

Seeing Polycentrically

Examining Governance Situations Using a Polycentricity Lens

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2.1 Introduction

Stephan, Marshall, and McGinnis observed: ‘Polanyi focused on polycentricity as a form of emergent order, in the sense that a complex system of component parts may exhibit regularized patterns which are only apparent if one looks at the system as a whole.’ This chapter deals with identifying regularized patterns in complex governance situations and, more specifically, with what it means to examine those situations by thinking about them as potentially polycentric. We call this approach ‘seeing polycentrically’.

A multitude of governance types qualify as polycentric. In this chapter we consider polycentricity as a particular lens through which to view governance arrangements. Given the ubiquity of governance arrangements involving multiple semi-autonomous but functionally interdependent actors, we believe it to be important to consider how thinking polycentrically might help in understanding and evaluating how they interact and perform.

The chapter proceeds as an inquiry. There is no classic or ideal type of polycentric governance, and polycentric order generally emerges rather than being planned using an a priori design. The analysis of how and in what ways a particular governance situation is polycentric, therefore should not be conducted deductively by starting with a model of a polycentric governance system and then determining how closely the situation under scrutiny fits the model. To some extent, developing an understanding of emergent situations needs to be emergent also.

An inquiry-based approach can be conducted as a kind of diagnostic assessment, guided by questions that draw out information that can be

used to develop an overall depiction of the situation.¹ The results from such an inquiry may also be useful in analysing the governance arrangements and contemplating modifications to them, as discussed in Chapter 11. The definitions and dimensions of polycentric governance presented in Chapter 1 can aid in identifying and organizing the inquiry one would undertake.²

In what follows, we imagine that one has come across a complex situation involving multiple centres of decision making, and then works through an inquiry process by which one might determine the extent to which that situation resembles polycentric governance. More directly, we would say that upon encountering any multi-organizational governance structure, an analyst needs to consider whether it is a polycentric governance arrangement or a fragmented and uncoordinated, polycentric mess.³ We present and discuss a sequence of questions that an observer can ask before reaching conclusions about the nature, operation, and effects of complex governing arrangements. The order of the topics and the sequence of questions have been considered carefully and adjusted from time to time during the drafting of this chapter, and we recognize that the questions are so interrelated that the answer to one question will entail or pre-empt others. This will not always or necessarily be the case, however, so the questions still need to be identified separately so they can be addressed as needed or relevant. In each of the six following sections of the chapter, the reader will find a set of questions grouped by topic; the questions are listed together at the beginning of each section and then discussed.

2.2 Questions about the Centres Themselves

- What centres influence the governed good/service/resource?
- What are their functions?
 - Do larger centres perform functions or provide services that are beneficial for smaller centres, or vice versa?
 - Are some centres primarily provision units and others primarily production units?

¹ For recent examples of inquiry-based approaches to analysing complex governance situations, see Buytaert et al. (2016), Kerber (2017), and Kiparsky et al. (2017).

² We are setting aside the topic of research methods, i.e., the means by which an analyst might collect and analyse data on these inquiries.

³ Of course, these are not the only options and may instead be seen as poles of a spectrum along which actual governance arrangements lie.

- Are functions concentrated in a few centres or widely spread among centres?
- What rationales underlie functional separation and functional integration among centres?
- Do the centres operate at different scales or levels?
- Is there actual duplication among the centres, and to what extent?
 - Are they identical, i.e. doing the same things in the same way?
 - Do centres that do the same things serve differing areas or clienteles?
- Is there overlap?
 - Do centres do some of the same things but not all of the same things?
 - Do centres overlap in affecting the good/service/resource but do very different things?
 - To the extent there is overlap, does there appear to be any rationale for it?
- Is there redundancy in the sense of a default actor in case another centre fails or ceases to act?
 - Where there is actual duplication, does it appear to be entirely needless or does it serve as potentially useful redundancy?
 - Do centres have overlapping authority or responsibilities formally but not necessarily in practice?

One's first impression of polycentricity may be of multiple identical centres. A polycentric structure composed of matching organizations is imaginable, but seems inconsistent with (a) processes of design, spontaneity, and emergence involving (b) intendedly albeit boundedly rational individuals, capable of engaging in (c) multiple levels of action. It is unclear why or how people would create and maintain copies of the same centres, despite being able to adapt them over time or eliminate them, or how and why any spontaneous or emergent processes of organizational creation and adaptation would produce and keep producing identical organizations.

