me to remain open to new insights and explanations that emerged from close and iterative readings of transcripts and other data sources.

## **1.5 Research Setting**

As noted, the setting for the case studies in Chapters 3 and 4 is the Northern Reef region of the Republic of Palau. Palau is an archipelago in western Micronesia comprising more than 340 islands, only eight of which are presently inhabited (Palau Bureau of Budget & Planning, 2015). Formerly a U.N. trusteeship administered by the U.S., Palau gained its independence in 1994 and is now a constitutional democracy in free association with the U.S. With a population of approximately 18,000 and a land area of only 189 square miles, it is one of the smallest countries in the world (Palau Bureau of Budget and Planning, 2015). However, with a robust tourism sector, a UNESCO World Heritage site, and highly publicized commitments to environmental conservation, Palau's global presence exceeds its diminutive size.

Palau's government is modeled after the U.S. federal system of government. At the national level, there is an executive branch, a bi-cameral legislature, and an independent

judiciary. Palau also has 16 states, each of which is further divided into hamlets, the modern-day equivalent of traditional villages. Like a number of newly independent Pacific island nations, Palau's Constitution recognizes the validity of traditional law and the authority of traditional chiefs in traditional matters. Palau's highest ranking traditional chiefs also serve in an advisory capacity to the President under the Constitution. The chiefs' most important responsibilities, however, generally pertain to customary matters (e.g., the conduct of funerals and the selection of traditional leaders) and to maintaining order in the hamlets (e.g., the ordering of community clean-up events or the establishment of curfews). In a number of domains, including the governance of small-scale fishing to a limited extent, the roles and authority of traditional and elected leaders overlap. This results in a highly complex and legally pluralistic governance system.

The Northern Reef region of Palau, where this dissertation research was conducted, is comprised of Palau's two northern-most states, Ngarchelong and Kayangel, which share the body of water colloquially known as the Northern Reef. Ngarchelong is located at the northern tip of Palau's largest island, Babeldaob, and has a land area of only about five square miles. It is comprised of eight rural hamlets and has a resident population of about 316 people (Palau Bureau of Budget & Planning, 2015). Kayangel is a small and relatively remote island atoll located 25 nautical miles north of Ngarchelong, with one populated island divided between two hamlets and a fluctuating resident population of around 70 individuals. Importantly, the number of Palauans who identify as being from Ngarchelong or Kayangel is much higher than the number of residents, as many former residents relocated for economic or other reasons but maintain strong ties and fishing privileges in their home states.

The Northern Reef is considered to be one of the richest fishing grounds in Palau, and residents of Ngarchelong and Kayangel have a high degree of dependence on fish and fishing. In recent years, however, there has been an apparent decline in the sizes and abundance of fish in the Northern Reef. The reasons for the decline are not entirely clear, though overfishing is believed by most to be a strong contributing factor. Since 2012, several NGOs have been working with fishers and elected leaders in Ngarchelong and Kayangel to catalyze fishery management reform. The NGOs' active involvement in the governance of fisheries in the Northern Reef adds yet another layer to an already complex governance system.

As a research site, the Northern Reef region is an ideal setting to investigate theoretical claims concerning polycentric governance systems and to explore the form and function of customary marine tenure. With regard to the latter, fishery access is a salient issue in the Northern Reef states, with fishing by outsiders perceived as both illicit under customary institutions and as contributing to the decline of reef fish. With regard to the former, the governance of small-scale fishing in the Northern Reef exhibits a fairly high degree of the characteristics associated with polycentric governance systems, with state and non-state actors at multiple jurisdictional levels involved in decision-making for the fishery. Though the governance system is complex, it is contained within a small geographic area, which is advantageous for research. In a small setting, governance processes are easier to observe and study, and respondents are easier to reach than they would be in a more geographically expansive setting. Thus, the selection of the Northern Reef region of Palau for the case studies in Chapters 3 and 4 is appropriate for both practical and theoretical reasons.

## 1.6 Positionality Statement

Qualitative research is inherently subjective, and it is important to the credibility of the work that the researcher understand and acknowledge his own positionality vis-à-vis the research (Ungar, 2003). As Cheng and Randall-Parker (2016) describe it, “positionality refers to one’s motivations, interests, and assumptions in a social situation, as well as the roles, identity, and power one exhibits relative to others in that situation” (p. 1169). As with any researcher, I brought my own ideas and assumptions to this research, and I was conscious that they shaped the lens through which I viewed the phenomena I was studying, as did my life experience. In this regard, I approached the research as a white, male, American, middle-aged, university-educated lawyer and scientist, categories that do not define me but influence how I perceive and am perceived. By the time I began field work, I had lived in Palau for just over one year, having served as legal counsel to the Koror State Legislature immediately prior to undertaking this research. This was an advantage, as many of my preconceived notions about Palau had been abandoned or reassessed, and I had gained some familiarity with the values and informal institutions that underpin decision making and social practices in Palau. I did, however, form new assumptions based upon my experience in Koror, the urban and economic center of Palau, that I would learn are not necessarily reflective of Palau’s more rural and traditional communities. I was initially skeptical, for example, about the continued existence of customary marine tenure institutions in Palau, as Palauans of all backgrounds fished in Koror’s marine territory without, as far as I knew, violating any customary institutions. As thoroughly described in Chapter 4, this is not the case in Ngarchelong State, where informal customary institutions prescribe a range of criteria and conditions for fishery access and usage. Additionally, my personal frame of reference and lack of historical perspective rendered certain phenomena

invisible or barely perceptible at the onset of field work. For example, with a Western individualistic paradigm as my frame of reference, I viewed the Northern Reef communities as highly group oriented or collectivist, as kinship networks and customary norms of sharing and reciprocity continue to serve as a social safety net and a mechanism for redistributing resources. Only gradually, through interviews and casual conversations, did I begin to appreciate that these communities had, in the not-too-distant past, been more cohesive and community members more dependent on one another for meeting the needs of daily life. Indeed, many of them reported concerns over a growing sense of individualism. Their reality and lived experience was different from what I, as an outsider with no appropriate frame of reference, expected.

One of the advantages of ethnographic research involving extended immersion is that the researcher has more time and opportunity to correct for bias and to discover that which is not readily apparent or observable. Though objectivity is never possible in interpretive research, I employed strategies to control bias, including the previously described practice of member checking whereby I shared my interpretations of data and emerging themes with key informants to gain their perspectives. I also engaged in ongoing critical reflection about my interpretations and remained open to new and different explanations. Recording my interpretations and hypotheses in a research journal was particularly helpful, as I found that putting my thoughts in writing subjected them to greater scrutiny. It also allowed me to revisit my mental processes and impressions from the field when I later coded and analyzed the data.

I was also aware that how I, and my research, were perceived affected what participants would be willing to share with me. Of the various categories or labels that could be ascribed to me, “scientist” and “conservationist” were likely the ones with the most baggage. There were signs of research fatigue in Ngarchelong, as a number of scientists and conservation

professionals had conducted research and pursued conservation initiatives in the state in recent years. Residents were growing weary of repeated interviews and surveys, and some openly expressed frustration that their cooperation with scientists was used against them to inform more restrictive fishing laws. Before starting interviews, I spent a month in the field, along with my adviser, Rebecca Gruby, and Xavier Basurto, a co-principal investigator and member of my dissertation committee, becoming reacquainted with the community (Dr. Gruby and I had spent brief amounts of time in Ngarchelong on previous trips) and explaining the purpose of the research. This helped to build trust, develop rapport, and ensure a higher rate of participation, particularly as community members came to understand the nature of the research. Of course, there is always a risk that participants will tell a researcher what they believe she wants or expects to hear. Obtaining data from multiple sources – i.e., triangulation – helped to control for this risk, as did interviewing a large number of individuals (103).

Finally, a researcher's motivations for undertaking research is central to positionality and disclosure of such motivations can enhance credibility of the research (see Cheng & Randall-Parker, 2016). In this case, my primary motivations were the following: (i) intellectual curiosity; (ii) a desire to contribute knowledge that could inform theory and practice on small-scale fishery governance and potentially benefit communities in Palau; (iii) a desire to strengthen my publication record; and (iv) pursuit of a doctoral degree. I have no personal stake in the outcome of this research. However, it was funded by a foundation that is deeply invested in conservation initiatives in Palau, including an ongoing fishery intervention at my field site discussed in the third chapter of this dissertation. Other than the provision of funding, the foundation was not involved in this dissertation research – e.g., foundation staff had no input in the formulation of research objectives or the interpretation of data, and they did not review any manuscript drafts.

Though I considered how this research might directly or indirectly benefit or affect my funder and other grantees, those considerations did not affect, shape, or compromise the research. More personally challenging were my concerns about how the research might reflect upon the communities in Palau where I lived, conducted my research, and forged friendships. Such concerns were allayed, in part, by my belief that a thorough exploration and reporting of the case studies, as I understand them, can potentially benefit the communities and others like them in their search for equitable and effective policies to sustain resources and livelihoods.

### **1.7 Dissertation Structure**

This dissertation follows a manuscript format. Though the chapters are topically related in their consideration of various aspects of complex forms of governance for natural resource systems, each is a stand-alone and coherent research product. Chapters 2, 3, and 4 were prepared for separate publication in academic journals, and each is co-authored with Rebecca Gruby. Chapter 2 is in press in *Policy Studies Journal* and is reprinted here with permission, and Chapter 3 is in review for a special issue of *Environmental Policy and Governance* tentatively entitled “Environmental Polycentric Governance.” I collaborated on the research design for Chapters 3 and 4 with Rebecca Gruby and Xavier Basurto, and I collected all data for the chapters in this dissertation. Data analysis and dissertation text reflect my original intellectual work.

## **2. POLYCENTRIC SYSTEMS OF GOVERNANCE: A THEORETICAL MODEL FOR THE COMMONS<sup>1</sup>**

### **2.1 Introduction**

Polycentricity is a fundamental concept in the work of Vincent and Elinor Ostrom. The term connotes a complex form of governance with multiple centers of decision-making, each of which operates with some degree of autonomy (V. Ostrom, Tiebout, & Warren, 1961; E. Ostrom, 2005a). The decision-making units in a polycentric governance arrangement are often described as overlapping because they are nested at multiple jurisdictional levels (e.g., local, state, and national) and also include special-purpose governance units that cut across jurisdictions (E. Ostrom, 2005a; McGinnis & E. Ostrom, 2011). This multi-level configuration means that governance arrangements exhibiting polycentric characteristics may be capable of striking a balance between centralized and fully decentralized or community-based governance (Imperial, 1999). While the existence of multiple, semi-autonomous decision-making centers may be sufficient to characterize a governance arrangement as polycentric, it does not guarantee that there will be sufficient coordination among the decision centers such that the arrangement functions as a polycentric governance system (Marshall, 2015; Pahl-Wostl & Knieper, 2014). A polycentric governance system, the focus of this paper, may exist if the decision-making centers take each other into account in competitive and cooperative relationships and are capable of resolving conflicts (V. Ostrom et al., 1961; Marshall, 2015).

Polycentric governance systems have been explored in a number of interdisciplinary contexts, most notably in studies of public administration and in commons scholarship

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<sup>1</sup> Carlisle, Keith, and Rebecca L. Gruby. In Press. "Polycentric Systems of Governance: A Theoretical Model for the Commons." *Policy Studies Journal*. Reprinted here with permission.

concerning the governance of natural resources.<sup>2</sup> Despite the popularity of the concept, there has been limited systematic development of polycentricity in the commons literature (Brie, 2014). While some progress has been made in recent years (e.g. Newig & Fritsch, 2009; Pahl-Wostl & Knieper, 2014), these empirical studies have employed definitions of polycentricity that are not entirely consistent with one another and/or do not capture the full import of the concept as conceived by V. Ostrom et al. (1961), thereby impeding systematic theoretical development. Commons scholars have also attributed a number of theoretical advantages to polycentric governance systems, ranging from the promotion of learning, trust, and adaptation to the mitigation of risk of resource collapse or failure (Marshall, 2009). However, there has been comparatively little study of the contexts and institutional features likely to yield such advantages.

Developing greater clarity around the concept of polycentric governance and the conditions under which it may lead to desired outcomes is an overdue endeavor that may help to advance our understanding of more complex natural resource governance. Much of the early commons scholarship focused on small-scale, community-based resource systems, in part, because governance processes are easier to observe in less complex systems (Berkes, 2006; E. Ostrom, 1990). Relatively simple, isolated systems are the exception rather than the rule, however. Most cases of natural resource governance are complex and cross-level in character (Berkes, 2006), and most human-environment interactions concerning natural resources take place at multiple scales (Blomquist, 2009). Moreover, human activities are increasingly

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<sup>2</sup> Our usage of the terms “commons” and “natural resource systems” as the context or domain of a polycentric governance system includes social systems dependent upon or associated with the resource of concern. Some scholars prefer the term “social-ecological system” to emphasize the integration of humans in nature and the artificial nature of delineating social systems from ecological systems (Folke et al., 2005).

interconnected at the national and global level on account of technological advancements, changes in governance systems, and the growth of capital markets (Folke et al., 2005). Given that polycentricity is a pervasive condition in much of the world, scholarly work that advances general understanding of the concept and helps practitioners enable and leverage the potential benefits of a polycentric governance system should be a priority.

This paper builds greater clarity around the concept of polycentricity by proposing a theoretical model of a functional polycentric governance system for the commons.<sup>3</sup> By “functional,” we refer to the capacity of the governance system to comport with the following three claims, explored in subsection 2.4, commonly made by scholars of natural resource governance: (i) polycentric governance systems are better able to adapt when faced with social and environmental change; (ii) they provide good institutional fit for complex natural resource systems; and (iii) they mitigate the risk of institutional failure and resource losses on account of their redundant teams of decision-makers employing diverse or redundant institutions. The model builds upon a definition of a polycentric governance system that is not specific to natural resource systems, but rather is drawn directly from the public administration literature in which the concept was conceived. In the language of the model, the universal definitional elements are “attributes.” Importantly, polycentric governance systems do not necessarily perform well or better than other forms of governance (V. Ostrom et al., 1961; Marshall, 2015). There are a number of potential pitfalls associated with their complexity. For example, the transaction costs

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<sup>3</sup> For clarity, we are developing theory only insofar as we are synthesizing the various bodies of literature already existing on the concept to propose a model of a polycentric governance system that exhibits features scholars have posited as necessary or conducive to achieving certain advantages in the commons. We are not proposing any novel features that have not previously been linked to the functionality with which we are concerned. We also note that although we developed the model with natural resource governance in mind, we make no claims about the suitability of the model for other contexts or settings.

associated with coordination can be quite high, particularly in larger or geographically dispersed systems (Huitema et al., 2009; Wyborn, 2015). Additionally, the dispersion of responsibilities in a polycentric governance system can make it challenging to hold decision-makers accountable for their performance (Huitema et al., 2009; Lieberman, 2011). We therefore specify additional institutional features in the model that may not be integral to the core concept but are associated with achieving the functionality predicted by commons scholars. These additional features are termed “enabling conditions.”<sup>4</sup> We distilled the attributes and enabling conditions through a review and synthesis of the commons literature and the public administration literature on metropolitan-area governance, as well as related literatures that address the form and function of polycentric governance systems. In formulating enabling conditions, we also drew from findings in related bodies of literature, such as work on social-ecological systems, where relevant.

Before we embark on this task, we clarify our position and the scope of this undertaking. First, it is not our position that all polycentric governance systems are capable of achieving the advantages examined in this paper or of otherwise performing as well or better than other forms of governance. Among other things, the effectiveness of a governance system depends upon its objectives (e.g., efficiency or equity) and the historical and cultural context in which the governance system is embedded. This raises a second point: the governance model we propose does not address the myriad contextual factors that may impact the functioning of a governance system. Our focus here is on the institutional features that theoretically enhance the functionality

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<sup>4</sup> It is not our intention in formulating attributes and enabling conditions to provide measurable indicators of a functional polycentric governance system. Our focus here is qualitative description of the elements of a functional polycentric governance system for the commons that necessarily leaves enough generality for contextual application and further development. Our contribution is to clarify a very complex concept and to focus critical attention on institutional features associated with expected functionality. As such, this paper should aid future efforts to operationalize the concept and to develop measurable indicators.

of polycentric governance systems in the commons. To be clear, we use the term “institution” to refer to the formal and informal rules, norms and strategies that structure human interactions (E. Ostrom, 2005a).

In subsection 2.2, we briefly trace the history of polycentricity. In subsection 2.3, we introduce the attributes that form the definitional core of the theoretical model, and in so doing, we clarify ambiguities and highlight open questions in the definition we adopt. In subsection 2.4, we describe the aforementioned theoretical advantages of polycentric governance systems, and we introduce enabling conditions that specify features that may be necessary or conducive for realizing the advantages. We present the model at the conclusion of subsection 2.4, bringing together the attributes and enabling conditions discussed in subsections 2.3 and 2.4 and correlating them with the advantages they support. Finally, we conclude with a discussion of the implications of the model and the challenges that lie ahead for further development and operationalization of polycentricity.

## **2.2 History and Development of the Concept**

The term polycentricity was first used in essays Michael Polanyi published as *The Logic of Liberty* (1951) to describe a method of social organization in which individuals are free to pursue their objectives within a general system of rules (Polanyi, 1951; see also V. Ostrom, 1999a). A decade after the publication of *The Logic of Liberty*, V. Ostrom et al. (1961) adopted the term polycentricity to describe a form of organization in metropolitan-area governance characterized by a multiplicity of overlapping political units. V. Ostrom et al. (1961) argued that this seemingly inefficient configuration of political units could achieve greater efficiency in the production and provision of public goods and services than a centralized government if certain market-like characteristics were present. They theorized that political units could operate in a

coherent manner with predictable patterns – i.e., as a system – to the extent they “take each other into account in competitive relationships, enter into various contractual and cooperative undertakings or have recourse to central mechanisms to resolve conflicts” (V. Ostrom et al., 1961, p. 831). The theoretical claims concerning polycentricity in metropolitan areas benefited from strong empirical support in the 1970s showing that the provision of police services in polycentric metropolitan areas regularly outperformed more centralized systems in terms of efficiency and certain measures of effectiveness, such as responsiveness (E. Ostrom & Parks, 1987).

In the 1980s, Elinor Ostrom turned her focus to the study of the commons where she sought to understand how humans achieve and maintain self-governance in the context of complex and dynamic social and physical environments. One of Ostrom’s most influential contributions to commons theory was her formulation of eight institutional design principles that she found to be associated with robust institutions for maintaining common-pool resources (E. Ostrom, 1990). The eighth design principle, which relates to larger-scale, more complex systems of common-pool resources, provides that the various governance activities associated with robust institutions “are organized in multiple layers of nested enterprises” (E. Ostrom, 1990, p. 101). In subsequent work, Ostrom and others have sometimes used the term “polycentric” interchangeably with, or in reference to, the “nested” requirement of the eighth design principle (e.g., E. Ostrom, 2005a; Huntjens et al., 2012), though polycentricity implies more than nestedness (Gruby & Basurto, 2013).

Since Ostrom’s publication of the design principles in 1990, a growing interest in polycentricity on the part of commons scholars is evident in the number of papers and books that consider the advantages of polycentric governance for sustaining natural resources (e.g.,

Blomquist & Schlager, 2005; Marshall, 2005, 2009, 2015; Andersson & E. Ostrom, 2008; Galaz et al., 2008; Newig & Fritsch, 2009; Pahl-Wostl et al., 2012; da Silveira & Richards, 2013; Bixler, 2014; Nagendra & E. Ostrom, 2014; Pahl-Wostl & Knieper, 2014). In this literature, the arguments for polycentric governance have evolved beyond improved efficiency, a major objective in public administration. Blomquist (2009) observes that the rationale of commons scholars who advocate polycentric governance includes themes such as: “1) the recognition of scale diversity; 2) the desire to reduce error-proneness and promote learning; 3) the recognition of limitations on human information processing capabilities; 4) the presence of multiple goals for resource management; and 5) the recognition of the diversity of human interests and values associated with most complex natural resource systems” (p. 115). Indeed, these themes feature explicitly in the theoretical advantages of polycentric governance that emerge from recent commons scholarship. Marshall (2009) notes that polycentricity has been associated with advantages such as better access to local knowledge, closer matching of policy to context, reduction of the risk that a resource will fail for an entire region on account of multiple avenues for policy experimentation, improved information transmission due to overlap, and enhanced capacity for adaptive management. The advantages enumerated by Marshall (2009) generally figure into three broad claims concerning polycentric governance that emerge from the commons literature: (i) polycentric governance systems have a greater capacity to adapt to social and environmental change; (ii) polycentric governance systems provide good “institutional fit” for complex natural resource systems; and (iii) redundancy inherent in polycentric governance systems mitigates risk. These claims are examined in subsection 2.4. First, we introduce the attributes of a polycentric governance system, which comprise the foundation of the theoretical model.

## **2.3 Attributes**

The attributes in the theoretical model represent the essential defining characteristics of a polycentric governance system based upon V. Ostrom et al. (1961). Reflecting on the seminal 1961 paper, Vincent Ostrom later wrote:

As formulated by [V. Ostrom et al. (1961)], a polycentric political system would be composed of: (1) many autonomous units formally independent of one another, (2) choosing to act in ways that take account of others, (3) through processes of cooperation, competition, conflict, and conflict resolution (V. Ostrom, 1991, p. 225).