Organizational diversity is a foundational concept for understanding polycentric governance. Instead of presuming or anticipating a set of replicas performing the same functions and operating identically, polycentric governance presumes and anticipates that the centres are differentiated. Empirical studies of polycentric structures, as well as theoretical explorations of why and how such structures would come into existence and persist over time, converge to a common view, namely, that most (and perhaps all) actual polycentric arrangements are comprised of distinct

units operating at different levels and/or performing different functions. Visualizing the polycentric governance of a region, for instance, Elinor Ostrom (2009, 753) wrote:

In a polycentric system, some units are general-purpose governments, whereas others may be highly specialized. Self-organized resource governance systems, in such a system, may be special districts, private associations, or parts of a local government. These can be nested in several levels of general-purpose governments that also provide civil equity, as well as criminal courts.

Governance functions may be distributed among centres, and if so, it can be important to inquire whether there have been reasons for arranging governance responsibilities in this fashion. For instance, one or more centres may be charged with regulating the activities of others, so that centres which provide goods and services are not policing themselves. The literature on local public economies (which are examples of polycentric arrangements) has emphasized the distinction between provision and production functions – provision decisions involving what goods or services to acquire, in what amounts and with what quality, how to pay for them, etc., and production functions being the actual transformation of inputs into the outputs that are those goods or services (Oakerson 1999; United States Advisory Commission on Intergovernmental Relations 1987). This distinction may help an analyst to begin to sort through the centres that are present in a complex situation to see whether some of them are provision units and others are production units.

Centres performing production functions may have different requirements and constraints. Roe and Schulman (2008) introduced the concept of ‘high reliability organizations’, meaning those that produce goods or services for which even slight deviations or errors may have disastrous consequences. This idea may help an analyst to make sense of the differentiation of functions across centres even when, at first glance, they are production units involved in ‘the same’ good or service or resource. On a given stream or lake, for instance, production of drinking water for public consumption may be an example of a ‘high reliability’ task, where treatment and distribution processes have to be executed the same way every time with minimal to no error, because any slippage could result in a public health epidemic, and any process changes have to be introduced carefully after extensive testing. Alternatively, the operation of facilities that manage stream flows or lake levels may be conducted within acceptable ranges, and might even be experimented with under limited conditions as part of an adaptive management approach. A complex governance

situation within which high-reliability tasks are distributed to one centre and more flexible and adaptive tasks to other centres may make sense if personnel needs, operating procedures, and performance standards differ in important ways from task to task.

It may be, and often is, the case that centres exist and operate at different levels (often referred to as ‘scales’ in the literature, although we follow the distinction of levels and scales used in Chapter 1). This observation does not assume and should not be confused with a claim that polycentric arrangements naturally or inevitably take advantage of scale efficiencies or result in appropriate matching of levels. Mismatches and inefficiencies are possible as well.

There are several ways in which levels and scales may come into play. One way is through the idea of scale of production. Conceptually at least, any good or service can be produced at levels ranging from individual to global. We can readily anticipate and observe that diverse levels of production will come into existence, whether through deliberate choice, trial-and-error adaptation, or sheer happenstance. To the extent that diversity of levels of production translates into the creation of multiple producer organizations, it is one source of polycentricity as organizations take others into account.

Scale of effects is conceptually distinct from scale of production, although as a practical matter they are often connected. Scale of effects involves the question of who benefits from or is otherwise affected by some good or service (compare with the concept of externalities, e.g. Bromley 1989). Scale of production and scale of effects do not have to match. The set of human or other beings who are affected – positively, negatively, or some combination of both – by any good or service may also range from very small to global levels. Impacts may be substantial or attenuated, and indeed, what it means to be ‘affected’ at all by any phenomenon is constructed and contestable. The inclusion of positive or negative externalities adds further complexity to an arrangement in ways that often give rise to felt needs for regulation and/or conflict resolution. As people organize processes and structures for demand articulation, demand aggregation, cost allocation, regulation, and conflict resolution, we can readily anticipate and often observe that those entities will exist at various levels corresponding not only with characteristics of the goods and services in question, but also characteristics of the communities that are perceived to be affected.

Organizationally diverse arrangements may exhibit duplication, overlap and redundancy. This is important to the understanding and analysis of

polycentric arrangements, in ways that go beyond normative judgements. Analysts sometimes use these terms interchangeably, or use one term when one of the others would be more accurate. There are important differences among the three, but our purpose is not to parse the terms. Instead, we are interested in how all three are connected with understanding polycentric governance.

All three terms have had negative connotations and have been used in critiques of multi-organizational settings. Viewed from the perspective of a Weberian ideal type of organization, all three characteristics are problematic and should be targeted for elimination. Rhetorically, just to apply the words duplication, overlap, or redundancy to a situation is to indict it as deficient and inefficient without any need for further inquiry.

Other scholars, however, have discovered some virtues in duplication, overlap and redundancy. Martin Landau's defence of redundancy (1969, 1973) is especially notable in this literature. He emphasized the value of back-up systems in complex structures to reduce their fragility and vulnerability, and his arguments became a building block of later work on robustness and resilience. Also during the 1960s and 1970s, in their studies of water resource management and of public service delivery in metropolitan areas and federal systems, both Vincent and Elinor Ostrom presented theoretical arguments and empirical support for arrangements that others had assailed for duplication and overlap. (Both often cited Landau, also.) They repeatedly connected duplication and overlap with the importance of contestation through the existence of overlapping forums for conflict resolution and the enforcement of rules guarding dissent and diversity (e.g. E. Ostrom 2009, 753). Another important thread of supporting argumentation is seen in the work of public administration scholars such as Peters (2015, 129) who have emphasized the importance of multiple channels of information and communication in complex and multi-organizational structures (see also Buytaert et al. 2016, 3).

One need not take sides among these contesting views in order to incorporate and apply the concepts of duplication, overlap, and redundancy in the effort to understand polycentric governance. Rather, one can recognize that (a) these characteristics are typically present in polycentric arrangements, (b) their presence is a matter of degree, such that there may be greater or lesser amounts of duplication, overlap, and/or redundancy in a particular setting, and (c) whether the duplication, overlap, and redundancy that are present have net positive or negative effects is an empirical question, the answer to which will depend on both the situation and the evaluative criteria the analyst applies.

2.3 Questions about the Social Problem Characteristics

- What biophysical characteristics of the problem/good/service/resource affect how the governance arrangement functions?
- Are there multiple possibilities to fulfil the function of the problem/good/service/resource that people are trying to address, and, if so, how does the multiplicity of decision-making centres align with those possibilities?
- How are characteristics of the problem/good/service/resource that people are trying to address multi-functional?
 - Is the problem/ good/ service/ resource used or valued in more than one way?
 - Do the multiple decision centres correspond with these multiple functions/uses/values?
- Are multiple scales of the problem/good/service/resource conceivable, such that it can be governed at smaller or larger scales and by lower or higher levels?
 - Do scale differences of centres appear to correspond in some manner with relevant differences in social problem characteristics?
 - Do scale differences of centres capture scales of production or scales of effects and, if so, in what ways?

The structure and functioning of governance arrangements strongly relates to the characteristics of social problems/goods/services/resources addressed, people's knowledge about those characteristics, and differing perceptions of them. This is an important focus of Chapter 3. The problem characteristics may change over time, and the knowledge and perceptions about them may change even more or faster. It is likely that governance arrangements reflect these processes and exhibit a multiplicity of settings with centres corresponding with different scales, levels, functional alternatives, as well as with the multifunctionality of a problem/good/service/resource. The plurality of possibilities to fulfil a function is a source for the variety of polycentric governance arrangements. For example, the function of producing drinking water may be fulfilled by using local groundwater resources, treating surface waters, transporting bottled water from a distance, etc. Governance arrangements might involve one or several of these possibilities in varying combinations, and one or more centres may come into being to pursue these possibilities separately or in a coordinated manner.

When dealing with complex and differently defined social problems, we should not expect a set of diverse and formally independent yet functionally interdependent centres to be harmonious. As Cash et al. (2006) observed, 'Knowledge is often held, stored, and perceived differently at different levels, resulting from differences across levels about what is perceived as salient, credible, and legitimate knowledge, or what is perceived as the important scale or level of the problem.' They referred to this as 'the plurality challenge'.

Differences in information and interpretations of information can and should generate some exchange, and this exchange is what we call contestation. The term is broader than the simpler 'conflict', and therefore preferable for our purposes here. (Chapter 6 focuses more directly on conflict between centres.) Contestation over differences in information or interpretations can be illuminating and can generate ideas and insights. It can also deteriorate into mere rebuttal, refutation, and rejection. What transpires in actual settings with respect to information and contestation is an empirical question. The variety of information at work in polycentric arrangements, and contestation among centres over its meaning and significance, may lead to positive or negative outcomes or a combination of both. The presence and patterns of information and contestation about the social problem, but also about governing processes are essential characteristics to be examined and assessed in any polycentric arrangement. Recent emphasis on adaptive management and collaborative governance should sharpen scholars' focus on the vital roles of information generation, exchange, and interpretation for understanding polycentric governance.