We adopt and adapt this three-pronged distillation of the concept in formulating the attributes in the model. Our rationale for doing so is that we believe it important that the attributes be loyal to the original 1961 conceptualization to ensure we do not imagine a substantively different concept. While there have been multiple formulations of the concept by Vincent Ostrom and others over the years, this particular formulation is a clear and concise articulation of the concept as it was originally conceived. Additionally, we note that even as polycentric governance has been explored in diverse literatures, many scholars continue to use definitions of the concept based upon the original 1961 conceptualization. In devising the attributes, we make minor modifications to the first prong (discussed in subsection 2.3.1), and we consolidate the second and third prongs. Thus, we propose the following two attributes of a polycentric governance system: (i) multiple, overlapping decision-making centers with some degree of autonomy; (ii) choosing to act in ways that take account of others through processes of cooperation, competition, conflict, and conflict resolution. In the following subsections, we describe and expand upon the attributes.

### **2.3.1 Multiple, overlapping decision-making centers with some degree of autonomy**

The first attribute is comprised of a number of distinct but related elements and conditions, the meanings of which are not entirely self-evident. We substitute the term “decision-

making center” for the word “unit” in V. Ostrom’s (1991) formulation because it better captures the active role that governance units assume in making and enforcing institutions in a particular domain. In fact, V. Ostrom et al. (1961) use the term “centers of decision-making” to describe the units, though they do not clearly define it. McGinnis and E. Ostrom (2011) are instructive in this regard:

Polycentric governance requires a complex combination of multiple levels and diverse types of organizations drawn from the public, private, and voluntary sectors that have overlapping realms of responsibility and functional capacities ... In addition, private corporations, voluntary associations, and community-based organizations play critical supporting roles in a polycentric system of governance, even if they have not been assigned public roles in an official manner (p. 15).

Thus, the decision-making centers in a polycentric governance system are not restricted to formal governmental bodies.

Not every organization or individual with an interest in a particular governance domain constitutes a decision-making center, however. Only those that exercise “considerable independence to make norms and rules within a specific domain” are decision-making centers (E. Ostrom, 1999, p. 552). Legislatures, administrative agencies, and other public bodies are clearly candidates for decision-making-center status, as are communities of resource users like the self-organized “harbor gangs” of the Maine lobster fishery who make and enforce unwritten norms and rules (see Low et al., 2003). But what about organizations or individuals – state or non-state – that lack authority to make rules in a particular governance domain but strongly influence policies or provide critical technical or financial support? We suggest that they fall in the category of “critical supporting role” (see McGinnis & Ostrom, 2011). That is, the effective functioning of a polycentric governance system often depends upon actors who can lend technical expertise or produce a good or service more efficiently or effectively (see V. Ostrom et al., 1961). They may at times collaborate with or join a decision-making center, though they are

not, in their individual capacities, decision-making centers. We therefore propose that the best way to envision a polycentric governance system is not as a tidy and static network of discrete, connected decision-making centers. Rather, it is a dense and evolving web of decision-making centers – some transitory and others relatively fixed – and supporting actors from diverse sectors and domains.

We also inserted the word “overlapping” in this attribute to describe the jurisdiction or domain of decision-making centers, which is integral to any polycentric governance system. Overlap may result from the layering of decision-making centers operating at multiple levels or jurisdictions when they share certain functional capacities or areas of responsibility (see McGinnis & E. Ostrom, 2011). A critical function of overlap is to facilitate the flow of information among decision-making centers, enabling them to learn which institutions employed by others have been successful (E. Ostrom, 1999; Marshall, 2008).

A reasonable question concerning polycentric governance systems is: how many decision-making centers are required? Typically, open-ended qualifiers like “many” (e.g., V. Ostrom et al., 1961), or “a multiplicity” (e.g., Aligica & Tarko, 2012) are used to describe the population of decision-making centers because the answer is context specific. As McGinnis (1999) observes: “[t]he key point is not the number of jurisdictions but rather the concurrence of multiple opportunities by which participants can forge or dissolve links among different collective entities” (p. 6). We would add that achieving balance and representation in decision-making is also likely more important than the number of decision-making centers.

Finally, autonomy or independence in decision-making is also a fundamental characteristic of polycentric governance systems. Autonomy implies that the decision-making centers act on their own behalf, without centralized coordination (see V. Ostrom et al., 1961).

But how much autonomy is necessary (Gruby & Basurto, 2013)? Scholars commonly write that decision-making centers in polycentric governance systems exercise “considerable” autonomy or independence (e.g., E. Ostrom, 1999, 2010; Marshall, 2009, 2015) or that they are “semi-autonomous” (e.g., Komakech & van der Zaag, 2013). Andersson and E. Ostrom (2008) use the phrase “some degree of autonomy,” a phrase we adopt because it highlights the uncertain and context-specific nature of the necessary or appropriate degree of autonomy.

As Marshall (2015) argues, it is de facto rather than formal autonomy that matters most given the focus in institutional analysis on rules-in-use rather than rules-in-form. A grant of formal independence to decision-making centers does not guarantee them considerable de facto autonomy; while central governments may devolve certain responsibilities to local governance organizations, they may nevertheless exert substantial control over outcomes through, for example, financial incentives and the imposition of burdensome reporting and compliance requirements (Marshall, 2015; Gruby & Basurto, 2013). The degree of autonomy required to reap the theoretical benefits of polycentric governance systems is an open and fundamental question for which there is little practical guidance in the literature.

### **2.3.2 Choosing to act in ways that take account of others through processes of cooperation, competition, conflict, and conflict resolution**

In formulating the second attribute, we consolidated the second and third prongs of Vincent Ostrom’s (1991) formulation because together, they describe how an assemblage of decision-making centers operating with some degree of autonomy may be capable of functioning as a coherent system: choosing to act in ways that take account of others through processes of cooperation, competition, conflict, and conflict resolution. Broadly, this means that decision-making centers, even if formally independent of one another, base their decisions partly on the

actions, inactions, or experiences of other members of the system. In taking one another into account, decision-making centers and other supporting actors in the governance system interact in processes of cooperation, competition, conflict, and conflict resolution (V. Ostrom et al., 1961). These processes can lead to self-organizing tendencies to the extent decision-making centers have “incentives to create or institute appropriate patterns of ordered relationships” (V. Ostrom, 1999a, p. 59). Governance systems that are self-organizing are able to persist and adapt without requiring central or outside planning or direction (see Lebel et al., 2006).

Turning to the four integral processes identified by V. Ostrom et al. (1961), we understand cooperation as a broad category involving voluntary joint action that is inclusive of processes such as collaboration and contractual undertakings. Cooperation is critical to a governance system’s functionality, as individual decision-making centers may be incapable of effectively or efficiently producing certain goods and services or addressing particular problems independently. Through cooperative processes, however, they may be able to enhance their collective capacity or to outsource functions to more capable decision-making centers or supporting actors. This point was fundamental to the claim in V. Ostrom et al. (1961) that polycentric governance systems may be capable of performing as well or better than monocentric systems. Their argument was premised on the notion that the entity that provides a public good or service to consumers need not be the same entity that produces it—particularly if it would be more efficient to outsource production to another entity. This important distinction between production and provision seldom figures into later commons scholarship concerning polycentricity though it remains relevant. For example, a decision-making center that lacks the resources or capability to produce knowledge needed to make effective decisions concerning a natural resource can outsource its production to more capable or efficient producers, such as a

higher level of government, research scientists, or local resource users. As characterized by McGinnis (1999), “polycentricity allows considerable mixing and matching of consumption, provision, and production units operating at different scales of aggregation” (p. 4).

With respect to competition, V. Ostrom et al. (1961) assert that it can generate self-organizing tendencies in metropolitan areas as municipalities are forced to compete for residents through their mix of public goods and services on offer, and as producers of public goods and services compete for the business of municipalities. In the context of natural resource governance, similar forms of competition may support self-organization. For example, municipalities may compete for residents through the provision of cleaner water or more green spaces. Additionally, NGOs may have to compete against one another for the right to lead or influence an environmental initiative undertaken by a political jurisdiction. A competition of ideas and methods employed by decision-making centers may also drive the self-organizing tendencies of polycentric governance systems, enabling them to better address emerging challenges and goals without central direction (see Olsson et al., 2007; Imperial, 1999). V. Ostrom et al. (1961) note that conditions fostering competition emerge when decision-making centers are located near one another and when they have access to information about one another’s performance.

While competitive processes can lead to beneficial self-organizing tendencies, intense competition over distributional issues can undermine cooperation and impede a governance system’s capacity for self-organization (Poteete & E. Ostrom, 2004). In this regard, da Silveira and Richards (2013) evaluate the functioning of a polycentric governance system for the Pearl River basin in China. They found that it lacked incentives for cooperation and was characterized by intense competition for resources among its members that undermined its effectiveness and

ability to adapt. This highlights the importance of designing institutions to manage or minimize competition over resources, and it suggests the need for effective conflict resolution mechanisms. Differences in power and values among parties with an interest in a shared resource make conflict nearly inevitable when decisions concerning allocation and use are made (Dietz, E. Ostrom, & Stern, 2003). So long as conflicts do not escalate to a point where the governance system becomes dysfunctional, they can bring about learning and change as different interests, philosophies, and perspectives are aired in the process of deliberation and conflict resolution (Dietz et al., 2003). V. Ostrom and E. Ostrom (1977) point out that conflict is an important indicator of potential losses and that the resolution of conflict can result in a net improvement of economic welfare. However, widely divergent or incompatible views of the preferred state or use of a natural resource could lead to potentially intractable conflict that could stymie self-organization. Maintaining the capability to resolve conflict is critical, however, and as Dietz et al. (2003) note, conflict resolution may be as important a reason for designing resource governance institutions as concern over a resource.

#### **2.4 Theoretical Advantages of Polycentric Governance Systems**

Having laid out the core attributes of a polycentric governance system, we turn to the three broad claims concerning the advantages of polycentricity in the governance of natural resource systems. In describing the logic of these claims, we introduce the enabling conditions in the model, which specify institutional and design features of each attribute that may be necessary or conducive to achieving these advantages. We note that whether an enabling condition is necessary or merely helpful likely depends upon context, and the literature is not sufficiently developed for us to make those distinctions. We also acknowledge that the three advantages are closely related and mutually reinforcing in the sense that realization of one advantage likely

contributes to realization of the others. For example, if a governance system produces institutions that are a good fit for natural resource systems and mitigates risk through incorporation of redundancy, its capacity to adapt to change is likely thereby enhanced. As this suggests, there is substantial overlap among attributes and enabling conditions that support each of the three posited advantages, and one could reasonably argue that all the attributes and enabling conditions are at least helpful, if not necessary, in achieving each of the advantages. However, we link the enabling conditions to the advantages they most directly support based upon the development of the claims in the literature. Finally, while it is important to maintain some degree of flexibility within enabling conditions to account for context-specific application, we expect the enabling conditions to be further refined as the research agenda on polycentricity develops.

#### **2.4.1 Adaptive capacity**

Perhaps the most commonly cited theoretical advantage of polycentric governance systems in the commons literature is that they may be capable of adapting to actual or anticipated social and ecological change better than more centralized forms of governance (e.g., Folke et al., 2005; da Silveira & Richards, 2013; Marshall, 2015; Pahl-Wostl, 2009; Bixler, 2014). This ability to adapt is often termed “adaptive capacity,” which Pahl-Wostl (2009) defines as “the ability of a resource governance system to first alter processes and if required convert structural elements as response to experienced or expected changes in the societal or natural environment” (p. 355). This includes adaptation through the design of new institutions (see E. Ostrom, 1999). With accumulating evidence signaling an increasing likelihood of nonlinear and abrupt changes in ecosystems (Millennium Assessment Report, 2005), there is considerable interest in designing institutions that allow for adaptation (e.g., Dietz et al., 2003; Galaz et al., 2008; Pahl-Wostl, 2009; Sovacool, 2011; da Silveira & Richards, 2013; Bixler, 2014; Pahl-Wostl & Knieper, 2014;

Wyborn, 2015). Theoretical support for the proposition that polycentric governance systems exhibit greater adaptive capacity can be found in complex-adaptive systems theory, which provides that self-organizing complex-adaptive systems have the ability to adapt by changing their rules and behavior as they gain experience (Pahl-Wostl et al., 2012). Polycentric governance systems have been characterized as complex-adaptive systems (Andersson & E. Ostrom, 2008), and their capacity for adaption has been linked to the notion that they facilitate parallel efforts to experiment with different ideas and rule combinations which, when combined with information transmission and learning, can lead to institutional innovation to cope with change (E. Ostrom, 1999; Imperial, 1999). In recent years, commons scholars have also begun to develop empirical support for the proposition that polycentric governance systems exhibit enhanced adaptive capacity (e.g., Pahl-Wostl & Knieper, 2014; Sovacool, 2011; da Silveira & Richards, 2013).

This potential advantage of polycentric governance systems stems first from their most basic attribute: multiple, overlapping decision-making centers operating with some degree of autonomy. If decision-making centers are actively engaged in semi-autonomous efforts to govern a resource, they may produce a diversity of institutions. While the probability that a particular institution will fail is likely high (E. Ostrom, 1999), some institutions may well achieve a degree of success. If decision-making centers take into account the successes and failures of others, and learn from them, they may be capable of devising and continually adapting ever more effective institutions (see E. Ostrom, 1999; Olsson, Folke, & Berkes, 2004). As the foregoing suggests, this claim also implicates the second attribute in the model, as it requires that decision-making centers take one another into account, including through processes of cooperation and competition (e.g., of ideas or methods), and that they resolve conflicts that could undermine

cooperation and stymie adaptation. Many other factors bear directly on the realization of adaptive capacity, and in the following subsections we describe the institutional features we identify as being most integral to the claim. These features constitute “enabling conditions” in the theoretical model of a functional polycentric governance system for the commons.

#### ***2.4.1.1 Decision-making centers employ diverse institutions***

This enabling condition makes explicit a common presumption concerning polycentric governance systems: namely, that a diversity of rules, norms, and strategies necessarily flow from a multiplicity of decision-making centers. We note that while institutional diversity is a logical outcome given a diversity of semi-autonomous governance actors, there is nothing inherent in polycentricity that prevents decision-making centers from coalescing around a common policy or approach. Were this to happen, some of the advantages ascribed to polycentric governance systems in the commons may not be achieved. One of these is their enhanced adaptive capacity, for it rests upon the notion that decision-making centers will continually experiment with different resource institutions and adopt (and adapt) the more successful ones. Given the improbability that any governance system will ever stumble onto the optimal combination of rules (E. Ostrom, 1999), and given that natural resource systems are dynamic and changing, we should never expect the actors in a functional polycentric governance system to settle upon a single policy or approach. Instead, we should expect ongoing experimentation in an effort to continually improve and adapt institutions.

#### ***2.4.1.2 Generally applicable rules and norms structure actions and behaviors within the system***

The capacity of governance systems to adapt to change depends in part on the existence of incentives for productive activity, including public or civic entrepreneurship, and agreed or

accepted limits on the range of possible responses by governance actors. As Vincent Ostrom observes, “social organization occurs when the potential variety of human behavior is constrained so as to exclude some possibilities and permit other possibilities” (V. Ostrom, 1999a, p. 55, emphasis in original). In a polycentric governance system, this condition is made possible by the existence of rules and norms generally applicable to actors in the system (see V. Ostrom, 1999a; Aligica & Tarko, 2012; Pahl-Wostl & Knieper, 2014). Generally applicable rules and norms bound the universe of possible policies and management strategies, and they ideally provide sufficient incentives for experimentation and creative problem-solving. To facilitate adaptation, it is also critical that the rules and norms allow the entry of new actors and enable new institutional pathways when existing governance actors cannot meet the needs and objectives of the governance system (see E. Ostrom, 1999). The possibility of entry allows for the influx of fresh ideas and methods, the creation of new partnerships and synergies, and the introduction of additional capacity. This may be essential when the system is faced with abrupt or unanticipated environmental change.

#### ***2.4.1.3 Decision-making centers participate in cross-scale linkages or other mechanisms for deliberation and learning***

In the commons literature, deliberation and learning have been posited as processes that support a governance system’s adaptive capacity (see Folke et al., 2005; Blomquist, 2009; Berkes, 2010; Gelcich, 2014). Learning, defined here as gaining knowledge from social interactions to inform natural resource management (see Crona & Parker, 2012), is a process that depends upon ample opportunities for communication and interfacing. It is promoted by deliberation, including “[w]ell-structured dialogue involving scientists, resource users, and interested publics, and informed by analysis of key information and environmental and human

environment systems” (Dietz et al., 2003, p. 1910). If there were no exchange of information among decision-making centers, each would have to learn on its own through trial-and-error processes without the benefit of knowing what policies instituted by others may have succeeded or failed (see E. Ostrom, 1999). Such an approach could undermine the governance system’s ability to adapt at the pace of change.

Given that decision-making in polycentric governance systems is dispersed among governmental and non-governmental actors, achieving predicted functionality may require forums designed to bring decision-makers together for deliberation and learning (see Galaz et al., 2011). We therefore specify in this enabling condition that decision-making centers participate in cross-scale linkages or other formal or informal mechanisms for deliberation and learning. The term “cross-scale linkage” generally refers to a point of interaction or cooperation (often in formalized organizations) among actors that exist at different scales or at different levels of political or social organization (Heikkila, Schlager, & Davis, 2011). The term is also used to refer to linkages among actors that exist at the same level of political or social organization but across space (i.e., “horizontal” linkages) (Berkes, 2002). With some polycentric governance systems, particularly those in smaller settings or with a significant degree of overlap among decision-making centers, informal social and professional networks may provide sufficient opportunities for interaction, deliberation, and learning. There is a risk, however, that reliance on informal networks may result in ad hoc decision-making (Wyborn, 2015) and foster group homophily that diminishes adaptive capacity (Galaz et al., 2008).

Cross-scale linkages or multi-stakeholder forums may be especially vulnerable to domination or capture by powerful interests (see Adger, Brown, & Tompkins, 2005; Bixler et al., 2016). When networks or cross-scale linkages are captured by one or more powerful actors, the

governance system may become dominated by a hegemony of ideas and interests that stifle dialogue, creative problem-solving, and eliminate the diversity of institutions that underlie adaptive capacity. Adger et al. (2005) find that when cross-scale linkages are characterized by power asymmetries, more powerful actors seeking to further their interests can dominate the linkages in a way that further skews knowledge and information in their favor. No social organization is ever without power asymmetries, but at some threshold, they may inhibit the intended functioning of a cross-scale linkage. As McCay (2002) characterizes it, “[t]he question becomes to what extent are the decisions due to open and honest exchange and deliberation or instead the result of the ‘governing mechanisms’ of money and political power and authority, on the one hand, or of prestige and social influence, on the other” (p.384).

While cross-scale linkages have been advocated for their potential to foster deliberation, learning, and adaptation, more empirical research is needed to understand how better to leverage their benefits. Important areas for research include the levels at which collaboration is most effective and the circumstances under which coordination is necessary (Wyborn, 2015). Similarly, more empirical research is needed to better understand pathologies in cross-scale linkages associated with power asymmetries and to identify strategies for preventing or mitigating them. Given the relative paucity of research in this area and the importance of context, it would be inappropriate to propose a blueprint for the design of cross-scale linkages that are effective at preventing or managing such pathologies. Ensuring that actors in a cross-scale linkage have adequate resources to enable their participation, however, is an important consideration (see Adger et al, 2005).

#### ***2.4.1.4 Mechanisms for accountability exist within the governance system***

The functionality of a governance system, including its capacity to adapt to change, depends upon the possibility of holding decision makers accountable for poor performance, corruption, or failing to meet the needs and expectations of those whom they represent. As Skelcher (2005) observes, “[a]n intrinsic element of jurisdictional integrity in a democratic system is that citizens are enabled to give consent to and pass judgment on the exercise of authority by that governmental entity” (p. 89). Lebel et al. (2006) note that downward accountability to local constituents is often weak in natural resource governance, and they contend that this can compromise not just a governance system’s adaptive capacity, but an entire social-ecological system’s adaptive capacity. As their argument goes, mechanisms for accountability allow socially vulnerable groups that bear disproportionate risks and receive insufficient benefits from natural resource policies to challenge decision-making authorities. Any resulting efforts to improve the distribution of risks and benefits may enhance the adaptive capacity of vulnerable groups, which in turn may benefit the social-ecological system as a whole by reducing conflict and strengthening weak links (Lebel et al., 2006).

In the case of a polycentric governance system, conventional mechanisms for accountability (e.g. the electoral process, deliberative processes, public hearings, demonstrations (Skelcher 2005)) may prove inadequate on account of the dispersal of decision-making authority among governmental and non-governmental actors. Lieberman (2011) examines polycentric governance of infectious disease control in the Eastern Cape of South Africa and found that it was difficult for citizens to hold governance actors accountable because multiple actors were responsible for performing the same or similar tasks, resulting in confusion over whom to blame or punish. Governance actors had strong incentives to shirk responsibilities because they could

rely upon other actors who were assigned the same responsibilities, and they were not likely to be blamed or held accountable for inaction. Similar concerns were raised by Blomquist and Schlager (2005), who note that accountability in some polycentric governance systems may be challenged because of the high number of governance actors, each with his or her own line of accountability, and the fluidity or lack of clarity that often characterizes relationships between the actors.