The goods and services that people produce and enjoy, the natural resources they value and with which they interact, and many other aspects of their environments are multi-functional. Very few if any phenomena of significant interest to us (including human beings) are just one thing or have just one aspect. As Norberg and Cumming (2008, 9) observed:

Each individual component of a complex system may have many properties and many functions; for example, an antelope is simultaneously a grazer, a food source, a disperser of nutrients, and a producer of methane. Any component of a complex system may have properties that are redundant (i.e. that are duplicated by other system components) and others that add diversity to the system.

A watercourse may be regarded and valued as an aesthetic treasure, a conduit for navigation, a source of drinking water, of hydropower, of waste disposal, of spiritual renewal, of recreation, of irrigation, and so on, as well as a habitat for a variety of plants and animals. Furthermore, each of these

uses and their effects may be experienced and governed by different but overlapping groups over different areas.

From a prescriptive perspective, multifunctionality may be the basis of arguments for a single integrated centre to govern and manage the water-course in its entirety and for all uses and all users. Empirical observation has tended to reveal the opposite, however. More commonly, people have established multiple overlapping centres, organized around particular groups or areas and focused on certain functions or values of the resource (Boelens, Zwarteveen, and Roth 2005; Kerr 2007; Lankford and Hepworth 2010). Such arrangements are a principal source of the overlap that occurs in polycentric governance arrangements. Whether they function well or poorly is an open question to be addressed.

The concept of scale, already discussed, has further relevance here to the existence of polycentric arrangements for the governance and management of natural resources. Natural resources tend to be interconnected, nested, and overlapping. At a broad and relatively abstract dimension, ecosystems and habitats illustrate this point. Ecosystems may contain habitats, but a habitat is not necessarily confined within a single ecosystem. Within a habitat we might identify critical zones (e.g. nesting grounds, spawning areas). The contours of those zones may change over time, as do the extent of habitats and ecosystems. We could go on, but the theoretical and analytical significance of this point for understanding polycentric arrangements can be stated directly. Natural resources exist at multiple scales and are impacted by dynamics occurring at and across multiple scales. Whether human beings are trying to exploit, preserve, or recover natural resources – and especially when human beings are trying to perform some combination of these, as is often the case – it is likely that they will organize decision making and action in multiple, overlapping centres along different scales. Inquiring about the connections between the centres in a complex governance situation and the scales and functions of a good or service is an important step in attempting to understand it from the viewpoint of polycentricity.

2.4 Questions about Independence and Interdependence among Centres

- How independent are the centres in their decision making?
 - To what extent and in what ways do they control their own resources (funding, personnel, etc.)?

- What kind of questions may centres autonomously decide on, i.e. what range of discretion do they have?
- To what extent and in what ways are they able to reach their goals on their own?
- What forms do relationships among the centres take?
 - Are there formalized relationships such as contracts between centres, membership of one or more centres in another centre, etc.?
 - Are there informal forms such as interpersonal relationships, overlapping members or constituents, etc.?
 - Are some centres nested within others and, if so, in what ways, and for what apparent reasons?
 - Are some centres in competitive relationships to each other and, if so, in what ways? Does competition generate any useful information or choices and, if so, for whom and in what ways?

A diverse set of units would not necessarily constitute a polycentric structure. If a single authority can create and eliminate each unit, establish every unit's structure and define the scope and processes of its operation, which the units themselves possessed no discretion to change, such an arrangement would be more nearly monocentric than polycentric. In polycentric arrangements, the centres exhibit at least some independence or autonomy. The centres can to a greater or lesser degree adopt and alter their functions and processes. The use of qualifying expressions such as 'at least some' and 'to a greater or lesser degree' is deliberate – independence does not have to be total and usually will not be.

The other side of the coin is the interdependence of decision-making centres – various relationships among centres that constrain their independence. Biophysical characteristics of a problem/good/service/resource may relate centres to each other, but centres are also socially embedded and sometimes institutionally interconnected, generating additional interdependencies. This idea is picked up, for instance, by the literature on cross-scale and cross-level linkages (see Adger, Brown, and Tompkins 2005; Berkes 2006). The conceptions of those linkages range from broad characterizations of 'institutional interplay' among centres to more intentional 'co-management' and concrete 'bridging organizations' that are created to forge and maintain relationships among centres.

As stated in Chapter 1 and elaborated further in Chapter 3, as well as in Chapters 9 and 10, the idea of an 'overarching set of rules' appears in several important definitions of polycentricity. In actual settings, such rules

may be expected to place some limits on what centres can do and in what ways. This may encompass formal and informal rules giving some sort of order between centres (E. Ostrom 1983). However, contesting rules might also create conflicts e.g. through institutional interplay (Young 2002). Some rules may apply to the whole arrangement, others only to parts of it, e.g. rules within a hierarchy. A hierarchical structure may have elements that can be considered as separate decision-making centres if they exhibit at least some independence in decision making from the higher level.

Relationships between centres may also be shaped informally through activities and memberships of individuals. Those information relationships might change faster than an overarching rule system and can be hard to control endogenously and exogenously. They offer the chance to find governance solutions based on personal trust and to exchange information, but may also be sources of additional conflicts (E. Ostrom 1986).

Competition may be inherent to all kinds of relationships mentioned. It is a common feature of polycentric arrangements, and is the focus of Chapter 7. Relationships between centres in polycentric governance arrangements will feature various combinations of competition and coordination at a given time, over time, and from one polycentric governance arrangement to another. The question for scholars then becomes how to incorporate the concept of competition into their analyses of polycentric governance. Part of the answer lies in considering what the centres may be competing for or about, and there is a broad range of possibilities.

Centres may compete with one another for power and influence, for more material matters such as revenue or territory or personnel, or even for constituents. In polycentric governance, some centres may function as producers of public goods or services and thus may compete in ways similar to rival producers in market-like settings (e.g. Bendor 1985; Tiebout 1956). They may be imagined also as nations or states competing on the international stage, or as agencies competing for control over policy making. Any number of analogies is possible and, for a given governance situation, some will be more apt and useful than others.

The effects that competition produces in any governance situation are both contingent and a matter for empirical inquiry. It may yield benefits – competition is often said to generate information and innovation, for example (Low, E. Ostrom, and Wilson 2003, 101; Vanberg and Kerber 1994, 216). It may be detrimental, as in the often-remarked ‘race to the bottom’ phenomenon (e.g. Konisky 2007). In complex actual settings, both benefits and drawbacks are likely to be observed, and discerning the overall effect becomes a challenging evaluation task.

We need not, however, consider competition and its effects solely from the perspective of the outside analyst observing and evaluating a polycentric governance arrangement. Competition among centres will be experienced and evaluated by the participants themselves. Accordingly, competition can also be incorporated into our analyses and understanding of polycentric arrangements as an endogenous driver of change. People may respond to competition by creating or modifying or eliminating centres, changing their operations, or shifting levels of action and altering the rules governing centres and their interaction. Competition and the setting of other relationships are therefore also essential for understanding polycentric arrangements and how they change over time.

2.5 Questions about Coordination

- Are there identifiable ways in which centres coordinate?
 - Do they share information and, if so, about what and in what ways?
 - Do they collaborate on projects/programs/activities and, if so, in what ways?
 - Do they share or exchange resources such as funding, personnel, facilities, etc., and, if so, in what ways?
 - Do they appear to coordinate their respective functions, i.e. to identify and to some extent agree upon which centres may/must/must not do what and under which circumstances?
 - Do centres at different levels coordinate with each other?
- Are there decision centres working at more than one level of the problem/ good/ service/ resource and, what is the rationale for that and how does it affect coordination and conflicts?
- How have conflicts among centres arisen and been addressed?
 - Have conflicts had only negative impacts, or have they reflected potentially useful contestation about alternative perspectives or values?
 - Are there centres that perform conflict-resolution functions and, if so, in what ways or under what conditions?
 - Can individuals or centres challenge a decision or action that was taken at another level?

How centres take each other into account may derive to some degree from their use and pursuit of information in relation to problems, goals, strategies, and outcomes (see Chapters 5–8 in Part II). Interactions

among centres may become cooperative, competitive and, to greater or lesser extents coordinated, depending on complementarities or incompatibilities in the information they generate, exchange, withhold, and use and in how they interpret and understand it. In addition to competition, as discussed, coordination is a way that centres ‘take each other into account’. Each centre does not have to coordinate with all the others in order to constitute a polycentric arrangement, but a collection of centres that was devoid of coordination would not be a polycentric governance arrangement.