To the contrary, Sovacool (2011) suggests that polycentric governance systems may actually enhance accountability because it may be more difficult for parochial interests to capture multiple levels of governance than to capture a single level. Similarly, E. Ostrom (2000) observes that polycentric governance systems, with their multiple centers of power at different levels, provide more opportunity for citizens and officials to correct maldistributions of authority and takeover by opportunistic individuals. This generally comports with V. Ostrom (1999b) who, in writing about “rule-ruler-ruled” relationships, states that “complex configuration[s] of institutional arrangements” where “everyone exercises some basic prerogative of governance and no one exercises unlimited prerogatives of governance” may help to stem abuses of power (p. 181). The topic of accountability, while clearly important, has not been explored in sufficient depth in the literature on polycentric governance for us to outline general strategies for closing accountability gaps. However, Agrawal and Ribot (1999) list a number of possibilities for decentralized governance arrangements, including monitoring by independent third parties (e.g., media or NGOs); auditing and evaluation; public reporting requirements for governmental decision makers; education; performance awards; and oversight by higher levels of government.

#### ***2.4.1.5 A variety of formal and informal mechanisms for conflict resolution exist within the system***

This enabling condition addresses the means by which decision-making centers in a functional polycentric governance system resolve conflicts that could otherwise erode coherence and undermine cooperative processes that maintain adaptive capacity (see da Silveira & Richards, 2013). V. Ostrom et al. (1961) state that having “recourse to central mechanisms to resolve conflicts,” is necessary for the coherent functioning of polycentric governance systems (p. 831). The authors’ use of the term “central mechanisms” does not mean that recourse to courts or higher-level government bodies is required or necessarily desirable for resolution of all conflicts. The submission of some disputes to judicial or higher-level governmental bodies may be unavoidable, particularly for decision-making centers that lack political or material clout (Agrawal & Gibson, 1999). But there is value in resolving conflicts through informal means, as V. Ostrom et al. (1961) recognize, because when higher-levels of government are invoked to resolve conflict, it tends to centralize decision-making and control. This, in turn, may impede adaptive capacity, as local decision-makers sacrifice autonomy to innovate contextually adapted solutions to resolve conflict at the local level (see V. Ostrom et al., 1961). Moreover, formal conflict resolution can be costly and protracted. In this regard, one of the design principles that Elinor Ostrom found to be associated with robust institutions for sustaining common-pool resources is rapid access to low-cost conflict resolution mechanisms (E. Ostrom, 1990).

Rather than creating strict hierarchical systems, E. Ostrom (2008) proposes “[d]esigning multiple tiers of arenas that can engage in rapid discovery of conflicts and effective conflict resolution” (p. 18). It is unclear how one might operationalize such a multi-tiered system, but the important point may be that conflict resolution systems should possess a diversity of forums and

offer a variety of approaches (e.g., conciliation, mediation, and arbitration) so that disputants have a choice in selecting a forum and mechanism most appropriate to the nature of the dispute and to their material circumstances. As Dietz et al. (2003) note, conflict resolution mechanisms “range from ballots and polls, where engagement is passive and participants interact minimally, to adversarial processes that allow parties to redress grievances through formal legal procedures, to various experiments with intense interaction and deliberation aimed at negotiating decisions or allowing parties in potential conflict to provide structured input to them through participatory processes” (p. 1909). The existence of a variety of formal and informal conflict resolution mechanisms may be particularly important in polycentric governance systems on account of their diversity of governance actors with varying degrees of political standing and material resources.

#### **2.4.2 Institutional fit**

A second advantage of polycentric governance systems commonly cited by commons scholars is that they are capable of producing institutions that are a good fit for natural resource systems (e.g, Lebel et al., 2006). Often referred to as “institutional fit,” the term very generally refers to the match or congruence between an institution and the problem or need it is meant to address. Institutions that exhibit good institutional fit may be more robust and effective in accomplishing desired outcomes because they better account for the characteristics of natural resource systems that they seek to address (Folke et al., 2007). Epstein et al. (2015) identify three types of institutional fit in the literature on social-ecological systems, two of which are relevant to the claim about polycentricity: (i) ecological fit, which typically considers whether institutions are aligned with the spatial, temporal, and functional characteristics of the ecosystem problem being addressed; and (ii) social fit, which is concerned with institutions that “reflect the interests, values, beliefs and psychological needs of groups” (p. 36). Scholars also sometimes credit

polycentric governance systems more generally with producing “context-specific” institutions, a claim that essentially concerns institutional fit without labeling it as such (e.g., Gelcich, 2014).

The claim that polycentric governance systems provide good institutional fit for natural resource systems is partly based on the concept of “near decomposability” (Blomquist, 2009). Nearly decomposable systems are comprised of a multi-level hierarchy of subsystems within larger systems. The subsystems operate largely independently but also impact or depend upon the other subsystems to varying degrees (see Simon, 1962). The concept of near decomposability has been extended to the analysis of natural resource systems, which are typically conceived as having multiple levels of sub-systems that function independently in many respects but are also functionally linked with higher-level and lower-level sub-systems within the larger natural resource system (see E. Ostrom, 2007). The partial independence of each subsystem implies that a governance configuration capable of producing good institutional fit would include decision-makers at the level of each sub-system to make context-specific institutions as well as decision-makers with authority over the entire natural resource system in order to address cross-level interactions (see Blomquist, 2009). Thus, Folke et al. (2005) observe that polycentric governance systems may be capable of producing institutions at levels that are most appropriate to ecological scale or level. The various human behaviors, values, preferences, and norms pertaining to, and interacting with, an ecological system are also heterogeneous and multiscale or multilevel. This further complicates the challenge of institutional design, and a governance system that is similarly heterogeneous and complex may be better suited to the task (Blomquist, 2009). The diverse mix of state and non-state governance actors in a polycentric system may be an advantage in this regard because governance actors may be able to leverage complementary knowledge (e.g., local or traditional knowledge and scientific knowledge) about social and

ecological systems to inform more contextually adapted institutions, thereby enhancing fit (see Cash et al., 2006).

In terms of the model, both attributes and two previously introduced enabling conditions contribute to the realization of good institutional fit. Given their full explication above, we address their pertinence to institutional fit in brief here. First, the existence of multiple, overlapping decision-making centers operating with some degree of autonomy (attribute one) helps make possible the production of place-specific institutions that are better tailored to a particular context or problem (see Pahl-Wostl et al., 2012; Folke et al., 2005). For example, Pahl-Wostl et al. (2012) state that “the distribution of authority among centers in a polycentric regime further enables place-specific responses to heterogeneity and uncertainties that a centralized system would make difficult” (p. 32). As Galaz et al. (2008) observe, these ‘place-specific responses’ take the form of diverse institutional arrangements, implicating enabling condition 4.1.1, which stipulates that decision-making centers employ diverse institutions. A one-size-fits-all approach to natural resource governance is antithetical to the concept of institutional fit, as we would expect decision-making centers to employ a diversity of institutions to effectively address the governance challenges of heterogeneous and dynamic commons (see E. Ostrom, 2012). Moreover, given the complexity of natural resource systems, it is unlikely that any single decision-making center possesses the range of knowledge necessary for the production of good institutional fit (Galaz et al., 2008). This speaks to the importance of decision-making centers taking one another into account, including through cooperative processes (attribute two), to enhance their capacity to produce institutions that are well-matched to social and ecological context. As governance actors may be widely dispersed in a polycentric governance system, participation in cross-scale linkages or other mechanisms for deliberation and learning (enabling

condition 4.1.3) may be necessary for this purpose (Imperial, 1999; Galaz et al., 2008). Such participation can build trust among disparate governance actors to encourage cooperation and stimulate institutional innovation to deal with challenging natural resource concerns (see Dietz et al., 2003).

We have identified two additional enabling conditions, discussed below, that may be necessary or conducive to achieving the advantage of good institutional fit.

#### ***2.4.2.1 Decision-making centers exist at different levels and across political jurisdictions***

The claim that polycentric governance systems provide good institutional fit for natural resource systems is based largely on the characteristic that they exhibit decision-making capability at different levels (e.g., local, state, and federal) that generally correspond to the multiple spatial levels or dimensions of natural resource systems (see Folke et al., 2005). While the existence of decision-making centers at different levels is partly implied in our first attribute by the criteria that decision-making centers be multiple and overlapping, we make this explicit and expand upon it by specifying that decision-making centers also exist or operate across political jurisdictions. Local-level decision-makers may be able to respond to environmental feedbacks more quickly than centralized decision-makers (Folke et al., 2007) and to craft institutions that are better adapted to local interests and norms of behavior (E. Ostrom, 2005a), but they often lack the capacity or authority to deal with transboundary issues. In this case, higher-level and/or cross-jurisdiction decision-makers in a polycentric governance system are necessary to deal with concerns that cascade across levels or jurisdictions (Galaz et al., 2008; Lebel et al., 2006). Cross-jurisdiction decision-making may be especially critical to fit, as Folke et al. (2007) argue that that the ecosystem properties that are most challenging for governance actors are those that are linked across jurisdictions or scales. McGinnis and E. Ostrom (2011)

observe that the existence of cross-jurisdictional decision-makers is an important component of polycentricity that distinguishes it from federalism:

Polycentricity conveys more than just federalism as it typically is understood. A federal system may consist only of a sequence of neatly nested jurisdictions at the local, state or provincial, and national levels, but a polycentric system also includes cross-cutting jurisdictions specializing in particular policy matters, such as an agency managing a river basin that cuts across state lines (p. 15).

The foregoing suggests that cross-jurisdiction decision-making centers may be an integral feature in any polycentric governance system. However, this may not be sufficient to ensure the production of institutions that are aligned with the spatial extent of a natural resource system or associated problem. As described in the following subsection, there should also be congruence between the jurisdiction of decision-making centers and the boundaries or spatial extent of the natural resource problem of concern.

#### ***2.4.2.2 The jurisdiction or scope of authority of decision-making centers is coterminous with the boundaries of the problem being addressed***

A core concern of institutional fit in the commons is that decision-making centers have jurisdiction or authority over the full spatial extent of a natural resource system or associated problem (Folke et al., 2007). In this regard, Cash et al. (2006) note that spatial scale mismatches occur when the extent of a decision maker's authority does not map coherently onto the spatial scale of the social or ecological problem at issue. They cite transboundary pollution, migratory fish stocks, and aquifer management as examples of concerns that often extend beyond the reach of a single decision-maker or governance system (Cash et al., 2006). V. Ostrom et al. (1961) make a similar point, observing that the boundaries of a political jurisdiction should "include the relevant set of events to be controlled" (p. 835). They note, for example, that the city of Pasadena suffers from smog attacks, but its political boundaries do not encompass an area sufficient to

control the social and meteorological variables that contribute to the problem (V. Ostrom et al., 1961). We therefore specify as an enabling condition in the model that the jurisdiction or scope of authority of decision-making centers be coterminous with the boundaries of the problem being addressed. To the extent decision-making centers cumulatively do not have coterminous authority to make decisions pertaining to a particular concern, this enabling condition also contemplates that a new decision-making center with appropriate jurisdiction could enter the governance system, including through a collaboration with existing decision-making centers.

### **2.4.3 Mitigation of risk through redundancy**

The final theoretical advantage we address is the claim that polycentric governance systems mitigate the risk of institutional failure and resource losses on account of their redundancy (e.g., E. Ostrom, 1999; Gelcich, 2014; Nelson, Howden, & Smith, 2008). This claim encompasses two related forms of redundancy: (i) the duplication of functions by decision-making centers within a given domain or issue area; and (ii) the existence of a diversity of institutions for managing a natural resource system across spatial and/or issue areas (see Low et al., 2003). This advantage is commonly proposed without a great deal of exposition. However, E. Ostrom (2012) provides the following hypothetical that illustrates the intuitive appeal of the claim:

Let us imagine a series of inshore fisheries located along the coast of a region and posit that every policy innovation has a probability of failure of 1/10. If the region were regulated by a single governing agency, one out of ten policy changes would be failures for the entire region. If designing rules were delegated to three genuinely independent authorities, each of these authorities would still face a failure rate of one out of ten. The probability that a failure would simultaneously occur along the entire coast, however, would be reduced from 1/10 to  $1/10^3$  or 1/1000. On a coast with many relatively separable inshore fisheries that are governed by local authorities, the likelihood of a coastal-wide failure is reduced still more (p. 129).

As this example illustrates, the existence of redundant or back-up teams of decision-makers experimenting with different rule-combinations may significantly reduce the risk of policy failure for an entire region, thereby increasing the stability or resilience of a natural resource system (Galaz et al., 2008). Dietz et al. (2003) note in this regard that catastrophic resource collapses have resulted when central governments exerted sole authority over resources.

Redundancy for purposes of this advantage may exist when there are multiple local-level decision-making centers across a larger resource system, as in the previous example, or when there are redundant decision-making centers at higher and lower governance levels in the same governance domain (Andersson & E. Ostrom, 2008). With respect to the latter, Low et al. (2003) note that the Maine lobster fishery represents a successful example of a redundant resource regime where decision-making occurs at state and local levels. Local lobster fishers control access and make some of the day-to-day informal rules for the fishery, while state government has enacted laws that protect breeding stock (Low et al., 2003). While the two centers of decision-making serve largely complementary roles, state regulators have intervened when local-level failures threatened the viability of the resource (Low et al, 2003). While the creation of redundant decision-making centers in a polycentric governance system may entail additional costs and appear inefficient, it may in fact be an efficient governance strategy if it avoids the loss of a resource (Galaz et al., 2008).

In terms of the model, we introduce no new enabling conditions on account of this posited advantage, as the most essential conditions for its realization have been previously described. Fundamental to the claim that polycentric governance systems mitigate risk through redundancy are a single attribute and two enabling conditions. First, the existence of multiple, overlapping decision-making centers with some degree of autonomy (attribute one) helps ensure

that redundant teams of decision-makers are engaged in a governance domain. In certain contexts, such as the Maine lobster fishery, a successful configuration of redundant decision-making will consist of lower- and higher-level decision-making centers. Thus, enabling condition 4.2.1, which specifies that decision-making centers exist at different levels and across jurisdictions, may be essential to realizing this advantage. The claim also presumes that decision-making centers produce diverse or different institutions in a governance domain (enabling condition 4.1.2) (See Andersson & E. Ostron, 2008). Otherwise, if an institution or policy experiment fails, there would be no alternative institutional approaches that could mitigate any resulting resource losses.

#### **2.4.4 Theoretical model**

In Table 2.1 below, we present a model of a functional polycentric governance system for the commons. The two defining attributes are represented in the far-left column, while the enabling conditions are in the adjacent column grouped below the attribute with which they are most closely associated. In the three columns to the right, we indicate which of the theoretical advantages are most directly supported by a particular attribute or enabling condition, recognizing that all of the elements in the model may contribute at least indirectly to realization of each advantage.

Table 2.1: Theoretical Model of a Functional Polycentric Governance System for the Commons

ATTRIBUTE	ENABLING CONDITION	ADVANTAGE: Enhanced Adaptive Capacity	ADVANTAGE: Provides Good Institutional Fit	ADVANTAGE: Risk Mitigation/ Redundancy
<b>Multiple, Overlapping Decision-Making Centers with Some Degree of Autonomy</b>		X	X	X
	Decision-making centers employ diverse institutions	X	X	X
	Decision-making centers exist at different levels and across political jurisdictions		X	X
	The jurisdiction or scope of authority of decision-making centers is coterminous with the boundaries of the problem being addressed		X	
<b>Choosing to Act in Ways that Take Account of Others through Processes of Cooperation, Competition, Conflict, and Conflict Resolution</b>		X	X	
	Generally applicable rules and norms structure actions and behaviors within the system	X		
	Decision-making centers participate in cross-scale linkages or other mechanisms for deliberation and learning	X	X	
	Mechanisms for accountability exist within the governance system	X		
	A variety of formal and informal mechanisms for conflict resolution exist within the system	X		

Presence of the elements we specify in the theoretical model is no guarantee that a polycentric governance system will perform effectively or achieve the advantages claimed by commons scholars. We emphasize that there are innumerable contextual factors that contribute to the emergence and maintenance of any governance system. Based upon development of the concept in the literature to date, we assert that their presence makes robust and functional governance of natural resources more likely. Of course, there are no perfect governance systems, and no polycentric governance system exists that fully manifests all the attributes and enabling conditions we prescribe and fully delivers on all the theoretical advantages proposed by commons scholars. Polycentricity presents in degrees, and polycentric governance systems may be more or less polycentric and more or less “system-like” in character (see Andersson & Ostrom, 2008; Gruby & Basurto, 2013; Galaz et al., 2011). It is therefore not our intention to develop a binary “litmus test” for polycentric governance systems. The model instead represents a stylized ideal type of a functional and fully polycentric governance system based on the current state of knowledge and research. In our final subsection below, we summarize some of the implications of the model and propose an agenda for future research.

## **2.5 The Path Forward**

In developing the theoretical model, we encountered a tension between, on the one hand, more specifically defining and bounding the concept of a functional polycentric governance system, and on the other, leaving open enough space for context-specific application and further development. We believe a more systematic approach to conceptualizing polycentric governance can better facilitate critical examination of the claims associated with it and the development of more nuanced theories concerning the features and circumstances associated with functionality. We viewed our task here as taking polycentric governance a step further towards specificity,

including identifying the underlying assumptions of commons scholars in attributing particular advantages to it, without sacrificing the generality necessary for contextual application. As previously noted, the theoretical model can never fully explain the emergence and success of a polycentric governance system (or lack thereof). The success of a particular polycentric governance system depends upon a myriad of factors, including the success and endurance of individual decision-making centers, which in turn may depend upon the extent to which they exhibit some combination of the eight design principles formulated by Elinor Ostrom (E. Ostrom, 1990).

Moving forward, work that investigates where, and under what circumstances, polycentricity in governance can lead to expected or desired outcomes is a critical avenue for further research. Additionally, comparative studies that integrate the findings and theoretical developments concerning polycentric governance and other similar concepts, such as multi-level governance (Hooghe & Marks, 2001) and network governance (Koppenjan & Klijn, 2004; Provan & Kenis, 2007) could prove very useful in advancing our understanding of polycentricity in complex governance systems (see McGinnis & E. Ostrom, 2011; Galaz et al., 2011). Other issues ripe for research include: (i) investigating how various degrees or manifestations of polycentricity are related to environmental and social outcomes; (ii) exploring the quality and degree of autonomy necessary for achieving well-performing polycentric governance systems in different settings; (iii) examining the benefits of cross-scale linkages and other coordination mechanisms and exploring how power asymmetries may be reproduced and amplified through such mechanisms and how they may be managed; and (iv) investigating mechanisms for increasing the accountability of decision-makers in polycentric governance systems.

Finally, this paper should not be read to suggest that polycentric governance systems are the definitive “answer” for the governance of natural resource systems. There are no panaceas, as Elinor Ostrom was well known for saying, and this is certainly as true for polycentricity as it is for other governance approaches. What succeeds in one setting may very well fail in another. Recent empirical studies suggest, however, that polycentric governance systems may be more likely than monocentric or centralized governance to exhibit enhanced adaptive capacity and therewith lead to better environmental and social outcomes (see Pahl-Wostl & Knieper, 2014; Pahl-Wostl et al., 2012). Much more empirical research is clearly needed to better predict when, where, and under what circumstances, polycentric governance is likely to perform well or poorly.

It is our hope that this paper will continue a conversation that seeks to build clarity around the concept of polycentric governance systems and the advantages they may yield. As noted earlier in this paper, polycentricity in governance is likely already a pervasive condition in much of the world, yet degradation of natural resources continues at an alarming rate (Millennium Ecosystem Assessment, 2005). This suggests that many polycentric governance systems may not be performing effectively. It is therefore critical that commons scholars move beyond making broad pronouncements concerning the theoretical benefits of polycentric governance for natural resources and begin to develop more nuanced and contextualized theories. There is ample reason to believe that polycentric governance systems, with their multiple avenues for collective action and creative problem solving, have the potential to lead to better social and ecological outcomes in many contexts. Given this potential and the challenges that natural resource governance presents, work that advances understanding of the concept, including factors associated with better performance, should be a priority for commons scholars.

### 3. FROM COMMUNITY-BASED TO POLYCENTRIC: FISHERY GOVERNANCE IN THE NORTHERN REEF OF PALAU<sup>5</sup>

#### 3.1 Introduction

In recent decades, a growing number of scholars have advocated decentralized, multilevel forms of governance to meet the challenges associated with sustaining natural resource systems. Underlying rationales include a recognition of the diverse scales and interests associated with natural resource systems and the limited capability of any single governance unit to deal effectively with the complexities they present (Blomquist, 2009). Among the governance concepts advanced, the one that may have gained the most traction in the literature is polycentricity. Polycentric governance systems are generally comprised of multiple, overlapping centers of decision making that operate with a fair amount of autonomy yet also evince a degree of coordination as they take one another into account in decision-making processes. (V. Ostrom, Tiebout, & Warren, 1961).