Searching for, characterizing, and assessing the coordination occurring in a polycentric governance situation is important but not simple. Coordination can appear in many forms. There are formal types of coordination, such as approval processes, and informal ones, such as consultation among peers. Coordination may be mandated (even legislatively; see Schafer 2016) or voluntary. It may be institutionalized in associations, task forces, working groups, and the like. The variety is immense, and the specific manifestations so diverse that Peters (2015, 128) has observed, ‘although we certainly know coordination when we see it, measuring that coordination in other than a qualitative sense is at present difficult if not impossible’. An added complication for the analyst is that in some situations one or more mechanisms of coordination may have been established formally, but no one is participating in them and no actual coordination is occurring in practice, so one must look beyond surface appearances.

Although coordination, cooperation, and collaboration are all used frequently and sometimes treated as synonyms, they are not the same. All cooperation/collaboration may be coordinative, but not all coordination is cooperative/collaborative, especially to the degree that cooperation connotes voluntariness – one may imagine, for instance, individuals or organizations coordinating their activities so that they can avoid each other. Coordination is therefore a characteristic property to be found at least to some extent in any polycentric governance situation, while cooperation and collaboration, although important, will be frequently but not necessarily present. Cooperation among centres is the focus of Chapter 5.

Coordination has a favourable connotation in many usages, but for our purposes we are not suggesting that it is inherently or necessarily good or efficient, fair, inclusive, etc. A cartel, for example, or a criminal syndicate involves very high levels of coordination among the centres involved. The effects of coordination are contingent and a matter for empirical investigation. The key is for analysts to look for and identify the forms and extent of coordination that are present in a polycentric governance situation as

part of the attempt to understand and explain it and assess its functioning and effects (Berardo and Scholz 2010). Berardo and Lubell (2016), and others, emphasize the bridging and bonding capital inherent to coordination processes in polycentric governance systems and the role of risk perception for organizing these processes. As noted briefly, these processes may also manifest in the establishment of specific 'boundary or bridging organizations' (i.e. additional centres). Cash et al. (2006) identified and characterized such organizations as one answer to the pervasive scale and plurality challenges playing intermediary roles in the exchange of information among centres. It should be considered that these organizations may have substantial independence and need to be counted as additional centres in a governance situation with their own goals, means, and power.

Furthermore, we make a distinction between coordination processes and whether the polycentric arrangement, as such, can be called coordinated overall. Conflicts may in some circumstances indicate a lack of overall coordination. As we have stated, conflicts are inherent to any governance situation and a dynamic component, with a strong temporal dimension, so it is relevant how conflicts arise and how they are resolved. Regularly occurring conflicts may render institutionalized conflict-resolution processes necessary. Conflicts resulting from dynamic processes, such as changing needs, changing perceptions and changing contexts, may be addressed through changes of the governance arrangements. Like competition, conflict and coordination may be endogenous drivers of change within polycentric arrangements. Individuals experiencing the presence, absence, extent, or effects of coordination and conflict may become motivated to create new centres or modify or eliminate existing ones, or shift levels of action and engage in rule adaptation for purposes of trying to alter the existence, nature, or operation of coordination in that polycentric situation. Section 2.6 elaborates these dynamisms further, and Chapters 5–8 in Part II use empirical cases to discuss, illustrate, and compare cooperation, conflict, and competition among centres.

2.6 Questions about Emergence, Transition, and Decline

- How do centres come into existence or dissolve?
- Are they able to change their organizational structures and/or their decision-making processes and, if so, how?
- Are they able to change their functions (activities performed, services provided, areas or constituencies served, etc.) and, if so, how?

- How have relationships and interactions between centres changed over time, and for what reasons?
- Do changes of centres or relationships reflect changed understandings of scales of problems, scales of production, or scales of effects?
- Have conflicts among centres resulted in changes to the number, composition, functions, and/or interactions of centres? If so, how did those changes occur and with what apparent consequences?

Fundamental to understanding polycentric arrangements is the recognition that both the units (centres) and their relationships can and do change. This is a focus of Chapter 4. These changes are not always or necessarily exogenously driven. Individuals within polycentric governance structures may and do generate changes. Processes of emergence, change and decline can be captured by the concepts of design and spontaneity. Because the centres in a polycentric structure are human creations, it is essential to view them as deliberately created, and therefore designed, at least, to some extent.

This does not, however, necessarily imply that a polycentric arrangement composed of those centres was designed. The structure is not merely the additive sum of the centres, but also the composite of their interactions with one another. It is possible, and even likely, that centres have been designed but the interactive system they comprise has not. Furthermore, the internal dynamics of any polycentric arrangement can be expected to change over time through the appearance or disappearance of centres and alterations in their individual operations and in their interactions with one another, and it is possible and even likely that these changes are also not designed.