Although much has been written about the potential advantages offered by polycentric governance of natural resources, there has been comparatively little empirical research to investigate and ground the claims (McCord et al., 2016). Such work is critical for moving beyond broad generalizations about polycentricity to more refined theory concerning the emergence and functioning of different forms of polycentricity in particular contexts. To that end, we use a qualitative case study approach to examine the functioning of a governance system that transitioned from community-based to polycentric in a developing country context. The case is a small-scale fishery governance system in the Northern Reef region of the Republic of Palau,

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<sup>5</sup> Carlisle, Keith, and Rebecca L. Gruby. In Review. "From Community-Based to Polycentric: Fishery Governance in the Northern Reef of Palau." *Environmental Policy and Governance*.

a small island nation in western Micronesia. Small-scale fisheries are generally comprised of fishers who use less capital-intensive gear to harvest fish and invertebrates in coastal waters (Hauck, 2008). Despite a small population and territorial extent, the Northern Reef governance system includes state and non-state governance actors from local, state, national, and global levels. Targeted fish populations in the Northern Reef have been dwindling for what many believe to be decades. Most agree that overfishing is a primary cause, and there have been a variety of policy attempts to address resource exploitation and decline. Our objective in this case study is to understand whether the governance system exhibits the normative functioning predicted for polycentric governance systems, and if not, to explain why it diverges.

We characterize the governance system's polycentricity and diagnose its functionality using criteria set forth in a theoretical model of a functional polycentric governance system developed in Carlisle and Gruby, in press. The model is comprised of attributes that constitute defining elements of the concept, and enabling conditions that specify additional institutional<sup>6</sup> features that scholars have posited as necessary or conducive to achieving commonly predicted advantages of polycentricity, as described in subsection 3.5. The model proves useful for characterizing the polycentricity of the governance system and identifying deficiencies in institutional features that prevent the governance system from fully attaining predicted normative functioning. To explain distal causes of functional deficiencies and to enrich our understanding of behaviors in the fishery, we trace the evolution of the governance system from community-based to a form of polycentricity that entailed the entry of higher-level government decision makers at the expense of local autonomy and traditional authority. In doing so, we show that not

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<sup>6</sup> We use the term "institution" in this context to refer to formal and informal rules, norms, and strategies that structure human interactions (E. Ostrom, 2005a).

only the form of polycentricity, but also the path to polycentricity and the context in which institutions are embedded all contribute to the diagnosed deficiencies. Further, in examining a case where more polycentricity does not entail greater functionality, we remind readers of an important but sometimes forgotten point made by V Ostrom et al. (1961) more than 50 years ago – that is, the functionality of any polycentric governance system should not be taken as a given but is an empirical question (V. Ostrom et al. 1961).

In the following subsection, we briefly review scholarly development of polycentricity, including advantages commonly ascribed to the concept that inform our theoretical model. In subsection 3.3, we provide background on the case study setting, and in subsection 3.4, we describe our methods. We then systematically characterize the governance system's polycentricity and evaluate its functionality in subsection 3.5 using criteria specified in the theoretical model (Carlisle & Gruby, in press), before analyzing the system's transition to polycentricity in subsection 6. We conclude in subsection 7 with a discussion of the implications of our findings for policy and the research agenda on polycentricity.

### **3.2 Polycentric Governance Systems**

The concept of a polycentric governance system was conceived over a half-century ago in response to calls for consolidation in the delivery of public goods and services in metropolitan areas. In a foundational paper, V. Ostrom et al. (1961) argued that polycentric governance arrangements, characterized by multiple, overlapping, and semi-autonomous decision-making centers, may be able to operate as efficiently as centralized arrangements when they function as a coherent *system*. To function as a polycentric governance system, they posited, requires that decision-making centers act in ways that take one another into account in processes characterized by cooperation, competition, conflict, and conflict resolution (Ibid.).

Scholars of natural resource governance began to embrace polycentricity in the 1990s following Elinor Ostrom's groundbreaking work in the commons, which included the finding that robust institutions for maintaining complex common-pool resources are often "organized in multiple layers of nested enterprises" (E. Ostrom, 1990, p. 101). Commons scholars have concerned themselves less with efficiency than with the information challenges posed by the management of complex natural resource systems and the notion that governance systems capable of drawing upon diverse sources of knowledge and policy design may be better suited to the task (e.g., Andersson & E. Ostrom, 2008). Although many advantages have been ascribed to polycentric governance systems in this context, most fall within three broad claims: (i) polycentric governance systems exhibit enhanced capacity to adapt to change (Pahl-Wostl, 2009); (ii) polycentric governance systems mitigate risks associated with the failure of any single governance actor or policy because they have redundant governance actors and policies (E. Ostrom, 1999); and (iii) polycentric governance systems are capable of producing institutions that are a good "fit" to ecological and social context (Folke et al., 2007).

While the predicted advantages of polycentric governance systems have intuitive appeal, they lack sufficient empirical study. Large-N studies are important for developing general propositions about polycentric governance systems, and while there has been recent progress (e.g., Newig & Fritsch, 2007; Pahl-Wostl & Knieper, 2014) the challenges for such research are considerable. Polycentricity is not a binary condition, but rather presents in degrees across a number of measures, making classification of a system as polycentric (or not) a nuanced exercise requiring extensive contextual knowledge about practice and rules-in-use, among other things (Andersson & E. Ostrom, 2008). Adding to the complexity of the task, there is no consensus on the fundamental characteristics of a polycentric governance system. Given the looseness with

which the concept has been defined, governance systems that may be classified as polycentric are ubiquitous and diverse by many measures, including historical, economic, and cultural context. Large-N studies necessarily smooth out heterogeneity to render governance systems commensurable, and in doing so, the reasons *why* a governance system may or may not have performed according to prediction may not be evident.

Thicker, more holistic case study analyses are critical to the broader research agenda on polycentricity, complementing large-N studies to inform more nuanced theory. In this regard, an emerging body of case study scholarship interrogates advantages commonly ascribed to polycentricity in the commons, and their insights suggest potential refinements to theory. da Silveira and Richards (2013), for example, find that adaptive capacity may depend upon incentives for collaboration and mechanisms to minimize conflict over resources, while Wyborn (2014) finds that adaptive capacity may be compromised when governance actors are spatially distributed over extensive areas. More recent case studies have undertaken longer-term or historicized investigations of polycentric governance systems to examine their robustness (Morrison, 2017) and their functioning following transition from centralized governance (McCord et al., 2016; Baldwin et al., 2016). Our research similarly investigates a transition to polycentricity, but from the opposite direction of previous studies: from community-based to polycentric. We demonstrate not only how the path to polycentricity, but also how the particular form of polycentricity and the context, impact upon functionality. By doing so, our research points to the need for more refined theory that distinguishes among different manifestations of polycentricity.

### **3.3 Case Study Setting**

#### **3.3.1 Republic of Palau**

The Republic of Palau is an archipelago of more than 340 islands, only eight of which are inhabited by a population of about 18,000 (Palau Bureau of Budget & Planning, 2015).

Beginning in 1885, Palau was occupied successively by Spain, Germany, Japan, and the United States before becoming a sovereign nation in 1994, with a federal system of government based largely on the U.S. model. Today, Palau is a member of the United Nations, and it enjoys a robust tourism sector and highly publicized commitments to environmental conservation.

Palauans also enjoy a high standard of living relative to other Pacific Island nations (UNDP, 2015). Most economic opportunities, however, are in the urban center of Koror, with relatively fewer opportunities for income generation in the Northern Reef communities.

#### **3.3.2 The Northern Reef**

The Northern Reef is a colloquial name for the roughly 1,500-square-mile body of water that separates Palau's northernmost states, Ngarchelong and Kayangel (see map at Figure 3.1 below). Ngarchelong is located at the northern tip of Palau's largest island, Babeldaob, and has a land area of roughly five square miles. It is comprised of eight rural hamlets and has a resident population of about 316 people (Palau Bureau of Budget & Planning, 2015). Kayangel is a small and relatively remote island atoll located 25 nautical miles north of Ngarchelong, with one populated island divided between two hamlets and a fluctuating resident population of around 70 individuals. Importantly, the number of Palauans who identify as being "from" Ngarchelong or Kayangel is much higher than the number of residents, as many former residents relocated for economic or other reasons but maintain strong ties and fishing privileges in their home states.



Map data ©2017 Google

Figure 3.1: Map of Main Palauan Archipelago

Prince et al. (2015) estimate that about 38 individuals in Ngarchelong fish regularly, while Kayangel, with its small and fluctuating resident population, has only 10 to 15 active fishers at any time. Fishers in the Northern Reef exhibit a high degree of dependence on fishery resources for sustenance, income, and satisfaction of customary obligations. Fishing does not represent a full-time occupation for residents of either state, however, as most fishers have other full-time employment. To supplement low wages, many Ngarchelong fishers sell fish at a frequency varying from several times a year to several times a week, while Kayangel fishers seldom sell fish because of their distance to markets.

Fishing in the Northern Reef is typically carried out in nearshore reef areas where well over 50 species of finfish are exploited. Most fishers own or have access to a canoe or small boat with outboard motor, and they employ a variety of fishing gear and methods. By nearly all accounts, Northern Reef fish populations have declined substantially over the last several decades, with fishers reporting that targeted species are smaller and less abundant. Perceptions of stock decline are supported by Prince et al. (2015), who conclude that populations of 11 commonly landed species in the Northern Reef are close to or below the threshold at which population recruitment is likely to become impaired. Declining productivity, along with the importance of fishing in Ngarchelong and Kayangel, has attracted a number of scientists and conservation NGOs to the communities, and these actors have assumed integral roles in the governance system.

### **3.3.3 Formal governance structure**

Formal rights and responsibilities in the governance of small-scale fishing in the Northern Reef flow from Palau's Constitution. Based upon the U.S. model, the Constitution establishes an executive branch, an independent judiciary, a bicameral congress, and 16 states. It also

recognizes the validity of traditional law and the traditional role of chiefs. Each state has its own constitution and a government that typically represents a blending of the democratic and traditional systems. Ngarchelong includes the highest-ranking chief from each hamlet (former villages) in its legislature alongside an elected member, while Kayangel's two highest-ranking chiefs possess veto power over any bill passed by the legislature. The Constitution vests ownership of natural resources out to 12 nautical miles in the states, and it gives the national congress management responsibility. The division between ownership and management created conflict, eventually resulting in judicial determination that the national government and states share authority to regulate the resources. The authority of traditional leaders in the domain of fishing is largely an open question not specifically addressed in the Constitution.

### **3.4 Methods**

We chose a qualitative case study approach (Yin, 2003) for this research to develop a contextualized understanding of governance processes in the Northern Reef, including deeper insight into historical and cultural forces that shape fishing incentives and behaviors. Our data collection methods were ethnographic in nature and included semi-structured and informal interviews, participant observation, and document analysis. The first author collected data for this research over a seven-month period in 2014 while living in Ollei Hamlet in Ngarchelong State, and he was joined by the second author during the first month of fieldwork. Both authors revisited the field for several weeks in January - February 2017 to follow up with key informants on developments pertaining to the fishery and to share emerging results. During initial fieldwork, we conducted semi-structured interviews with 103 individuals. Our sampling method was purposive, and respondents consisted of Northern Reef resource users, elected and traditional leaders from Ngarchelong and Kayangel, NGO representatives, and state and national

government employees engaged in resource management efforts in the Northern Reef. These categories are not mutually exclusive, as many individuals occupy multiple roles and could speak from multiple perspectives. We also conducted frequent informal and unrecorded interviews with key informants and small groups to test ideas, to make sense of conflicting data, and to gain perspectives difficult to elicit in an interview setting. We recorded these data along with observations from participating in fishing activities, engaging in community events, and attending fishery management meetings in a research journal totaling 287 pages of field notes. Documents such as national and state statutes and constitutions, resource management plans, newspaper articles, and reported court decisions constituted another data source. Finally, we reviewed published literature on the history of Palau's political, social, environmental, and institutional systems to supplement primary data and to inform our understanding of the evolution of the governance system.

We used a combination of inductive and deductive processes to collect and analyze data. Consistent with a deductive approach, our research questions and data collection were informed by theory on polycentricity and institutional analysis. We thus collected data on both formal and informal rules-in-use regarding fishing at operational, collective choice, and constitutional levels (E. Ostrom 2005a), as well as data concerning the health and uses of fishery resources, perceptions of decision makers and decision-making processes, and historical fishing practices and institutions. We incorporated iterative processes in the field, however, in which we analyzed data and continuously revised our collection efforts as we gained insights into governance processes and the broader context in which they were embedded. Once we completed data collection, we transcribed interviews and uploaded transcriptions and other data into QSR NVivo qualitative analysis software for thematic coding and interpretive analysis. Our approach to

coding also incorporated both inductive and deductive processes. Prior to analysis, we formulated codes corresponding to the characteristics of a functional polycentric governance system (see Carlisle & Gruby, in press). As new themes emerged during analysis, we assigned them to newly-created codes. This approach gave us the flexibility to analyze the governance system through a pre-existing theoretical lens while remaining open to alternative explanations, contextual considerations, and theoretical refinement.

### **3.5 Evaluation of the Governance System through the Lens of Functional Polycentricity**

To characterize the Northern Reef governance system's *functional* polycentricity (i.e., the extent to which it is polycentric and also achieves advantages commonly ascribed to polycentric governance systems), we evaluate it according to criteria in the theoretical model developed in Carlisle and Gruby (in press). These criteria were formulated with generality to allow for context-specific application, and we use qualitative description here to assess their presence, recognizing that polycentricity presents in degrees across these criteria (Andersson & E. Ostrom, 2008). The theoretical model is comprised of two attributes (described in subsection 3.5.1), which constitute the core elements of a polycentric governance system, and seven enabling conditions (described in subsection 3.5.2), which specify additional institutional features that may be necessary or conducive for achieving one or more theoretical advantages of polycentricity in the commons. Thus, the enabling conditions are not inherent to the concept but have been posited by scholars as potentially critical to functionality. As we acknowledge in Carlisle and Gruby (in press), although some enabling conditions are more integral to realization of a particular advantage than others, one could reasonably argue that all of the enabling

conditions are at least helpful in achieving each advantage. We refer the reader to Carlisle and Gruby (in press) for a more detailed treatment of the model and the three predicted advantages.

### **3.5.1 Characterization of the Northern Reef governance system: How polycentric?**

We characterize the governance system's polycentricity by evaluating the extent to which it exhibits the two attributes of a polycentric governance system.

#### **3.5.1.1 Attribute one: *Multiple, overlapping decision-making centers with some degree of autonomy***

Any governmental or non-governmental actor that makes and enforces institutions in a particular domain may be characterized as a decision-making center in a polycentric governance system (E. Ostrom, 1999). We emphasize that to meet our definition of decision-making center, a governance actor must make and enforce *rules-in-use*. At least six groups meet these criteria in the Northern Reef governance system to varying degrees: traditional leaders of Ngarchelong and Kayangel, the state governments of Ngarchelong and Kayangel, the national government, and fishers. They are overlapping in the sense that they all exercise decision-making authority over fishing in the Northern Reef, though jurisdiction of state government and traditional leaders is circumscribed by their respective state territorial boundaries.

As examples of decision making, the national government has enacted prohibitions on destructive fishing methods, and it instituted seasonal closures on several popular species and bans on the harvest of two overexploited species. It also pursued non-legislative strategies to reduce pressure on reef fish, including promotion of giant clam aquaculture and fishing of pelagic species. The two state governments initially had little capacity for fishery management, but with direction and support of NGOs, each gradually introduced fishery and marine conservation policies. For example, Kayangel prohibited the sale of fish caught inside its lagoon

and created a permit scheme that in practice was used only to issue permits to tourists, while Ngarchelong enacted a scarcely known law prohibiting citizens of other states from fishing in its waters. The state governments share a critical deficiency with the national government: weak enforcement. There was effectively no national government enforcement presence during our fieldwork, as the responsible agency lacks resources to patrol the Northern Reef and generally relies on tips from civilians. Although each state has a patrol boat and a small staff of conservation officers, the high cost of fuel makes it prohibitively expensive to do extensive and regular patrols. More problematic, no conservation officers in either state had legal authority to issue citations until mid-2014, when several from each state were deputized. State conservation officers also expressed and demonstrated reluctance to penalize community members. Indeed, more than two years after deputization, a Ngarchelong conservation officer was unable to recall any citations having been issued.

Traditional leaders from Ngarchelong and Kayangel have become increasingly marginal in the governance of fishing, except to the extent they serve in state government. In their capacity as chiefs, they sometimes act as gatekeepers when fishers from other states seek permission to fish in their waters. And chiefs in each state have occasionally declared traditional laws, known as a *bul*, pertaining to marine conservation and fishing, including designation of a no-take marine protected area (MPA) in each state's waters. The MPAs were subsequently protected by state legislation, as chiefs have no dedicated resources for enforcement. Although respondents professed a high level of respect for traditional law, citizens of other states may be less inclined to comply with a directive from local chiefs, especially after a 2009 case in which a trial court found that Ngarchelong chiefs had no constitutional right to enforce a *bul* that forbade citizens of other states from fishing in Ngarchelong. The ruling did not create a binding precedent, but it did

contribute to uncertainty about traditional authority. After another controversy in 2011 surrounding the defiance by chiefs in one Ngarchelong hamlet of a statewide *bul* on the sale of sea cucumbers, the chiefs have become increasingly inactive; no fishing or marine conservation *bul*s have since been declared.

We note that fishers do not generally make institutions for the fishery aside from operational rules for a fishery cooperative. However, caveats are in order. First, fishers in both states weakly reproduce territorial norms based upon customary marine tenure. Second, many Palauan men fish, and fishers inevitably occupy decision-making roles in government and traditional leadership. The extremely small size of Palauan states also means that fishers generally know, and have direct access to, decision makers. Thus, while fishers occupy a relatively limited decision-making center role, other decision-making centers are theoretically capable of leveraging fisher knowledge and preferences to inform contextually-adapted institutions. In practice, this has not regularly occurred, as institutional design has more often been shaped by external actors. In this regard, most post-independence fishery policies in the Northern Reef have been initiated and/or supported by NGOs (see Matthews, 2007). In Palau, one national-level policymaker described NGOs as “development partners,” with national and state governments relying on them for scientific expertise, policy design, and material resources. An NGO respondent explained that NGOs screen potential fishery management approaches for local suitability before introducing them to decision makers. Though we do not classify NGOs as a decision-making center given their reliance on government decision-making centers for promulgation and enforcement of institutions, one could reasonably argue that they should be considered a decision-making center given their imprint on institutions. Regardless, they have

been integral in catalyzing governance response to ecological change, shaping agendas, and designing policies.

*Summary.* Although there are at least six overlapping and semi-autonomous decision-making centers, their capacity for enforcement is uniformly weak. Given the definition of decision-making center as an actor who makes and *enforces* rules-in-use, we conclude that the first attribute of a polycentric governance system is partially present in the Northern Reef.

**3.5.1.2 Attribute two: *Choosing to act in ways that take account of others through processes of cooperation, competition, conflict, and conflict resolution***

The second attribute describes processes by which decision-making centers can function as a cohesive system without the need for central direction: cooperation, competition, conflict, and conflict resolution. In effect, these processes can generate self-organizing tendencies (V. Ostrom et al., 1961). All four processes are identifiable in the Northern Reef governance system. For example, cooperative processes underlie the outsourcing by government decision-making centers of the production of scientific knowledge to more efficient or capable producers, such as NGOs. Processes of competition, conflict, and conflict resolution have largely determined the relative authority of traditional leaders and national and state governments to regulate fishery resources on account of constitutional ambiguities. Each has competed for legitimacy in the domain through the exercise of rule-making authority, and conflicts concerning the constitutional authority of state governments and traditional leaders to make and enforce fishery laws have been resolved by courts, with significant consequences for the ordering of the governance system. Processes of competition also characterize efforts of different NGOs to influence fishery policy in the Northern Reef.

A presently ongoing fishery co-management initiative illustrates how processes of cooperation and conflict have shaped recent policy response to fisher decline. Spearheaded by an NGO, the Northern Reef fishery co-management initiative began in 2012 and represents a collaborative approach (i.e., cooperation) between Ngarchelong and Kayangel. The NGO organized a co-management committee with representatives from government, traditional leadership, and fishers to agree on a general approach involving the development of equivalent fishery management institutions in each state. Although the adoption of uniform institutions entails a loss of state autonomy to develop more contextualized policies, it serves at least two purposes. One, it could shore up enforcement, as conservation officers from both states could cooperate in policing the Northern Reef without concern over whether an incident occurred in one jurisdiction or the other. Second, it would avoid bringing to a head a low-simmering boundary dispute over a reef claimed by both states, and thus constitutes a strategy for conflict management, if not resolution.

The NGO promoted size limits and short-term moratoria on a suite of species to state decision makers, and it organized separate meetings among fishers to discuss potential fishery rules and formation of a cooperative. The meetings were more in the nature of a consultation, although there is evidence that some of the fishers' concerns, including size preferences for particular species, were taken into account by the NGO in its recommendations to state government decision makers. In 2015, both states enacted three-year bans on the harvest of six grouper species. Not long after, Kayangel adopted comprehensive regulations that created an expanded fishery permit system and imposed minimum size limits on 14 species of reef fish, more than twice the number originally discussed with fishers. The same regulations have been under consideration in Ngarchelong, but as of January 2017, they had yet to be adopted. Some of

the proposed size limits met with resistance from a minority of fishers who exhibit a high degree of dependence on several species at issue. Despite the conflict, the NGO organized a joint fishery cooperative that purchases only size-compliant fish from fishers. The NGO also promoted aquaculture and fisheries for underexploited species. These efforts are still early stage so their prospects for longer term success are uncertain.

*Summary.* We find that the second attribute of a polycentric governance system is present in the Northern Reef, as decision-making centers have taken one another into account in fishery management, including through processes of cooperation, competition, conflict, and conflict resolution. Among other things, this has enabled decision-making centers to identify common objectives (e.g., strengthening enforcement), to institute a variety of complementary fishery policies, and to identify opportunities for collaboration (e.g., the Northern Reef fishery cooperative), all without central direction. We therefore find that the governance of small-scale fishing in the Northern Reef constitutes a polycentric governance system, exhibiting a fairly high degree of the characteristics associated with the concept, but with enforcement deficiencies noted in subsection 3.5.1.1.

### **3.5.2 Characterization of the Northern Reef governance system: How functional?**

We characterize the governance system's functionality by first assessing the extent to which it exhibits enabling conditions from the theoretical model (assigned numbers here to facilitate discussion). They constitute additional institutional features posited in the literature as necessary or conducive to achieving one or more of three commonly predicted advantages of polycentricity, as described at greater length in Carlisle and Gruby (in press). We then describe the extent to which each of the advantages is present.

### 3.5.2.1 *Enabling conditions*

*Enabling condition one: Decision-making centers employ a diversity of institutions.*

Institutional diversity – i.e., a variety of written and unwritten rules, norms, and strategies in a particular domain – underlies all the posited advantages of polycentricity given the high probability that any single institution will prove inadequate or ineffective (E. Ostrom, 1999). We characterize this enabling condition as partially present, for although a variety of fishery institutions have been enacted in the Northern Reef (e.g. seasonal closures, access restrictions, MPAs, species bans, and gear restrictions), they are weakly enforced, and many do not constitute rules-in-use. There is evidence of a significant level of poaching by fishers from outside the Northern Reef communities (Prince et al., 2015), and while fishers from Ngarchelong and Kayangel exhibited a high degree of compliance with MPAs and laws prohibiting destructive fishing methods, violations of other laws, especially species-specific laws, were not uncommon.

*Enabling condition two: Generally applicable rules and norms structure actions and behaviors within the governance system.* Generally applicable rules and norms may be essential to the self-organizing capacity of polycentric governance systems because they bound the universe of acceptable policies and governance actors in a domain, and they ideally provide sufficient incentives for institutional innovation (V. Ostrom, 1999a). We characterize this enabling condition as present. The Constitution, as interpreted by courts, is the supreme law of Palau and establishes ownership of fishery resources and allocates responsibility for their management. Additionally, informal rules-in-use permit new actors (e.g., NGOs) to enter the governance system, allowing for enhancement of governance capacity, innovation, and adaptation.

*Enabling condition three: Decision-making centers participate in cross-scale linkages or other mechanisms for deliberation and learning.* The predicted functionality of polycentric governance systems is often predicated on the dissemination of information for decision making, deliberation among stakeholders, and learning (e.g., E. Ostrom, 1999), processes that are facilitated by participation in forums designed for such purposes. We characterize this enabling condition as partially present. Decision makers, resource users, scientists, and NGOs have participated in a variety of formal and informal forums to discuss fishery concerns. However, some respondents reported that Palauan norms of respect for authority have at times inhibited free and open exchange and that agendas have sometimes been controlled by NGOs. There is also evidence that some fisher groups (e.g., Kayangel residents) were inadequately represented in deliberative forums.

*Enabling condition four: Mechanisms for accountability exist within the governance system.* A governance system's functionality and integrity depends upon the possibility of holding decision makers accountable for poor performance, corruption, or failing to meet the needs and expectations of citizens or community members (Skelcher, 2005). We characterize this enabling condition as partially present. While elected leaders are accountable to voters through electoral processes, traditional leaders are primarily accountable to the clan they represent, and, so far as we are aware, NGOs are formally accountable to their funders and are at least informally accountable to government decision-making centers. However, the small size of Palau, the importance of reputation and familial relationships, and the high level of group dependence all serve as informal or indirect accountability mechanisms to all stakeholders.

*Enabling condition five: A variety of formal and informal mechanisms for conflict resolution exist within the governance system.* Conflict is extremely likely when decisions are made affecting resource access and use, and functionality may require availability of a diversity of conflict resolution forums and approaches so disputants can choose one that is most appropriate to the nature of the dispute and their material circumstances (Dietz, E. Ostrom, & Stern, 2003). We characterize this enabling condition as partially present on account of heavy dependence on courts in Koror for conflict resolution, which is costly, protracted, and tends to centralize decision making and control (V. Ostrom et al., 1961). However, existence of unresolved conflict (e.g., a border dispute between Ngarchelong and Kayangel) has not precluded productive activity among governance actors.

*Enabling condition six: Decision-making centers exist at different levels and across jurisdictions.* Functionality, including production of context-appropriate institutions, may require decision-making capability at multiple levels and also across jurisdictions to deal with transboundary issues (McGinnis & E. Ostrom, 2011). We characterize this condition as present, as government actors regulate fishing at the state and national levels, and traditional leaders occasionally regulate fishing at the state (and rarely hamlet) level. Decision-making centers also regulate fishing across state jurisdictions through the Northern Reef fishery co-management committee and the national government. We note, however, an important level in this case is only marginally engaged in decision making: resource users.

*Enabling condition seven: The jurisdiction or scope of authority of decision-making centers is coterminous with the boundaries of the problem being addressed.* Effective problem solving requires that decision-making centers have decision-making capability over the variables relevant to the problem of concern (V. Ostrom et al., 1961). We characterize this condition as

present, as the national and state governments as well as traditional leaders collectively have full jurisdiction over access and appropriation of fish populations of concern, which are non-migratory.

Thus, all the enabling conditions associated with functionality are at least partially present in the Northern Reef. In Table 3.1 below, we summarize our evaluation of the presence of attributes and enabling conditions in the Northern Reef governance system.

Table 3.1: Presence of Attributes and Enabling Conditions in Northern Reef Governance System

Attributes	Presence in the Northern Reef Governance System
<b>Attribute One:</b> Multiple, overlapping decision-making centers with some degree of autonomy	<b>Partial:</b> Six semi-autonomous and overlapping decision-making centers exist for the Northern Reef, but their functioning is compromised by weak capacity for enforcement.
<b>Attribute Two:</b> Choosing to act in ways that take account of others through processes of cooperation, competition, conflict, and conflict resolution	<b>Present:</b> All four processes are evident. Decision-making centers have competed for authority and legitimacy within the governance system and have cooperated on policy initiatives. Conflicts over decision-making authority have been resolved primarily by courts.
Enabling Conditions	Presence in the Northern Reef Governance System
<b>Enabling Condition One:</b> Decision-making centers employ diverse institutions	<b>Partial:</b> Institutions are diverse and include restrictions on access, species-specific moratoria and seasonal closures, bans on destructive fishing methods, and MPAs. <i>However, institutions are weakly enforced and many do not constitute rules-in-use.</i>
<b>Enabling Condition Two:</b> Generally applicable rules and norms structure actions and behaviors within the system	<b>Present:</b> The Constitution is the supreme law of Palau and establishes limitations on the exercise of decision-making authority in the domain of fishing. Informal rules-in-use permit new actors (e.g., NGOs) to enter the governance system, allowing for the introduction of additional capacity and adaptation.
<b>Enabling Condition Three:</b> Decision-making centers participate in cross-scale linkages or other mechanisms for deliberation and learning	<b>Partial:</b> Leaders, scientists, and resource users have participated in forums to discuss and deliberate fishery management alternatives. <i>In some cases, however, norms of respect may have inhibited free and open dialogue, certain fisher groups lacked representation, and agendas were shaped by external actors.</i>
<b>Enabling Condition Four:</b> Mechanisms for accountability exist within the system	<b>Partial:</b> Elected leaders are accountable to voters through electoral processes; traditional leaders are primarily accountable to clans; and NGOs are primarily accountable to funders and government decision makers. <i>However, Palau's small size and the importance of reputation partially mitigate deficiencies in formal downward accountability mechanisms.</i>
<b>Enabling Condition Five:</b> A variety of formal and informal mechanisms for conflict resolution exist within the system	<b>Partial:</b> Palauan society is litigious, with disputes frequently litigated in courts rather than resolved through traditional or informal means. Litigation can be costly and protracted. Smaller, local-level conflicts are occasionally mediated by traditional leaders and elders. <i>Unresolved conflict has not precluded cooperation or other productive activity.</i>
<b>Enabling Condition Six:</b> Decision-making centers exist at different levels and across political jurisdictions	<b>Present:</b> Government actors exist at the state and national level; traditional leaders can function at the hamlet, state, and national level, but function almost exclusively at the state level in the domain of small-scale fishing; decision-making centers also function across political (state) jurisdictions through the Northern Reef fishery co-management committee and the national government.
<b>Enabling Condition Seven:</b> The jurisdiction or scope of authority of decision-making centers is coterminous with the boundaries of the problem being addressed	<b>Present:</b> Decision-making centers have jurisdiction over the full spatial extent of Northern Reef fish populations.

Given the deficiencies described above, we would not necessarily expect full achievement of predicted functionality. In the subsections that follow, we describe the extent to which each predicted advantage is realized in the Northern Reef governance system, and we describe how particular attributes and enabling conditions contribute to, or undermine, their achievement. We note that deficiencies in accountability mechanisms (enabling condition four) and conflict resolution mechanisms (enabling condition five) have thus far not materially contributed to deficiencies in functionality, underscoring our assertion in Carlisle and Gruby (in press) that the importance of an enabling condition will vary by context.

### **3.5.2.2 Adaptive capacity**

An advantage frequently ascribed to polycentric governance systems is that they exhibit enhanced capacity to adapt to social and ecological change by altering governance processes and/or structural elements (e.g., institutions) as decision makers gain experience (Pahl-Wostl, 2009). The usual rationale is that their multiplicity of semi-autonomous decision-making centers facilitates parallel efforts to experiment with different institutions which, when combined with information transmission and learning, can lead to institutional innovation (E. Ostrom, 1999). We point out that realization of adaptive capacity, as we and other scholars have defined it (e.g., Pahl-Wostl, 2009), does not necessarily entail improved resource health, as the focus is on institutional innovation with an implied expectation that positive resource outcomes may follow.

We find that the governance system exhibits adaptive capacity in the narrow sense that the multiple governance actors (attribute one) have continually pursued new policies when existing ones proved inadequate. Ideas for new institutions, however, have not so much emerged from deliberative forums (enabling condition three) as they have from external actors, such as NGOs, whose participation in the governance system is permitted under generally-applicable

informal rules-in-use (enabling condition two). This has resulted in institutional diversity (enabling condition one), but many institutions do not constitute rules-in-use on account of weak enforcement and variable compliance (deficiencies in attribute one and enabling condition one). We therefore characterize realization of adaptive capacity as partial.

### ***3.5.2.3 Mitigation of risk through redundancy***

Polycentric governance systems are commonly thought to mitigate against the risk that a particular decision-making center or policy might fail or prove ineffective because they have redundant or “back-up” decision-making centers and institutions in a given domain that may succeed (e.g., E. Ostrom, 2012). Such redundancy can increase the stability of a natural resource system and avoid total resource collapse, as has happened when central governments exerted sole authority over resources (Dietz et al., 2003).

In the Northern Reef governance system, multiple decision-making centers (attribute one) exist at different – primarily national and state – levels (enabling condition six), theoretically mitigating against possible failures by any of them. There is also a diversity of institutions in the governance system (enabling condition one), theoretically mitigating the risk of any single policy failure. As we previously observed, however, many institutions do not constitute rules-in-use (deficiencies in attribute one and enabling condition one). We note, however, that redundant use of state and traditional law for a single prescription (e.g., state MPAs) may hedge against the risk of noncompliance, as some respondents expressed a greater sense of obligation to comply with a *bul*. We therefore conclude that realization of this benefit is partial, as the governance system exhibits the *potential* to mitigate risks on account of redundant institutions and governance actors, but realization of the advantage is contingent on enforcement and compliance, which varies widely across the different institutional arrangements.

#### 3.5.2.4 *Institutional fit*

A final advantage we consider is institutional fit, a term that refers to the congruence between an institution and the problem or need it is meant to address (Folke et al., 2007). Claims that polycentric governance systems facilitate provision of good institutional fit in the commons generally refer to *ecological fit* and/or *social fit*. Ecological fit concerns the alignment of institutions with relevant spatial, temporal, and functional characteristics of a resource or ecosystem, while social fit generally concerns whether institutions reflect important characteristics of affected human communities, such as values and preferences (Epstein et al., 2015). Institutions that exhibit good fit may be more effective because they better account for ecological and social conditions and the characteristics they seek to influence (Folke et al., 2007).

In the Northern Reef governance system, provision of institutions with good *ecological fit* is theoretically possible. The multiple decision-making centers (attribute one) have jurisdiction over the full range of reef fish populations (enabling condition seven) enabling them to regulate access and appropriation. Species of concern are non-migratory, and recent evidence indicates that some self-recruiting reef fish populations may exist at scales as small as 1-10 km, nested within larger populations (Prince et al., 2015). The multilevel structure of the governance system (enabling condition six) allows for fine-scale policy at the state level that is roughly aligned with the spatial scale of fish populations and national-level policy to address transboundary issues. While fishery resources have yet to rebound, we cannot conclude that institutions represent poor ecological fit, as a number of them have been introduced only recently, and it would be premature to expect returns.

The difficulty in assessing ecological fit, whether now or at some future date, is that many institutions are not routinely enforced or followed (deficiencies in attribute one and enabling condition one). This indicates that some institutions likely constitute poor *social* fit in the sense that they do not reflect fishers' interests or preferences or otherwise provide sufficient incentives to induce voluntary compliance (Rohe et al., 2017). In this regard, Northern Reef fishers have had insufficient voice in institutional design. Although fishers participated in forums to discuss potential rules, Ngarchelong fishers described being steered towards pre-selected options while most fishers residing in Kayangel were unaware of the rules under consideration, raising issues of representation (deficiencies in enabling condition three). Many Ngarchelong respondents were opposed to temporary moratoria, and key informants reported in 2017 that fishers continued to harvest groupers, notwithstanding the three-year moratorium that emerged from the initiative. We therefore characterize achievement of good institutional fit in the Northern Reef governance system as partial on account of shortcomings in social fit.

Partial fulfillment of attribute one and key enabling conditions have thus resulted in partial achievement of all three advantages, leading the governance system to underperform relative to the theoretical ideal. In Table 3.2 below, we summarize our evaluation of these advantages in the Northern Reef governance system.

Table 3.2: Realization of Theoretical Advantages of Polycentricity

Advantages	Realization in the Northern Reef Governance System
<b>Adaptive Capacity</b>	<b>Partial:</b> Decision-making centers participate in deliberative forums to discuss fishery concerns and continually experiment with new fishery policies and approaches to address resource decline, resulting in institutional diversity. However, recent ideas for policies have originated from external actors (NGOs) rather than fishers, and many policies are not rules-in-use on account of weak enforcement and variable compliance.
<b>Mitigation of Risk Through Redundancy</b>	<b>Partial:</b> Redundancy exists in that there are (i) multiple decision-making centers that exercise responsibility for making and enforcing institutions in the Northern Reef (i.e., functional overlap); and (ii) multiple, diverse fishery institutions. This redundancy endows the governance system with the potential to mitigate risk, but actual mitigation is contingent on enforcement and compliance of institutions, which varies widely.
<b>Institutional Fit</b>	<b>Partial:</b> Ecological fit of institutions is theoretically possible, as decision-making capability is roughly aligned with the likely structural organization of fish populations. Social fit of some institutions is poor, however, as fishers generally have had insufficient voice in institutional design. As a result, some institutions do not reflect fisher preferences, which contributes to compliance deficiencies.

### 3.6 The Transition to Polycentricity

The above analysis reveals that compliance deficiencies, linked to weak enforcement and insufficient participation by fishers in institutional design, have undermined the potential efficacy of institutions and impeded full achievement of the three advantages. Our understanding of these findings – in particular, compliance deficiencies – is enriched by an interpretive analysis of the governance system’s transition from community-based to polycentric. This analysis points to additional, distal causes of compliance deficiencies, as well as other factors that have altered incentives for fishing and have contributed to a deterioration of norms that encouraged resource stewardship.

Prior to the arrival of foreign occupiers in the late-19<sup>th</sup> Century, the most important political units in Palau were villages, which coexisted in dynamic alliances (Graham & Idechong, 1998). Decision-making authority for fishing was vested in village-level councils comprised of male chiefs representing strictly-ranked kinship clans (Matthews, 2007). Chiefs administered customary marine tenure systems whereby adjacent reefs were controlled for the

exclusive use of villagers, and they used *buls* to implement restrictions with the intent or effect of conservation (Johannes, 1978). Decision-making by councils often required consensus and the support of prominent community members (Useem, 1950), and although chiefs commonly tasked an individual with responsibility for monitoring and reporting violations, all villagers effectively assumed this responsibility. Fishers also followed and enforced rules-in-use discouraging wasteful fishing practices (Johannes, 1981). In this sense, the pre-colonial governance system could be characterized as community-based, particularly as chiefs were also fishers. Compliance was purportedly high, as punishments could be harsh and impact not only the reputation of the transgressor, but also his family and clan (Useem, 1950).

Foreign occupation introduced a gradual shift away from the preeminence of villages, as occupiers created and engaged with 16 higher-level political districts generally corresponding to historical village alliances (Graham & Idechong, 1998). The two Northern Reef districts represented a political realignment (Matthews, 2007), however, as Ollei village was incorporated into the district of Ngarchelong despite having a closer alliance with the district of Kayangel. Notwithstanding increasing influence of districts, governance of fishing in the Northern Reef remained largely village based through the 1970s. Under U.S. administration, the Trust Territory government enacted a handful of fishery laws, but Johannes (1981) reports that they were seldom enforced. Respondents' accounts of fishing during this time depict high levels of individual responsibility for resource stewardship, mutual accountability, and respect for traditional authority. As examples, older fishers recounted being punished by elders for bringing home too many fish, and some described being taught to release a portion of fish from their nets to replenish the reef. Norms in Kayangel and Ngarchelong also discouraged the selling of fish caught close to ports to ensure an adequate supply for local consumption. And fishers in Ollei

reportedly created a conservation area for trochus mollusks. Village chiefs continued to make fishing *bul*s with some regularity, and respondents reported that respect for chiefs and traditional law was high. An older Ngarchelong resident explained that if he learned a neighbor had violated a fishing *bul*, he would have reported it out of a sense of obligation but would feel no such obligation to report a violation of a government fishing law today.

In 1981, Palau became a self-governing territory with the ratification of a national constitution, and thirteen years later it gained independence. The Constitution increased polycentricity in the domain of fishery governance at the expense of traditional and village-level autonomy. The 16 districts became states, and they were given ownership of the reefs and the authority to regulate fishing together with the national government. State-government decision making did not equate to local-level decision making, however. In Ngarchelong, political organization at the state level was incongruent with local social organization, as Ollei Hamlet continued to maintain a distinct identity, cohesion, and fishing culture relative to the other hamlets. Moreover, state government decisions for the fishery often reflected the priorities and recommendations of external actors rather than ideas originating from community members.

Traditional leaders and fishers grew increasingly reliant on government to manage fishing. Respondents were nearly unanimous in characterizing monitoring and enforcement today as the responsibility of government. Indeed, many responsibilities that were once community concerns are now viewed as the job of government. In the words of one fisher, “people seem to think that the government has all the answers and ... whatever the problem is, they’ll fix it ... Before, when we walked on the streets and saw trash, we picked it up ... Today, you walk down the street, you see trash and say, ‘the government is not doing its job.’” It represents an example of “crowding-out,” whereby externally imposed regulations weaken

individuals' intrinsic motivation to comply with existing social norms (Gurney et al., 2016). In this case, however, government decision-making centers lack sufficient capacity to enforce regulations.

Experimental evidence has shown that when externally imposed regulations are modestly enforced, they can do more harm than good because they tend to crowd out prosocial behavior in favor of self-interest (Cardenas, Stranlund, & Willis, 2000). We see evidence of this in the Northern Reef, as respondents reported that fishers increasingly fish alone and hide their catch and fishing spots from one another. Respondents also reported that informal rules-in-use discouraging wasteful fishing practices no longer exist, with fishers garnering the respect of peers rather than disapproval for returning to port with coolers full of fish. When asked why these rules disappeared, some explicitly blamed the transfer of reef ownership and management responsibility to the state. One fisher remarked that it is no longer possible to stop someone from engaging in a fishing practice unless a government law prohibits it, and indeed, most respondents were skeptical about the ability of fishers to make and enforce unwritten rules without the imprimatur of government. Yet it is also true that the democratic system lacks the legitimacy of the traditional system (Ruddle, 1993). Respondents typically expressed greater respect for the traditional system but at the same time often remarked that “chiefs no longer know how to be chiefs.” In a sense, the transition to polycentricity created a vacuum of moral authority that elected leaders have been unable to fill. This manifests in reduced social pressure to follow rules and greater ease in rationalizing their violation.