Scholars have used terms such as ‘spontaneity’, ‘spontaneous order’, ‘emergence’, ‘emergent structure’, etc., to try to capture and convey the idea that even though there may be identifiable patterns in a dynamic structure, they do not necessarily reflect or result from an act or a process of design. It may also be the case that some aspects of polycentric arrangements have been designed and others have emerged so the structure has designed and undesigned elements. The multitude of polycentric arrangements that exist in the world is better approached with a conceptual toolkit that includes design as well as spontaneity or emergence, and where many polycentric arrangements belong somewhere on a spectrum between being fully designed and completely spontaneous.

Some contributors to the literature on polycentricity have argued that it is a practical impossibility for any one person to design a structure as

complex and dynamic as a polycentric governance system (e.g. Boettke and Coyne 2005, 154; McGinnis 2005, 168). Polycentric arrangements are complex, having been composed by multiple ‘designers’ who have established centres and developed and altered their relationships over time. The levels of action concept⁴ aids in understanding and explaining scope, extent and mechanisms of endogenous change in polycentric arrangements. It was presented in 1982 by Kiser and E. Ostrom (1982) and since then has been used in many theoretical and empirical examinations of institutions and their functioning. It is also one of the core elements of the Institutional Analysis and Development (IAD) framework, although it can be used and applied outside of an IAD approach as well.

What centres exist, how they came into being, and how they are altered, are functions of actions taken at a *collective-choice level*. Similarly, what centres must, or may or may not, interact with other centres, and in what ways, depend upon rules adopted at a collective-choice level. Changes that are made at a collective-choice level feed into and shape the *operational level of action* of a polycentric structure by affecting the number, types, and functions of the centres and the manner in which they take each other into account. The *constitutional-choice level of action* is also important to understanding polycentric arrangements because decisions made at that level determine whether and how easily people may make changes at the collective-choice level. In communities (of whatever size) where the constitutional-choice level of action allows wide latitude for individuals and organizations⁵ to establish and alter centres and their relationships, the dynamics of stability and change of polycentric structures can and should be expected to differ from those that are observed and experienced in communities with stronger constraints on institutional modification.

One seeks to understand a polycentric structure through an examination of the centres, their functions and operations, their interactions, effects, and adjustments over time as individual actors and organizations pursue their aims, try to solve problems, and adapt. Any unit may fail, or may succeed at others’ expense, or may find ways to succeed through cooperative ventures that advance others’ well-being too. More likely, a polycentric structure at any given time will include all of those experiences plus others,

⁴ Remember that the concept of levels of action is not the same as levels of government.

⁵ Remember that each level of action does not entail a different set of actors. Individuals working at the operational level may decide to shift to collective-choice actions to modify centres and relationships, and to constitutional-choice actions if they wish to address the processes by which such changes may take place.

which is another reason why polycentric arrangements change over time even though no single designer is adjusting the structure as a whole.

2.7 Questions about Effects

- How has the governance arrangement helped or hindered efforts to improve conditions and solve problems?
- In what ways and to what extent has this governance arrangement facilitated information generation, learning, error correction, and adaptation?

To this point, the inquiry has been directed toward understanding elements, context, and dynamics of the governance situation – allowing the analyst to see it in terms of polycentricity. At this stage, the analyst may pose questions about the governance arrangement as a whole and how to think about the effects it generates.

Evaluating a governance arrangement differs from evaluating a particular good or service, a programme or a policy. Citing McGinnis (2011), Koontz et al. in Chapter 8 observe, ‘Scholars of polycentricity, and governance more generally, have identified a wide range of performance criteria.’ Those authors apply multiple criteria – some emphasizing processes and others focused on outcomes – to the cases they present in Part II. These performance criteria are accountability, social learning, adaptability, representation, consideration of appropriate knowledge in decision making, network building, and coherence (both among decision centres and across levels), in addition to the familiar evaluation criteria of efficiency and efficacy. This combination of criteria is compatible with prior work by Blomquist (1992), Pahl-Wostl and Knieper (2014), Pahl-Wostl (2014, 2015) and with the recommendation of Low, E. Ostrom, and Wilson (2003, 86) that performance of management arrangements for complex resource systems can, and should, be assessed in terms of their ability to cope with risk, uncertainty, and exogenous shocks, reduce errors through learning, address local as well as subsystem and system level problems, and avoid system collapse or failure. Accordingly, the questions listed address a myriad of effects that a governance arrangement may have.