The transition to polycentricity did not impact upon fisher behavior in isolation, as incentives for fishing were also altered by ongoing demographic, economic, and technological changes. Reef fish, commoditized under Japanese occupation, were increasingly harvested and

sold by Palauans with the progression to a market economy (Johannes, 1981). Fishing pressure was further fueled in the 1980s by the development of a tourism industry that brought new infrastructure, foreign workers, and greater demand for reef fish (Ueki & Clayton, 1999). Technology that was formerly unavailable, including motorboats and freezers, gradually became ubiquitous and facilitated larger harvests and longer storage to meet the demand of locals and tourists. These factors conspired to incentivize fishing at levels that were unsustainable, and they contributed, together with changes associated with the transition to polycentricity and deficiencies identified in subsection 3.5 (weak enforcement and insufficient fisher participation in decision making) to a deterioration of rule compliance.

### **3.7 Discussion**

We set out to understand whether the Northern Reef governance system evinces the functionality predicted by commons scholars and if not, to explain why it diverges. Given this objective, much of our attention here has been focused on deficiencies. Through our evaluation of the governance system using criteria in the theoretical model, we found that weak capacity of decision-making centers to enforce institutions, variable compliance, and insufficient participation by fishers in institutional design contributed to partial functionality in terms of adaptive capacity, institutional fit, and mitigation of risk.

Our findings also show that the path to polycentricity is implicated in functional deficiencies in the Northern Reef governance system. In this case, becoming polycentric necessitated some loss of power and control at the local level because responsibility for the fishery had been vested entirely in village communities. As we described, this contributed to crowding-out dynamics, an increase in self-interested behavior, and greater social tolerance of rule violations. We speculate that when the path to polycentricity entails a loss of local control or

self-determination, one should expect different outcomes than when the path entails a degree of local empowerment, as would typically be the case if polycentricity were preceded by centralized governance. We hypothesize that a transition from centralized to polycentric governance could strengthen citizenship, prosocial behavior, and conditions amenable to collective action (see Marshall, Hine, & East, 2017), whereas a transition from community-based to polycentric governance risks conditions conducive to crowding-out and a loss of prosocial behavior. The latter may be more likely when, as in the Northern Reef governance system, resource users retain little or no decision-making authority and higher-level authorities are characterized by weak enforcement capacity and lower perceived legitimacy (Cardenas et al., 2000).

Context also figures into a distal explanation of compliance deficiencies and fisher behaviors in at least two respects. First, factors such as economic and technological development were inextricably bound up with the transition to polycentricity in altering individual incentives for restraint in resource appropriation and rule compliance. With the possibility of larger, more efficient harvests, and the growth of markets for fish, restraint in fishing became equivalent to a loss of needed income (Johannes, 1978). This served to reinforce changes in compliance behavior wrought by erosion of local autonomy and assertion by state and national governments of responsibility for maintaining the fishery. Context is also implicated in the performance of top-heavy polycentricity in the Northern Reef in the sense that national and state governments lacked sufficient resources to carry out the responsibilities they assumed. In a context where higher-level decision-making centers are characterized by inadequate resources for rule implementation, top-heavy polycentricity constitutes a poor fit to material realities. Laws and regulations may fail to become rules-in-use if governments are not capable of enforcing them. Moreover, where resource users are characterized by strong norms encouraging resource

stewardship, top-heavy polycentricity risks crowding-out, representing a waste of human and material resources (E. Ostrom, 2005b).

Taken as a whole these findings suggest that the particular form of polycentricity that emerged in the Northern Reef is implicated in the functional deficiencies we identify. Decision making is dominated by national and state governments, with decisions strongly influenced by external NGO actors. It represents a “top-heavy” form of polycentricity, in that historical decision-centers - hamlets and resource users – are marginal in decision making, contributing to deficiencies in institutional fit and compliance. Because of the looseness with which polycentricity has been defined, top-heavy systems fall under the same conceptual umbrella as systems exhibiting considerable local autonomy. This impedes development of theory, as there is reason to believe that polar forms of polycentric governance should diverge in functioning. In common-pool resource literature, participation by resource users in decision making has repeatedly been shown to contribute to positive social and environmental outcomes and rule compliance (E. Ostrom, 1990; Gurney et al., 2016), suggesting that the extent of resource-user participation in a polycentric governance system may be linked to better performance in particular contexts.

Although we highlight the potential value of giving resource users decision-making authority in the Northern Reef, we point out that there is no guarantee that they will be capable of collective action or that any institutions they make will constitute good ecological fit. There are considerable differences among Northern Reef fishers, including with respect to fishing methods, fishing frequency, species harvested, and reliance on income from selling fish. It is not at all clear that they would be capable of agreeing on rules for the fishery, which is not to say that allowing them the opportunity is not a worthwhile endeavor. Achieving functionality

requires continual trial-and-error experimentation to develop policies and decision-making structures that are appropriate for a particular context.

Although this paper focuses on deficiencies, we also wish to emphasize that the governance system exhibits many advantageous characteristics that may allow it to redress deficiencies we found. For example, governance actors demonstrated a willingness and capability to adapt to resource decline in that they continually tried new policies and strategies when existing ones proved inadequate. In fact, the recent collaboration between Kayangel and Ngarchelong is partly an effort to address enforcement deficiencies, which compromise functionality. A major reason the system has exhibited the possibility of adaptation is that informal rules allow actors from civil society, such as NGOs, to supplement governance capacity, providing material resources and information for decision making to help communities cope with declining resources. However, there is a fine line between being perceived as supportive versus controlling, and fishers often perceived NGOs and government as the latter. Deliberative processes, like policies, are experiments; there is reason to believe that governance actors, based upon their continuous development of new approaches to fishery management, are capable of learning from past experiences with deliberative processes and improving upon them.

In summary, this paper highlights certain needs, issues, and goals for the empirical research agenda on polycentricity. Chief among needs is sustained and systematic empirical research that examines the functionality of diverse forms of polycentric governance systems in different contexts and over time. One direction suggested by our case is to investigate the relationship between functionality and polycentric governance systems exhibiting varying degrees or configurations of local- and higher-level decision making. In contexts where government actors have thin financial resources, research that investigates how such actors can

effectively support or catalyze decision making by other actors in a polycentric governance system would be extremely valuable for theory and policy. More research is also needed that investigates the emergence of polycentric governance systems, including the relationship between the path to polycentricity and functionality. An issue that arises in evaluating functional polycentricity is the critical need for methods that facilitate an understanding of rules-in-use, autonomy, and the exercise of decision-making authority, as a superficial accounting of formal institutions and entities with formal grants of authority may be a poor representation of reality. A longer-term goal for the research agenda is development of more nuanced theory that distinguishes among different forms of polycentric governance systems and characteristics associated with their advantages and pathologies in various contexts. Scholarly work that advances this goal is critical if polycentricity is to endure, not just as a normative ideal or a label for complexity, but as a concept with predictive power that informs better policy.

## **4. CUSTOMARY MARINE TENURE IN A RURAL PALAUAN STATE: SOCIAL FUNCTION AND IMPLICATIONS FOR FISHERY POLICY**

### **4.1 Introduction**

Customary marine tenure (“CMT”), a situation where a group controls access and use of marine resources on traditional nearshore fishing grounds (Johannes, 2002), is well documented throughout the islands of the Pacific (e.g., Ruddle, 1994; Johannes, 1978). Historically, CMT varied in form and function across the region, but it commonly entailed flexible administration of fishing rights that were characterized by some degree of exclusivity (e.g., in the use of a fishing ground or a particular fishing method) (Ruddle, 1996, Johannes, 1998). Though forces associated with colonialization, economic development, and nation-building eroded CMT systems throughout the Pacific, they persist in a number of settings today (Aswani, 2017). Their form and function may have evolved, however, to reflect the changing demographics and needs of fishing communities and the coexistence of CMT with state law.

CMT is often characterized as a traditional form of small-scale fishery management (e.g., Johannes, 1981). Small-scale fishers, who generally harvest fish from shore or small boats in coastal waters, account for as much as 90 percent of the world’s fishers (Hauck, 2008). With small-scale fisheries facing mounting challenges throughout Oceania (Hardy et al., 2016), there is considerable interest in reviving, strengthening, or using features of CMT to address resource overexploitation and decline (Kittinger et al., 2014; Aswani, 2017). Prescriptions for doing so are generally grounded in the belief that CMT represents a better fit to local social and ecological context than Western models of fishery management (Aswani & Ruddle, 2013) and/or in the logic of neoclassical economics that exclusive and secure property rights (presumed to flow from CMT) incentivize fishers to invest in the maintenance of fishery resources because resulting

benefits will accrue only to rights holders (Wilén, Cancino, & Uchida, 2012). With respect to the latter, CMT is often equated with territorial use rights for fisheries (“TURFs”), a popular rights-based fishery management tool that grants exclusive fishing rights in a particular territory to a defined group of fishers (Wilén et al., 2012; Quynh et al., 2017). The extent to which CMT functions to produce the incentives that economists ascribe to TURFs is uncertain, however, as fishing rights under CMT may be less secure and conditional upon meeting culturally specific criteria. Indeed, Lieber and Rynkiewich (2007) prefer the term “claim” to “right” to avoid any presumption of enforceability through sanction. We use the term “right” because of common usage, but with the understanding that CMT rights may be poorly defined, contingent, and contestable.

Our concern here is not so much the functioning of CMT as a resource management strategy, but rather, the functioning of CMT as a social or community management strategy and the implications for fishery policy, topics that have received insufficient attention in the literature on Pacific small-scale fisheries. We address this deficiency through in-depth case study analysis of the form and functioning of CMT with respect to a small-scale fishery in Ngarchelong State in the Republic of Palau, a small island nation in western Micronesia. Our objectives are (i) to describe the parameters of CMT rights in Ngarchelong; (ii) to explain the social function they serve; and (iii) to explore the implications for fishery policy in our research site and more broadly. Historically, CMT served a number of important social functions in Pacific societies, including conflict minimization and resource distribution (Johannes, 1982). Indeed, it is debatable whether CMT embodies a conservation ethic, as there is evidence that in many societies it evolved, not in response to resource scarcity, but to manage relationships between social groups (Foale et al., 2011). With elements of CMT persisting in places, administration of

customary fishing rights by local communities may continue to serve important social functions in contemporary Pacific societies. Aswani (2017) observes that CMT systems are “‘messy’ and ‘contested’ social spaces that are continually evolving” (p. 5), though not necessarily for the purpose of conserving marine resources. He notes that failure to account for the fluid networks of CMT stakeholders in TURF design can compromise a policy’s effectiveness and equity (Ibid.). We broaden that argument to suggest that failure to account for networks of CMT stakeholders and the social function of CMT in the design of *any* fishery management policy that formalizes or redefines fishery access and use rights risks undermining social systems that help support the viability of fishing communities. As our case demonstrates, even where CMT institutions are weakly enforced and coexist with state law, they may nonetheless exert subtle constraints on behavior and help to maintain social bonds and networks that are critical to sustainable livelihoods. We follow other scholars in calling for “hybrid” fishery policies (e.g., Aswani & Ruddle, 2013; Kittinger et al., 2014) that incorporate customary principles, such as administrative flexibility, into conventional fishery policies, and we demonstrate how such policies may be designed to take into account local institutions and the social function of CMT.

To ground our discussion of CMT in Ngarchelong, we briefly review the literature on customary property rights in the Pacific in the following subsection, highlighting the dynamic, contingent, and relational nature of such rights, and the group and individual benefits they provide. We also introduce the concept of legal pluralism, which we employ to understand and explain the development of CMT in Ngarchelong under multiple legal systems. We then describe our methods in subsection 4.3 and the case study setting in subsection 4.4. In subsection 4.5, we discuss historical CMT in Palau before turning to our examination of present-day CMT in Ngarchelong, including its social function or benefits, in subsection 4.6. We conclude in

subsection 4.7 with a discussion of the implications of our findings for fishery policy, both in Ngarchelong and more broadly.

## **4.2 Customary Property Rights in the Pacific**

### **4.2.1 Characteristics**

CMT represents a specific form or subset of customary property rights, which, as a broader category, encompass customary rights to a range of property types or resources, both terrestrial and marine. Though there is considerable variability across customary property rights systems in the Pacific, there are common features or principles that emerge from the literature and ground our discussion of CMT in Ngarchelong. First, property rights, whether customary or otherwise, do not merely define an individual's relationship to a thing; rather, they define the terms of a relationship among people with regard to a thing (Wagner & Talakai, 2007; Lieber & Rynkiewich, 2007). As such, property rights have been conceptualized as a form of social relation (Wagner & Talakai, 2007). In addition, property rights derive from institutions — i.e., formal and informal rules, norms, and strategies that structure human interactions (E. Ostrom, 2005a). In the case of customary property rights, the underlying institutions that give substance to the rights generally emanate from customary practice and traditional law (Ruddle, 1996), though as described in subsection 4.2.2, they may also be based, in part, upon state law. Among other things, these institutions prescribe who may use a resource, for what purposes, and under what conditions.

In the Pacific, culturally specific criteria determine who holds customary property rights and the specific uses and obligations attendant to those rights. On Lihir Island off of Papua New Guinea, rights to land controlled by a particular clan may be acquired by joining in, and contributing to, feasts (Macintyre & Foale, 2007). Even after individuals relocate to another

village, they can maintain membership in the community of rights holders through continued participation in this social ritual. Importantly, members of customary rights-holding communities do not necessarily have equal or identical rights. In the marine context, Ruddle (1996) observes that CMT may be characterized by multiple, overlapping layers of customary rights with differing use privileges assigned according to social criteria. Extensive primary rights, for example, may be inherited by descent, while more restrictive secondary rights may be gained through marriage or residency (Ibid.). Additionally, countervailing rights to a particular species or fishing technique may belong to a kinship group, such as a clan or lineage (Carrier, 1987).

In general, the boundaries of a social group or network with customary property rights are not rigidly defined, but are instead fluid and contingent upon multiple factors (Aswani, 2017). For example, CMT rights at Marovo Lagoon in the Solomon Islands may be inherited through both matrilineal and patrilineal descent (Ruddle, 1996). An individual thus belongs to multiple social groups with rights in potentially more than one fishing territory (Ibid.). The strength of those rights and group membership is influenced by residency and usage, however, as fishing rights are generally strongest in areas closest to an individual's primary residence, and they may erode over time if not used (Ibid.). Customary property rights and associated social groups are also dynamic, being deeply embedded in changing political, economic, and social contexts (Aswani & Ruddle, 2013). Societal changes associated with colonialization, development, and nation building in Oceania have greatly impacted customary property rights throughout the region (Ruddle, 1996). In some cases, they have adapted and persisted, while in others they have collapsed (Ibid.). Aswani (2002) finds that adaptation and maintenance of CMT in the face of social and demographic changes may be more likely when rights holders reside in close proximity to one another and hold a higher degree of social and cultural affinities, while

Cinner (2005) finds that continued maintenance of CMT is associated with greater distance from markets, lower migration, higher dependence on fishing, and more conflicts over resources.

In settings where customary property rights persist, norms associated with resource use may provide both group and individual benefits. Resource-sharing norms, for example, are common throughout the Pacific, and while they are often credited with equitable distribution of resources, they may also promote group harmony and cohesion as well as the stability of the customary system (Ruddle, 1996). The sharing of fish may be associated with individual benefit or gain as well. On Ponam Island off of New Guinea, individuals with exclusive rights to a particular fishing technique give away much of their catch in adherence to norms of generosity (Carrier, 1987). In doing so, they gain repute and social credit, which later benefits them in ceremonial transactions (Ibid.). Norms of reciprocity that impel group or community support may also attend customary property rights. In certain areas of the Solomon Islands, for example, villages receive direct assistance, including cash remittances, from individuals who move away but wish to maintain customary fishing rights (Hviding, 1998). As explored in the case study of CMT in Ngarchelong, such assistance may be critical to the welfare and endurance of rural villages faced with limited economic opportunity and out-migration.

#### **4.2.2 Coexistence with state law**

Customary property rights and traditional or customary legal systems do not exist in isolation. Throughout the Pacific, imported Western legal systems have been superimposed on traditional legal systems, with the constitutions of most Pacific nations recognizing custom or traditional law to varying extents (Graham & Idechong, 1998). Even where there is a lack of formal recognition, however, the existence of traditional law and customary property rights is not necessarily precluded. Indeed, in more remote or rural communities, customary practices and

traditional law often still predominate in daily life (Clarke & Jupiter, 2010). Where state and traditional laws or institutions coexist, the result is a phenomenon referred to by socio-legal scholars as “legal pluralism” – i.e., a circumstance where different rule systems or legal orders apply to identical situations (Gupta & Bavinck, 2014). This research employs legal pluralism, not to advance theory or the concept, but as an analytical lens through which to view and better understand the case study. In this regard, legal pluralism directs the researcher to identify which statements of authority tend to be treated as binding by particular individuals, and for what purposes, without prejudgment that a particular legal system is more legitimate, pervasive, or dominant than another (Berman, 2009; F. von Benda-Beckmann & K. von Benda-Beckmann, 2006).

Customary property rights in the Pacific often exist under conditions of legal pluralism, with resource usage regulated by both customary and state institutions. This can affect the strength and substance of customary property rights, as they may be treated as subordinate to state law and/or may evolve to incorporate state-law features. As the latter suggests, legal orders are neither impermeable nor isolated; they interact and influence one another in ongoing processes of reconstruction and hybridization (Meinzen-Dick & Pradhan, 2002; Salim, 2010). Indeed, the unwritten and flexible nature of customary property rights makes them particularly conducive to processes of bricolage (see Gupta & Bacinck, 1986).

When property rights are defined under multiple legal systems, individuals may have more opportunity or means to negotiate access to resources. Ruddle and Satria (2010) note, for example, that in the Kei Islands of eastern Indonesia, residents view the imposition of state law as supplementing traditional law rather than replacing it, such that they have additional options for accessing and using resources. Opportunity for access may also be expanded on account of

uncertainties created by legal pluralism. In this regard, legal pluralism compounds the information challenge people face in trying to understand the source and substance of institutions (Meinzen-Dick & Pradhan, 2002). In some cases, this may result in “fuzzy” property rights with nebulous parameters (Phuc, 2007). The information challenge may be particularly acute in the Pacific, as state law is often written by Western-trained lawyers in a form of unfamiliar jargon, while traditional law is generally unwritten. The uncertainties that result effectively expand the normative or legal space within which customary property rights evolve, providing more room for contestation and reinterpretation (see Adhuri, 2013), a theme we return to in our discussion of CMT in Ngarchelong.

### **4.3 Methods**

We chose a qualitative case study approach (Yin, 2003) for this research to gain in-depth understanding of rules-in-use and perceptions concerning access and use of fishery resources. To that end, our data collection methods were ethnographic in nature and included semi-structured and informal interviews, participant observation, and document analysis. The first author collected the data for this research over a seven-month period in 2014 while living in Ollei Hamlet in Ngarchelong State, and he was joined by the second author during the first month of fieldwork. We conducted semi-structured interviews with 103 individuals who fell into two general categories: (i) primary resource users (e.g., fishers and reef gleaners), and (ii) fishery decision makers (e.g., traditional and elected leaders). Given that many traditional and elected leaders also fish or glean, the two categories are not mutually exclusive. Resource-user respondents included both Ngarchelong residents and nonresidents with ancestral ties who continue to fish or glean in the state. We also conducted frequent informal and unrecorded interviews with key informants and small groups to test ideas and triangulate data, and we

participated in fishing and gleaning activities and community events to identify rules-in-use and to understand the social and cultural importance of fishery resources. All data from participant observation and informal interviews were recorded in an extensive research journal totaling 287 pages of field notes. Finally, we supplemented these data with documentary evidence, including national and state statutes and constitutions, newspaper articles, and reported court decisions pertaining to fishery access and use.

We used a combination of deductive and inductive processes in our collection and analysis of data. Consistent with a deductive approach, our data collection efforts were informed by institutional analysis and our objective of documenting and understanding rules-in-use for the fishery, including their social function. Thus, our initial questions focused primarily on who is allowed to fish in Ngarchelong and for what purposes (e.g., commercial sale, consumption, and customary use), as well as the sources of authority for fishery institutions and the uses of fishery resources. As we gained additional insights in the field (e.g., conditions or expectations associated with fishing rights), we used iterative processes in which we continually analyzed data and revised our collection efforts to reflect our evolving understanding of the case. Once we completed data collection, we transcribed interviews and uploaded transcriptions and other data into QSR NVivo qualitative analysis software for thematic coding and interpretive analysis. As with data collection, our approach to coding incorporated both deductive and inductive processes. Prior to analysis, we formulated codes corresponding to elements of formal and informal fishery institutions (e.g., characteristics of permitted resource users and conditions attached to resource use). As additional themes and patterns emerged during analysis, however, we assigned them to newly-created codes. This flexible approach allowed us to remain open to

new insights and explanations that emerged from close and iterative readings of transcripts and other data sources.

#### **4.4 Case Study Setting**

The Republic of Palau, situated roughly 600 miles east of the Philippines, is an archipelago of more than 340 islands, only eight of which are presently inhabited. Independent from the U.S. since 1994, Palau's population of about 18,000 and land area of only 189 square miles (Palau Bureau of Budget & Planning, 2016) rank it among the world's smallest nations. Its global presence exceeds its diminutive size, however, as it enjoys a robust tourism sector, a UNESCO World Heritage Site, and highly publicized commitments to environmental conservation. Relative to other Pacific island nations, Palauans enjoy a high standard of living, with per capita gross national income in 2015 of \$13,771 USD (UNDP, 2015). Population and economic opportunity are not evenly distributed among Palau's 16 states, however. Though only about seven square miles in land area, Koror State is home to two-thirds of the country's population and an overwhelming share of industry, including tourism. It also hosts Palau's only hospital, public secondary school, and community college. Consequently, most Palauans from rural villages have left their ancestral homes over past decades to resettle in or near Koror for economic, health, and educational reasons, as well as for marriage.

Ngarchelong State, the setting for this research, is among the Palauan states affected by rural out-migration. Ngarchelong lies on the northern tip of Palau's largest island, Babeldaob, roughly an hour's drive away from Koror, a distance that makes daily commuting difficult. Many, if not most, of Ngarchelong's elected and traditional leaders now reside in other states, along with a significant number of other former residents. Ngarchelong's resident population stands at around 316, distributed among eight small rural hamlets (Palau Bureau of Budget &

Planning, 2016). Importantly, the number of Palauans who consider themselves to be from Ngarchelong is likely more than double the number of residents, as Palauans typically identify strongly with their ancestral homes. Many resettled individuals continue to maintain voting privileges and property interests in Ngarchelong and to contribute various forms of support to the resident community. We use the term “community” throughout to refer to individuals residing both within and without Ngarchelong who are perceived to have a legitimate right or interest in the state’s resources. We note, however, that within this community are multiple social groups with shared norms and values, particularly among the different hamlets, or groupings of hamlets, within Ngarchelong.

One advantage enjoyed by Ngarchelong over most Palauan states is a large marine territory and a relative abundance of marine resources. Despite a land area of only about five square miles, Ngarchelong has over 76 square miles of marine territory in what is colloquially known as the Northern Reef of Palau. Its fishery is a typical tropical multispecies fishery in that well over 50 species of finfish are exploited by fishers using a variety of gears and methods. Prince et al. (2015) estimate that about 38 individuals in Ngarchelong fish regularly, though most men and a minority of women in the state fish at least occasionally. There is also a smaller fishery for invertebrates, such as sea cucumbers and bivalve mollusks, prosecuted almost exclusively by women. Fishing does not represent a full-time occupation for residents of the state, as most fishers have other employment, typically in minimum-wage state government jobs. To supplement low wages, many sell fish and invertebrates at a frequency that ranges from several times a year to several times a week.

Ngarchelong’s reef fish have been declining in recent years, as they have throughout Palau’s main archipelago. The Northern Reef nevertheless remains one of the more productive

fisheries in Palau, and Palauans with ancestral ties to Ngarchelong regularly return to take advantage of its marine resources. As we describe in the following subsection, their access and use of resources is governed by customary institutions that have evolved to account for legal, demographic, political, and economic changes.

#### **4.5 Historical Customary Marine Tenure in Palau**

As in many Pacific island societies, Palauans historically used sophisticated customary systems of tenure to regulate access and use of marine and terrestrial resources (Graham & Idechong, 1998). Control over natural resources was based in villages, the most basic and important political units in Palau prior to the arrival of foreign occupiers in the late 19<sup>th</sup> century (Matthews, 2007). Villages typically had ten chiefs and an equal number of female counterparts who represented strictly-ranked kinship clans. As fishing was the exclusive domain of men, decision making over fishing was vested in village councils comprised of male chiefs (Ibid.). Chiefs administered CMT systems whereby villages controlled the adjacent marine territory to just beyond the outer reef edge for the exclusive use of villagers (Johannes, 1981). They also imposed a variety of other fishery restrictions with the intent or effect of conservation, including temporary area closures and temporary bans on the harvest of particular species (Johannes, 1978).

Johannes (1981) contends there is no evidence of historical resource scarcity to explain the evolution of CMT in Palau, and he suggests it may have emerged on account of dangerous storms and constant warfare that forced fishers to stay close to village boundaries (Ibid.). We submit that another plausible explanation is resource distribution, and relatedly, the securing of benefits associated with the sharing of marine resources under village control. Sharing and reciprocity were among the basic tenets of traditional Palauan society (Matthews, 2007), and

village control over CMT was flexibly administered to accommodate these principles. It was not uncommon, for example, for Palauan chiefs to grant access to fishers from other villages who needed fish for important customary feasts (Johannes, 1981). And during Japanese occupation, the district (now state) of Ngeremlengui ceded fishing rights in an area of its traditional fishing grounds to a neighboring district with fewer resources (Ibid.). Such events likely did not represent disinterested generosity, as recipients of valuables in traditional Palauan society were generally expected to reciprocate in an appropriate manner (Ota, 2006). In some cases, villages shared reciprocal fishing privileges in support of relationships that could be called upon when faced with hardship. Ollei Village, now a hamlet in Ngarchelong State, and the two villages of Kayangel, a small and relatively remote island state in the Northern Reef, formed a close alliance of cooperation and mutual support that entailed the sharing of food, trading of commodities, and reciprocal fishing privileges (Putney, 2008). When Kayangel was devastated by a storm in what respondents believed to be the late-19<sup>th</sup> or early-20<sup>th</sup> century, Kayangel residents were permitted to build temporary homes in Ollei and to live there until Kayangel's natural resources were replenished.

In the 20<sup>th</sup> century, Palau experienced profound societal change on account of forces associated with colonialization, economic development, and nation-building. Of particular relevance to CMT are changes associated with the creation of political districts, the introduction of formal democracy, and self-governance. Foreign occupiers created 16 political districts for administrative purposes that generally corresponded to historical alliances of villages (Graham & Idechong, 1998). The district of Ngarchelong, however, represented a political realignment, as Ollei village was combined with the seven neighboring Ngarchelong villages into a single district despite its closer association with Kayangel, which became a separate district (Matthews,

2007). The 16 districts eventually became states in 1981 with Palau's ratification of a constitution that enshrined democratic principles previously introduced by the U.S. Pursuant to the Constitution, states assumed ownership of natural resources out to 12 nautical miles, and they shared responsibility with the national government for marine resources management. Although the Constitution recognized the validity of traditional law and the authority of chiefs in traditional matters, it did not explicitly address the authority of chiefs to regulate fishing. The power of chiefs in Palauan society was diminished, including in the domain of fishery management. CMT, previously practiced at the village level, was weakened in Ngarchelong by the transfer of resource ownership and management responsibility to the state. Informal CMT institutions concerning access and use of fishery resources did not disappear, however. They persisted and evolved as fishery stakeholders grappled with, and contested, questions of who should be allowed to harvest fish in the state's waters, and for what purposes.

#### **4.6 Present-Day Customary Marine Tenure in Ngarchelong**

##### **4.6.1 State and traditional laws**

Today, rights to access and use fishery resources in Ngarchelong exist in a state of legal pluralism. The fishery is de jure limited access, as both state and traditional laws prohibit citizens of other states from fishing in Ngarchelong's waters. On-the-ground reality is more complicated, however. The state law limiting fishing access to Ngarchelong citizens was enacted in 2000, a time when the state government had no enforcement capability. The law had little to no practical effect, and most respondents, including some state leaders and conservation officers, were unfamiliar with it when interviewed in 2014. A nearly identical traditional law, known as a *bul*, was issued by Ngarchelong's highest chiefs in 2007. Unlike the state law, the *bul* was publicized throughout Palau by radio, and in two well-known incidents, chiefs ordered state government

employees to seize the boats and equipment of violators. In the first incident, the violator was a nonresident with familial ties to Ngarchelong, and he argued that he qualified as a Ngarchelong citizen under its constitution and was therefore allowed to fish in the state. The Constitution defines “citizen” as any person with blood lineage to a Ngarchelong clan, or who through custom becomes a member of a Ngarchelong clan. This is an extremely broad definition that captures a large proportion of Palauans given the high rate of intermarriage among Palauans from different states. The chiefs countered that for purposes of the *bul*, citizenship carries the additional customary requirement that a nonresident continue to support and contribute to the resident community, which the violator had failed to do. The violator accepted the chiefs’ decision and forfeited his boat rather than pay a steep fine. The second violator sued the chiefs in court rather than pay a \$10,000 USD fine after he was found fishing in Ngarchelong for a second time in violation of the *bul*. The court found that the chiefs lacked authority to enforce a fishing law because Palau’s Constitution grants that authority to the national congress, which in turn delegated it to the states but not to the chiefs (Rteai Chiefs of Ngarchelong v. Ongidobel, 19 ROP 204, Tr. Div. 2010). The decision did not create a binding legal precedent as it was issued by a trial court, but the *bul* has not been enforced by the chiefs since the case was decided in 2010. Most respondents were unsure of whether the *bul* remained in force. It was never formally rescinded, but the unwritten nature of a *bul* means that it tends to fade over time if not actively enforced.

#### **4.6.2 Customary institutions**

Despite the lack of an enforced state or traditional law limiting access to the fishery, it is not de facto open access. Instead, the fishery lies somewhere on the spectrum between limited access and open access on account of weakly-enforced unwritten institutions concerning access

and use of fishery resources. We use the term “institution” loosely in this context because a prerequisite of institutions is that there be a shared understanding of their substance (E. Ostrom, 2005a), and in this case, there are varying levels of disagreement and uncertainty concerning allowable users and uses of fishery resources. To be clear, the customary institutions at issue are distinct from traditional laws (i.e., a *bul*), which are issued by chiefs pursuant to decision-making rules or procedures. As described in the paragraphs below, the customary tenure institutions are produced and reproduced by the behaviors of individuals who draw upon multiple sources of authority and precedent to secure and contest resource access and usage. The successor to historical CMT is, in effect, an amalgam of state and traditional laws and historical artifacts.

*Overarching Tenure Institution.* Among respondents, there was broad agreement that a person must be “from Ngarchelong” (a qualification discussed below) in order to fish in state waters without prior permission. This represents an adaptation of historical CMT to contemporary political organization and state resource ownership, as tenure was previously based upon village (present-day hamlet) territorial boundaries. There remain vestiges of village-based tenure, however, as a minority of fishers still consider it disrespectful when individuals from other hamlets fish close to their port without permission, and repeated transgressions may result in disparaging gossip. In practice, most fishers continue to fish on or near their traditional village fishing grounds, though this may have as much to do with their knowledge of nearby reefs and their desire to conserve fuel as it does with respect for fading village-based tenure institutions.

In general, the sentiment that individuals from other states are not allowed to fish in Ngarchelong is strongly held, with respondents often comparing fishing by outsiders to stealing. Opinions differ, however, concerning the institution’s source, with state law, *bul*, unwritten

custom, and a combination of the foregoing all cited by respondents. The variety of responses reflects an uncertainty created by overlapping state and traditional laws, customary practices, and the court decision undercutting the 2007 *bul*. The result is a nebulous normative or legal space that allows for reinterpretation and contestation of the tenure institution.

There is also no consensus as to what it means to be “from Ngarchelong” for purposes of fishing rights, with multiple criteria, such as residency, clan affiliation, and community support, factoring into the determination. Moreover, resource uses (e.g., commercial sale, consumption) perceived as legitimate or allowed varies depending upon the nature of a person’s affiliation with Ngarchelong. Thus, the statement that one must be from Ngarchelong to fish in state waters is an overarching institution, comprised of multiple institutions that specify particular use rights for different categories of individuals. In this regard, there are three broad categories of institutions, discussed in the following paragraphs, applicable to access and use of Ngarchelong’s fishery resources: (i) institutions pertaining to Ngarchelong residents; (ii) institutions pertaining to nonresidents who are from Ngarchelong; and (iii) institutions pertaining to nonresidents who are not from Ngarchelong.

*Ngarchelong residents.* Residency may be the strongest predictor of fishing rights in Ngarchelong. There is consensus that all residents of Ngarchelong descended matrilineally or patrilineally from a Ngarchelong clan have universal fishing rights, which include three main categories of resource use: (i) consumption, (ii) customs (e.g., provision of fish for important cultural events or distribution in kinship networks), and (iii) commercial sale, the most restrictive of the three. Additionally, most respondents agreed that all Palauans living in the state, regardless of clan affiliation, are allowed to fish there for any purpose. A small number, however, felt that individuals who relocated to Ngarchelong for marriage – effectively the only

category of Palauan residents not affiliated with a Ngarchelong clan – should fish only for personal consumption. Indeed, one individual who moved to the state after marrying a woman from Ngarchelong reported being repeatedly reprimanded by other fishers for catching fish to sell, though his wife suspected their response may have been provoked by his fishing prowess. She maintained that her husband had the right to sell fish on account of her lineage and the fact that he had become a Ngarchelong voter. In this regard, voter registration is a strategy individuals (including nonresidents) employ to secure fishing rights, although there is no formal law or constitutional provision that accords fishing rights to registered voters. It nevertheless provides a basis in contemporary society for individuals who lack traditional indicia of group membership, such as membership in a Ngarchelong clan, to demonstrate group affiliation and legitimacy in order to bolster their claim to fishing privileges.

*Nonresidents from Ngarchelong.* The fishing rights of nonresidents who are from Ngarchelong are perhaps the most contentious on account of the number of Palauans living in and around Koror who can trace a line of ancestry to Ngarchelong and thus satisfy the state's constitutional standard for citizenship. If one were to ask whether individuals from Ngarchelong living in another state are permitted to fish in Ngarchelong, the answer would almost invariably be yes, though further probing would reveal a diversity of opinions about conditions, expectations, and exclusions attached to the right. Ten respondents, for example, said that such nonresidents may only fish for consumption or customs, and another five said that their right to fish is contingent upon registration as a Ngarchelong voter. Additionally, most agreed that these nonresidents are expected, though not necessarily required, to contribute to the resident community, such as through participation in organized events to clean the hamlets and through attendance and support at important customary occasions, if they wish to fish in Ngarchelong.

Though direct confrontation with those who fail to meet expectations is uncommon, a polite joke or comment about the person's absence at community events may effectively serve the same purpose. A chief explained that individuals who show up in Ngarchelong only to fish can sense the residents' disapproval, and many would feel too ashamed to continue doing so. Indeed, the nonresident Ngarchelong fishers we interviewed acknowledged that they are expected to contribute to, or participate in, community events for the privilege of fishing and that, in fact, they do so.

*Nonresidents not from Ngarchelong.* With the limited exception of citizens of Kayangel State (discussed below), citizens of other states who do not reside in Ngarchelong do not have a recognized right to fish in Ngarchelong, per the overarching customary tenure institution described above. There are, however, circumstances under which such individuals are permitted to fish in Ngarchelong, as CMT continues to be flexibly administered to accommodate norms of sharing and reciprocity. For example, Palauans from other states are still regularly granted permission to fish in Ngarchelong for important customary events, a valuable allowance given that fish populations are declining throughout Palau's main archipelago, and Ngarchelong is one of the remaining areas where fishers can reliably catch enough fish to supply a large feast. Most respondents felt it was important to allow this use of the fishery in order to maintain Palau's customs and traditions. There was disagreement, however, over the protocol for obtaining permission in these circumstances, as state government has usurped much of the chiefs' authority over matters of fishing. In practice, the governor and/or the high chief are commonly consulted, with either, or both, granting permission. Other customary practices involving the sharing of fishery resources are evolving on account of resource decline and demographic change. For example, individuals from other states have historically been permitted to fish in Ngarchelong

for personal consumption as the guest of a community member. While the practice continues, it has become a contentious issue, with a significant number of respondents expressing disapproval, particularly as to nonresident community members who brings guests to Ngarchelong to fish.

As an exception to the overarching tenure institution, fishers from Kayangel and Ollei Hamlet in Ngarchelong share reciprocal fishing privileges in one another's marine territory, as there is a high degree of relatedness between the two places and a historical relationship of mutual support. The people of Ollei and Kayangel maintain a self-organized credit union, for example, and they have provided assistance to one another over the years following typhoons, including one that devastated Kayangel in 2014. These reciprocal fishing privileges effectively represent another vestige of village-based CMT, as most respondents said that Kayangel fishers are not permitted to fish in waters adjacent to the other Ngarchelong hamlets, notwithstanding the political integration of Ollei with those other hamlets.

Enforcement of the tenure institution against citizens of other states is fairly weak, in part because the relatively large size of Ngarchelong's marine territory enables poachers to fish at times and in locations that make detection difficult. Nearly every fisher could recall a confrontation with a poacher that resulted in the poacher's departure, but based upon observation, these encounters are not common. State conservation officers also direct poachers to leave Ngarchelong, but they do not engage in extensive patrols of state waters, nor do they issue citations to poachers. Despite weak enforcement, the institution may nonetheless constrain the behavior of some fishers who may be concerned with reputation and/or who respect traditional law and custom regardless of the risk of sanction.

*Summary.* CMT thus persists in Ngarchelong, though it has been transformed by, among other things, the consolidation of villages under a single state government, the assumption by state and national governments of fishery management responsibilities, the coexistence of state and traditional laws concerning fishery access and citizenship, the dispersal of rights holders throughout Palau, and the decline in fishery resources. There is no single, shared institution that prescribes all the categories or criteria of individuals allowed to fish in Ngarchelong and all applicable conditions or exclusions. Rather, there is general consensus concerning the universal fishing rights of a core group of fishery users who are both residents and members of a Ngarchelong clan and disagreement as to the rights of individuals who have a weaker association with the state. Concerning the latter, access and use rights are determined by a balance of modern and traditional criteria, including voter registration, spousal connection, strength of lineage, and contribution to the resident community. Political power may also figure into such calculations, as evidenced by the community's toleration of one nonresident who, according to a Ngarchelong elder, was permitted to fish because of his family's connections in the national government. As this example illustrates, such calculations may reflect pragmatic considerations, such as potential political advantage. Flexible administration of CMT thus enables the resident community to secure potentially valuable benefits, an aspect explored in the following subsection.

#### **4.6.3 Social function of customary marine tenure in Ngarchelong**

Although Ngarchelong provides limited economic opportunity for residents, customary control and allocation of its relative wealth of fishery resources help support a flow of benefits that contribute to the welfare of the resident community. The leverage they are afforded by such control and allocation derives in part from the role and symbolic importance of fish in Palauan culture. As one respondent explained, fish is “a celebrated type of resource [that] gives people

status [and] confirmation.” It is shared, along with other foods, as a means of forging and maintaining relationships, and it is given in customary exchanges to gain valuables or other forms of support (Matthews, 2007). In Ngarchelong, as throughout Palau, men regularly give the best portion of their catch to female relatives, particularly sisters, who under Palauan custom later reciprocate by providing financial support for such things as the construction of a house or medical care. Indeed, more than one fisher referred to the customary practice of giving fish to female relatives as an “investment.” Individual benefits, both tangible and intangible, are thus conferred upon those with the right and ability to capture and provide fish.

The benefits individuals accrue from fish and fishing endow CMT rights with significant value, particularly rights to fish in Ngarchelong where fish remain relatively more plentiful. One way this value is realized by the resident community is the material support provided by nonresidents who wish to maintain fishing rights in the state. As noted, nonresidents are generally expected to contribute to the resident community in order to fish in Ngarchelong, and one of the most common ways they do so is through donations of money and food at important customary occasions, such as a funeral, first-birth ceremony, or a party to collect funds for the building of a house. Donations at customary occasions are an important lifeblood of the community, with a single funeral sometimes garnering more than \$100,000 USD in total contributions, a considerable sum in Ngarchelong where nearly 30 percent of households reported income of less than \$2,500 USD in 2014 (Palau Bureau of Budget & Planning, 2016). Such support stems not only from obligations associated with fishing rights, but more importantly, from responsibilities associated with familial relationships and clan affiliation. The extension of fishing rights and the sharing of fish are essential to maintaining these relationships as kinship groups become more dispersed.

The contribution of fishing rights towards sustaining social bonds may be the most important social function of CMT in Ngarchelong, as kinship groups are both a source of political and economic power in Palau (Ota, 2007), as well as a fundamental part of a person's identity. In Palau, as throughout the Pacific (Wagner & Talakai, 2007), individuals construct identity largely in terms of their ancestral lands and people. Fishing, and the social rituals surrounding it, are one of the means by which Palauans maintain their connection to the people and places integral to their identity. In Ollei Hamlet in Ngarchelong, the fishing port serves as the center of social life for men. Regardless of their intentions to fish, men gather at the port daily to share food, gossip, and news of the day. They are commonly joined by kin living in other states who make the trip to Ngarchelong to fish and to visit friends and family. As part of the social ritual, visitors typically offer food, and they spend time at the port before and/or after fishing reaffirming social bonds. They sometimes bring along other family members, including their children, helping ensure that membership in the community, with its attendant rights and responsibilities, is passed on to the next generation. Maintaining such social bonds is critically important to sustainable livelihoods. Kinship networks constitute a form of social insurance or safety net in Palau that spreads risk and enables Palauans in rural communities to share in the disproportionate economic benefits earned in and around Koror. Reciprocity is essential, however, and the sharing of fish and the extension of CMT rights are among the rewards, along with customary contributions of money, that Ngarchelong residents offer in return. In this way, CMT contributes to the continuing viability of rural life in Ngarchelong.