In regard to complex systems, adaptive capacity is a vital criterion. It connotes purposeful adjustment in light of updated information. In the governance context, we may link it to the concept of levels of action mentioned in Section 2.6. In a governance structure that exhibits adaptive capacity, people would be able not only to make behavioural adjustments

at the operational level in response to changed understandings, but also to shift to the collective-choice level to alter rules governing behaviour and to the constitutional-choice level when necessary to alter decision-making processes. Pahl-Wostl has linked the concept to the importance of single-loop, double-loop, and triple-loop learning as characteristics of adaptable complex governance structures.

Adaptation by governance arrangements in response to updated information and revised understandings depends necessarily upon both information generation and the interpretation of information from multiple viewpoints. Assuming that fuller information is beneficial for effective governance, arrangements that more effectively promote the generation of information from different levels, about various dimensions of problems, performance and about alternative practices would be preferable. Similarly, since information admits of multiple meanings, governance arrangements featuring diverse channels through which people can express, exchange, and even contest about the interpretation and significance of that information would be preferable to governance arrangements that limit such flows.

These criteria are readily linked to another, i.e. error reduction. Human-created structures are unavoidably error-prone to greater or lesser degree, both in bringing about undesirable results and in failing to achieve desirable ones (Bendor 1985). Error elimination may be impossible, but error reduction is nonetheless desirable and a legitimate criterion on which to evaluate the demonstrated performance of governance systems. Whether a governance arrangement enables or inhibits learning and contestation is therefore an important area for inquiry.

The examination of effects of polycentric governance arrangements in specific settings will often – perhaps always – generate mixed findings. Naturally, some trade-offs may be identified between the openness of a governance system to change and its robustness to maintain functions and withstand disruption. It is worthwhile to take both into account when evaluating governance arrangements, to consider how they are situated between rigidity and flux. Furthermore, Milman and Scott's (2010) cogent assessment of trade-offs in the water-management context is valuable. They noted that the overlap and redundancies of polycentric arrangements may enhance resilience, but also raise transaction costs and the prospects of conflict and confusion over authority and responsibility. Overlap among centres may be incomplete: 'gaps in jurisdiction' may occur where 'some aspects of water management do not fall under the purview of any water management agency' (2010, 532). The dynamic nature of polycentric

arrangements is surely an advantage in some respects, but it can also be the case that '[r]apid evolution leads to ambiguity (ill-defined roles) [that] in turn leads to legitimacy claims that can result in overlapping mandates and program implementation working at cross purposes' (2010, 532). Noting both the pitfalls and the promises of polycentricity, Milman and Scott reach a conclusion similar to that of Elinor Ostrom when she wrote 'there is no guarantee that such systems will find the combination of rules at diverse levels that are optimal for any particular environment' (E. Ostrom 1999, 39).

2.8 Conclusion

Since polycentric governance is widespread, it is essential to have some way of identifying and characterizing it. This is challenging, however, because of the countless forms and variations that actual polycentric arrangements may take and their continuous change over time. The diagnostic inquiry-based approach laid out above therefore has many parts and steps.

However, making this effort to 'see polycentrically' should generate insight into the ways in which the various aspects and dimensions of polycentric governance manifest themselves in a complex governance situation. What should emerge in the composite result of these inquiries is an understanding of governance in a particular setting that helps to indicate whether, to what extent, and in what ways it resembles a polycentric governance system, an uncoordinated and fragmented jumble, or something in-between. We encourage the use and refinement of this inquiry-based approach in future research on polycentric governance across a variety of settings, which will enhance the accumulation of knowledge.

Developing that kind of overall portrait of a complex governance situation, by assembling this information, is also vital to any prospect for an accurate and empirically grounded evaluation of how the governance arrangements perform and of the prospects for positive change. If we make such pronouncements without undertaking the inquiry, we run the risks not merely of failing to understand the governance arrangements, but also of substituting ideological judgements for actual analyses – i.e. (a) dismissing as undesirable all polycentric governance situations, regardless of how well or poorly they may actually operate, or (b) embracing as desirable all polycentric governance situations, regardless of how well or poorly they actually operate. Neither is the appropriate stance for committed researchers or practitioners.

Other chapters in this book use empirical cases of water and other governance situations to discuss, further illustrate and compare the elements laid out in this inquiry. How polycentric governance functions in any actual setting depends on more than the characteristics of the governance arrangements themselves. It also depends on the overarching rules of the polity, the nature of the problems being addressed, and the communities in which governance arrangements are embedded. These are the focus of Chapter 3.

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