#### **4.7 Implications for Fishery Policy in Ngarchelong and Beyond**

The decline of reef fish in Ngarchelong, as throughout Palau and the Pacific, has spurred concern and the development of new fishery management policies. Most in the community

believe that overfishing is a major contributor to the decline, and respondents generally support policies that would restrict fishing by outsiders, as existing state and traditional laws limiting access are either not recognized or not enforced, and customary tenure institutions are generally an insufficient deterrent for those unconcerned with their reputation in the community. As of January 2017, the Ngarchelong Legislature was considering a proposed permit scheme that would prohibit all forms of fishing in the state absent a government-issued permit. Only Ngarchelong citizens, as defined in the state's Constitution (i.e., those who have blood lineage to a Ngarchelong clan or become a member of such a clan by custom), would be eligible for most permit types (e.g., subsistence and commercial), though single-use guest permits would be available for citizens of other states who accompany a permit holder from Ngarchelong. If enforced according to the letter of the law, permit eligibility based upon the Constitution's definition of citizenship could prove problematic, as it would exclude certain community members who have customarily been accorded fishing rights (e.g., resident spouses with no membership in a Ngarchelong clan and fishers from Kayangel) but would include Palauans with attenuated blood lineage to Ngarchelong who otherwise have little or no connections with the state and are not perceived as having legitimate fishing rights. A more important question raised by such a policy, however, is the extent to which the permit scheme could impact upon customary norms and social bonds that are strengthened through the resident community's administration of customary fishing rights.

Gelcich et al (2006) observe, in regard to TURF policies, that superimposing state-based fishing rights on existing customary fishing rights may potentially erode trust relationships and weaken local institutions, thereby impairing social bonds. Permit schemes pose a similar danger in that they redefine the right to fish as a privilege granted by government, thereby prioritizing

vertical linkages between government and individuals over the horizontal linkages that community members maintain with one another (McCay & Jentoft, 1998). Such policies may pose less downside in urbanized areas where populations are more diverse and CMT institutions more eroded. However, in a rural setting like Ngarchelong, where CMT institutions and group dependence are relatively stronger, the risk is nonnegligible. Social networks and norms of sharing and reciprocity – so critical to livelihoods in the state – could suffer if payment of a permit fee diminishes or absolves a nonresident’s sense of moral responsibility to the resident community for the privilege of fishing or discourages them from fishing in Ngarchelong altogether. Such a policy also increases residents’ dependence on government, in this case to act as gatekeepers for the fishery. As we described in Carlisle and Gruby (in press), the government’s assumption of fishery management responsibilities that once belonged to community members in Ngarchelong has led to crowding-out of prosocial behavior and norms of individual responsibility for maintaining fishery resources. Imposition of any state-sponsored policy that redefines fishery access as a government-issued and enforced privilege risks further crowding-out.

So, what to do when the status quo concerning fishery access poses unacceptable risk to the health of fishery resources? Virtually no policy is without risk or trade-offs, and it is possible that the benefits of a permit scheme, if enforced, could outweigh any social costs that result. We suggest, however, that a better policy would leverage the authority and resources of government while also incorporating community norms and flexibility in administration. To that end, a number of scholars now advocate “hybrid” fishery management policies that draw upon both Western and customary fishery management paradigms and principles (e.g., Aswani & Ruddle, 2013; Kittinger et al., 2014). The form of any hybrid policy depends upon context, but such

policies are commonly characterized by greater administrative or institutional flexibility (Kittinger et al., 2014). Consequently, they may be more adaptable than conventional state approaches, which are often constrained by managerial or statutory requirements (Aswani et al., 2007). By way of example, Ngarchelong could enact a hybrid permit scheme whereby the granting of yearly fishing permits for out-of-state residents would be based upon a combination of specified criteria, including such things as blood and spousal relations to the state, voter registration, and community contribution. No single criterion need be dispositive, but rather a determination could be based upon a balance of factors. Such a law could authorize the governor to appoint a board to review all permit applications (e.g., a rotating board comprised of a handful of local chiefs). While administratively more burdensome, such a policy is far more flexible and contextually appropriate than a pay-to-fish scheme based upon a fixed and flawed eligibility standard. It is also designed to sustain existing customary institutions and the social benefits they support and, depending upon composition of the board, could reengage traditional leadership, which continues to be respected in the state. To be clear, it is not our intention here to provide a blueprint for policy design in Ngarchelong or elsewhere, as a myriad of legal and resource considerations bear upon such an undertaking. Rather, we wish to demonstrate how one might approach the design of a hybrid fishery management policy that integrates flexibility and local institutions into a conventional fishery management structure. More importantly, we wish to emphasize that it is not only critical, but also possible, to account for the social benefits and function of CMT in a state-sponsored policy.

A broader lesson from this case study is that even where a fishery may appear to have devolved into open access, customary institutions that subtly impact upon resource access and usage and contribute to the strength of social bonds and the viability of a fishing community may

persist. It is essential therefore that policy makers not assume local, customary control over resources has been entirely eroded when contemplating a fishery intervention (Aswani, 2005). When fishing rights are simplified, as through a TURF, permit scheme, or other policy that fixes and/or redefines access and use rights, it can undermine customary practices that enable communities to flexibly administer fishing rights in ways that are responsive to their changing needs (Macintyre & Foale, 2007).

There is, of course, no guarantee that when a state redefines fishing rights by statute, the new policy will function in the manner intended. Among other things, this will depend upon (i) how the policy is interpreted and administered by state agencies; (ii) the extent to which the policy is enforced; and (iii) whether the policy is generally known, understood, and respected by those whose behavior is regulated. Where state agencies have limited resources for policy implementation and enforcement, and where statutory fishing rights coexist alongside customary rights in a situation of legal pluralism, the outcome may be more uncertain. As Parlee and Wiber (2014) observe, “civil society is not a passive recipient of rules and regulations” (p. 48). State policy may be selectively ignored, invoked, and/or reinterpreted to support an individual’s claim or interests. And even where a policy partly succeeds, it may lead to unexpected or unintended consequences (Moore, 1978). If, for example, a permit scheme is introduced to a fishery already characterized by a complex of customary fishing institutions, the result may be an increase in access and fishing effort if the permit scheme effectively supplements, rather than replaces, customary institutions. Policy makers must therefore pay careful heed to existing customary arrangements and anticipate potential interactions in the design of any new policy. Where state law standards and prescriptions conflict with strongly held values and norms, strict compliance is unlikely.

Finally, this research speaks to the multidimensional challenges inherent in any effort to strengthen or reform fishery management practices in the Pacific. In the search for solutions to the decline of fishery resources in the Pacific, the notion that the past may serve as a guide for the present is popular, with scholars, NGOs, and policy makers increasingly advocating customary management principles for contemporary fishery problems (Kittinger et al., 2014). To be sure, customary approaches have much to recommend them, as they generally constitute a better fit to social, cultural, and ecological context in Oceania than do policies developed for temperate-water fisheries in the West (Aswani & Ruddle, 2013). The challenge, however, lies in translating customary management principles into policy that achieves positive ecological outcomes while maintaining the social function of existing customary institutions. The task requires a balancing of potentially competing objectives, as optimization of one may lead to deterioration of the other. A single-minded focus on resource sustainability, for example, might result in a policy that reflects customary principles of exclusivity (e.g., exclusive territorial fishing rights) but neglects customary principles of flexibility in administration. If, however, we accept the premise that socially deteriorated communities pose a greater threat to fish stocks (Jentoft, 2000), these twin objectives are less competing than complementary. This more holistic, social-ecological perspective acknowledges that “viable fish stocks require viable fisheries communities” (Ibid., p. 54). In the Pacific, maintaining viable fishing communities in the context of rapid societal change requires recognition of the critical role CMT may serve in promoting sustainable livelihoods and the design of policies that take local customary institutions into account.

## 5. CONCLUSION

This dissertation investigates the theoretical promise and empirical realities of complex governance systems in the commons. It takes, as its point of departure, a nearly half-century-old concept that is experiencing a renaissance among natural resource governance scholars: polycentricity (V. Ostrom, Tiebout, & Warren, 1961). Despite its age, pedigree, and apparent popularity, it remains conceptually “fuzzy” and empirically underdeveloped (Carlisle & Gruby, in press). This dissertation addresses these deficiencies through conceptual and empirical contributions to the growing scholarship on polycentricity. In its empirical contributions, this dissertation also advances research on the governance of small-scale fisheries through a finer-scale examination of the social functioning of customary marine tenure institutions within a governance system that is both polycentric and legally pluralistic. The key findings and contributions of this dissertation research are summarized in the following subsections.

### 5.1 Key Findings and Contributions

#### 5.1.1 Chapter 2: Conceptual polycentricity

Chapter 2 distills the literature on polycentric governance systems to develop a theoretical model of a *functional* polycentric governance system for the commons – i.e., one that exhibits institutional features associated with achievement of three commonly predicted advantages: (i) greater capacity to adapt to actual or anticipated social and ecological change (e.g., Folke et al., 2005), (ii) enhanced capability to produce institutions that are a good fit for complex natural resource systems (e.g., Folke et al., 2007); and (iii) mitigation of the risk of institutional failure and resource losses on account of redundant decision-making centers and institutions (e.g., E. Ostrom, 1999). This research finds that while much of the commons scholarship continues to define the concept by reference to V. Ostrom et al. (1961), easier-to-

measure quantitative characteristics, such as the number of decision-making centers, have been given greater definitional and analytical weight than qualitative characteristics, such as autonomy and the criterion that decision-making centers take one another into account in decision making (e.g., Newig & Fritsch, 2007). The relatively more neglected qualitative characteristics are integral to the concept as envisaged by V. Ostrom et al. (1961), however. Indeed, the extent to which decision-making centers take one another into account in decision making is what largely distinguishes a coherent and self-organizing governance *system* from a fragmented assemblage of governance actors (see V. Ostrom et al., 1961). Such characteristics are challenging to operationalize and measure, but failure to do so impedes development of the concept. This research proposes and explicates a definition that fully accounts for the qualities imagined in the seminal 1961 paper: (i) multiple, overlapping decision-making centers with some degree of autonomy; (ii) choosing to act in ways that take account of others through processes of cooperation, competition, conflict, and conflict resolution (see V. Ostrom, 1991). The two prongs of the definition, which are examined in detail, constitute “attributes” of a polycentric governance system in the theoretical model developed in Chapter 2.

This research then deconstructs the claims about the predicted advantages of polycentric governance systems in the commons and finds that their achievement is typically predicated on the existence of additional institutional features, which constitute “enabling conditions” in the theoretical model. There are a total of seven enabling conditions, each of which is associated with one or more of the predicted advantages: (i) decision-making centers employ diverse institutions; (ii) decision-making centers exist at different levels and across political jurisdictions; (iii) the jurisdiction or scope of authority of decision-making centers is coterminous with the boundaries of the problem being addressed; (iv) generally applicable rules and norms

structure actions and behaviors within the system; (v) decision-making centers participate in cross-scale linkages or other mechanisms for deliberation and learning; (vi) mechanisms for accountability exist within the governance system; and (vii) a variety of formal and informal mechanisms for conflict resolution exist within the system. In articulating the enabling conditions, this research highlights, among other things, that normative polycentricity theory – i.e., theory concerning the “virtues” of polycentric governance (Thiel, 2016, p. 8) – is predicated on numerous additional conditions that should not be taken as given or inherent to polycentricity. More generally, this research provides much-needed conceptual clarity that facilitates systematic analysis of polycentric governance systems and the development of more nuanced theory concerning functionality in the commons.

### **5.1.2 Chapter 3: Polycentricity case study**

Chapter 3 empirically examines the theoretical propositions concerning the advantages of polycentric governance systems identified in Chapter 2. It does so through a qualitative case study of small-scale fishery governance in the Northern Reef region of the Republic of Palau that seeks to understand whether the governance system functions as predicted by commons scholars, and if not, to explain why it diverges. To facilitate this analysis, Chapter 3 evaluates the Northern Reef governance system against the attributes and enabling conditions in the theoretical model developed in Chapter 2. The research finds that the governance system exhibits a fairly high degree of the characteristics associated with polycentric governance systems (i.e., the attributes in the theoretical model). Additionally, all of the enabling conditions from the theoretical model are at least partially present in the governance system. However, the three advantages commonly predicted by commons scholars are not fully achieved because the potential efficacy of fishery institutions is undermined by deficiencies identified using the theoretical model: weak

enforcement of fishery institutions, variable compliance with fishery institutions, and insufficient participation of resource users in decision making and institutional design.

Analysis of the historical transition of the governance system from community based to polycentric reveals additional distal explanations of deficiencies in functionality. In particular, the transition to polycentricity entailed the entry of higher-level government decision-making centers, the erosion of traditional authority, and a loss of village control over traditional fishing grounds. Local norms encouraging resource stewardship were crowded out by government attempts to regulate the fishery, and community members grew increasingly reliant on government for resource maintenance. However, government actors lacked sufficient legitimacy and enforcement capacity to induce compliance. With opportunity for profit from increasing demand for fish and low risk of sanction, voluntary compliance deteriorated, particularly as fishers were not meaningfully engaged in decision making and institutional design.

This research underscores an important, but all too often overlooked, point made in V. Ostrom et al. (1961): polycentricity in governance does not necessarily entail greater functionality than other alternatives. In this case, the particular form of polycentricity to have emerged in the Northern Reef – i.e., a form that is dominated by higher-levels of decision making – is not fully functional in its context. Because of the looseness with which the concept has been defined, however, “top-heavy” systems, such as the Northern Reef governance system, fall under the same conceptual umbrella as systems exhibiting considerable local autonomy. This impedes the development of generalizable theory, as there is reason to believe that very different forms of polycentric governance should diverge in functioning. In particular, in contexts where national and state governments lack sufficient resources to carry out governance responsibilities, as in the Northern Reef, a top-heavy form of polycentricity likely constitutes a poor fit to

material realities. Finally, this research suggests that functionality is partly a function of the path to polycentricity. In this case, the path necessitated some loss of power and control at the local level, which contributed to crowding-out dynamics, an increase in self-interested behavior, and greater social tolerance of rule violations. This research calls attention to the need for more nuanced theory that considers the emergence of polycentricity and distinguishes among different forms of polycentric governance systems in various contexts.

### **5.1.3 Chapter 4: Customary marine tenure case study**

Chapter 4 of this dissertation addresses the need to advance understanding of the social dimensions or functions of customary marine tenure (CMT) in contemporary Pacific settings, including implications for governance and policy. It does so through a qualitative case study of CMT in Ngarchelong State, one of two Palauan states that border the Northern Reef. Its objectives are: (i) to describe the informal customary institutions that govern resource access and usage in Ngarchelong's marine territory – i.e., present-day CMT; (ii) to examine the social function of CMT in Ngarchelong; and (iii) to explore the implications of the findings for fishery policy in Ngarchelong and the broader Pacific region.

This research finds that weakly enforced CMT institutions persist in Ngarchelong in a state of legal pluralism, providing space for reinterpretation and contestation of fishery access and use rights. While there is consensus that all Ngarchelong residents affiliated with a Ngarchelong clan are allowed to fish in state waters for any purpose, there is disagreement as to the rights of individuals who have a weaker association with the state. In the case of individuals now living in other states who have Ngarchelong ancestry, they are generally recognized as having a legitimate right to fish in Ngarchelong, but they are also expected to support or contribute to the resident community if they exploit the state's marine resources. In this way,

residents' administration of CMT helps maintain social bonds and networks and also secure material benefits, which are critical to sustainable livelihoods in the state.

An important lesson from this case study is that in settings where a fishery may appear to have devolved into open access, there may nevertheless be customary institutions that subtly impact upon resource access and usage and contribute to the strength of social bonds and the viability of a fishing community. When fishery policies that fix or redefine access and use rights are superimposed on customary systems, they can undermine informal practices that enable communities to flexibly administer fishing rights in ways that are responsive to their changing needs (Macintyre & Foale, 2007). One such policy – a fishery permit system – is under consideration in Ngarchelong, and this research describes an alternative “hybrid” policy approach (e.g., Aswani & Ruddle, 2013) that incorporates flexibility and community norms and standards in a state-sponsored permit scheme. In doing so, this research demonstrates how policymakers may design a fishery policy aimed at sustaining not only fishery resources, but also the fishing communities that benefit from local administration of CMT.

## **5.2 Future Directions**

Chapter 2 calls for continued research of polycentric governance systems in the commons, including empirical research that investigates the particular contexts and circumstances under which polycentricity can lead to the advantages commonly predicted by scholars. Specific avenues for future research raised in this chapter include: (i) exploring the quality and degree of autonomy necessary for achieving well-performing polycentric governance systems in different settings; (ii) examining the benefits of cross-scale linkages and other coordination mechanisms and exploring how power asymmetries may be reproduced and amplified through such mechanisms and how they may be managed; and (iii) investigating

mechanisms for increasing the accountability of decision-makers in polycentric governance systems. The theoretical model proposed in this chapter is also intended to spur dialogue about functional polycentricity in the commons, including other conditions or institutional features that should be included in the model. As such, it is hoped that this model will undergo revisions through the collective efforts of other scholars.

Chapter 3, in its empirical examination of polycentricity, reasserts some of the calls for research that were raised in Chapter 2, including the need for systematic empirical research examining the functionality of diverse forms of polycentric governance systems in different contexts. Additional directions for future research were also suggested by the findings in this case study. These include research that investigates the relationship between functionality and polycentric governance systems exhibiting varying degrees or configurations of local- and higher-level decision making and research that investigates how government actors can effectively support or catalyze decision making by other actors in the governance system. This case study also speaks to the need for more research that investigates the emergence of polycentric governance systems, including the relationship between the path to polycentricity and functionality. More generally, this research suggests a longer-term goal of developing more nuanced theory that distinguishes among different forms or “species” of polycentric governance systems and the characteristics associated with their advantages and pathologies in various contexts.

Finally, Chapter 4 speaks primarily to practice in the context of small-scale fisheries and echoes Chuenpagdee and Jentoft (2015) in calling for locally-tailored policies for small-scale fisheries that take into account existing tenure institutions and the needs of fishing communities. This will require research that enables deep understanding of the role and functioning of CMT

systems in particular settings, including any benefits or advantages derived by fishing communities through their administration of fishing rights. It will also require creative, “outside-the-box” approaches to policy design that balance social and ecological needs and objectives and also anticipate any interactions between state and customary laws and norms. One such approach for Pacific small-scale fisheries highlighted in this chapter are “hybrid” fishery management policies that draw upon both Western and customary fishery management paradigms and principles (e.g., Aswani & Ruddle, 2013; Kittinger et al., 2014). Advancing hybrid fishery management policies in the Pacific will require instructive research that demonstrates how such policies may be formulated, as well as empirical research that investigates successes and failures of any such policies in situ.

Taken as a whole, this dissertation speaks to the need for more nuanced and contextualized theory and practice in regard to complex governance systems in the commons. Natural resource systems vary widely across a range of social and ecological factors – indeed, small-scale fisheries, just one of many types of natural resource systems, exhibit a tremendous amount of diversity globally (Jentoft, 2014). Moreover, governance systems that may be classified as polycentric are ubiquitous and extraordinarily diverse by many measures, including size, age, purpose, and historical, economic, social, and cultural context. As the case study in Chapter 4 illustrates, such systems may be characterized not only by multiple, overlapping decision-making centers, but also by multiple, overlapping legal orders. With all of this diversity and complexity, the potential for universal theory concerning polycentric governance systems in the commons may be limited. Though Chapter 2 assembles theoretical development of polycentricity in the commons into a coherent theoretical statement about functionality, it acknowledges that there is insufficient empirical grounding of the theory and that functionality

may be dependent upon innumerable contextual factors, some of which are illustrated by the case study in Chapter 3. What likely is needed at this juncture is a second generation of theory on polycentricity that accounts for the embeddedness of governance systems in larger social, cultural, economic, and historical contexts; the relative strengths (capacities) and weaknesses of particular governance actors; and the nature of the resource system at issue, among other considerations. The long-term result of such an approach may be multiple forms of polycentricity and multiple theoretical models specifying conditions associated with their functionality in multiple contexts.

In a similar vein, one-size-fits-all policies and governance approaches generally constitute a poor fit to the diversity and complexity embodied in natural resource systems. In the context of fisheries, for example, Chuenpagdee and Jentoft (2015) observe that “commonly used instruments such as marine protected areas and individual transferable quotas are not similarly applicable in large- and small-scale fisheries” and that small-scale fisheries may benefit from approaches “generated from within communities based on local experience and knowledge” (p. 242). Indeed, the findings of the polycentricity case study in Chapter 3 suggest that the most successful or functional form of governance or configuration of governance actors varies by context. The need for locally sensitive approaches to governance and policy stands at tension with efforts by conservation practitioners to scale up and roll out models for conservation that may have proved successful in a particular setting (see Jentoft et al., 2011). However well-intentioned such efforts may be, the failure to take into account local conditions, needs, and desires in the pursuit of solutions to natural resource problems may produce more harm than good. This is not to say, however, that meaningful generalizations about policy approaches, as well as theory, cannot be made when it comes to complex governance and complex natural

resource systems. It is my hope that this dissertation spurs research that teases out finer-grained knowledge about complex governance systems and policies, both in the commons generally, and in small-scale fisheries more specifically.

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