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POLYCENTRICITY AND ADAPTIVE GOVERNANCE

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Abstract

The concept of adaptive governance has become increasingly advocated by scholars of social-ecological systems as essential for sustainability as we proceed into a more complex and less predictable world. This concept has become closely associated in this research community with polycentricity and related governance concepts. As the number of scholars identifying these concepts as elements of adaptive governance has increased, however, a number of issues have arisen which could impede clear communication both within the research community, and also between this community and the political, and policy-making and practitioners communities that could incorporate these concepts into their deliberations over how to achieve more adaptive forms of governance. This paper identifies a number of such these issues and proposes how they might be resolved. These proposals are summarised as follows:

- a governance arrangement should be regarded as polycentric when its constituent decision-making entities exhibit *de facto* considerable autonomy from one another, regardless of whether the entities are formally independent of one another;
- polycentricity should be understood generally as an attribute of polycentric governance *arrangements* rather than more specifically of polycentric governance *systems*; i.e., it should refer to the degree to which the decision-making entities comprising a governance arrangement exhibit *de facto* considerable autonomy from one another;
- a clear distinction needs to be maintained between the coherence of a polycentric governance arrangement (where sufficient coherence connotes a polycentric governance *system*) and its performance, and the subsidiarity principle should be used as a key guide to crafting arrangements that are well-performing as well as coherent.

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1. INTRODUCTION

The value of human capacities for adaptation and transformation continues to escalate as the social and environmental dimensions of our world become increasingly closely coupled as social-ecological systems which often behave in unpredictable ways (Marshall 2013). With many biophysical indicators having moved outside the range of variability experienced during the Holocene epoch during which human cultures developed within relatively stable environments (Biermann et al. 2010), ‘we are now living in a no-analogue world’ (Steffen et al. 2015 p. 14).

Adaptive management – a process in which the management interventions are treated systematically as experiments generating knowledge of value for subsequently adapting those interventions – has become widely espoused as a response to this growing uncertainty. Authentic application of this management approach has been rare, however, due to its poor fit with the cultures of government agencies for environmental management that tend to value certainty and be intolerant of failure (Allan et al. 2005).

Starting with Dietz et al. (2003) there has been an upsurge of interest in ‘adaptive governance’ that affords ‘sufficient flexibility for adaptive management’ (Cosens et al. 2012). This kind of governance was seen to be needed since ‘fixed rules are likely to fail because they place too much confidence in the current state of knowledge, whereas systems that guard against the low probability, high consequence possibilities and allow for change may be suboptimal in the short run but prove wiser in the long run’ (Dietz et al. 2003 p. 1909). They saw this form of governance as synonymous with ‘robust governance’ which possesses an ‘ability to adapt and transform in response to disturbances in order to continue performing its core functions’ (Marshall et al. 2010 pp. 270-271).

The concept of adaptive governance has become closely associated with the earlier one of ‘polycentricity’. The latter was introduced by V. Ostrom et al. (1961 p. 831) who explained that it ‘connotes many centers of decision making that are formally independent of each other’. Dietz et al. (2003 p. 1910) implicitly made this association when they identified the following as a general principle of robust governance of environmental resources: ‘Allocate authority to allow for adaptive governance at multiple levels from local to global’. Numerous scholars have subsequently made this association explicit, including Folke et al. (2005), Moran et al. (2009), Marshall (2010), Curtis et al. (2014), Pahl-Wostl et al. (2014) and Gruby and Basurto (2014).

Huiteima et al. (2009) found that governance scholarship provides theoretical justification for claims that polycentricity adds to the adaptive capacity of governance, but identified a lack of empirical evidence that polycentric forms of governance are actually superior to centralised (i.e., monocentric) forms in coping with uncertainty. Progress in filling this empirical gap has since been reported by Pahl-Wostl et al. (2012) and Pahl-Wostl et al. (2014), with both studies finding polycentric governance to be more adaptive than other forms of governance⁴.

As the number of scholars identifying polycentricity and related concepts as elements of adaptive governance has increased, however, a number of issues have arisen which could

⁴ As discussed in section 4, however, these authors defined polycentric governance as a polycentric governance *system* within which constituent decision-making entities act coherently, rather than more generally, as originally conceived by V. Ostrom et al (1961), as a polycentric governance *arrangement* within which constituent decision-making entities may or may not act coherently.

impede clear communication both within the research community and between this community and the political and policy-making communities that could incorporate these concepts into their deliberations over how to achieve more adaptive forms of governance. The aim in this paper is to identify these issues and to propose how they might be resolved.

The paper proceeds in section 2 with a discussion of what polycentric governance means in contemporary circumstances. A review of the advantages and disadvantages of polycentricity for achieving more adaptive forms of governance is presented in section 3. The concept of a polycentric governance *system*, as opposed to the more inclusive concept of a polycentric governance *arrangement*, is considered in section 4. Challenges in achieving well-performing polycentric governance systems are also considered in this section. The value of the principle of subsidiarity as a guide to crafting well-performing polycentric governance systems is discussed in section 5. The need for institutional innovations allowing this principle to be applied consistently with a complexity perspective – through which the potential contribution value of polycentricity to adaptive governance can be understood – is also highlighted in this section. Section 6 pulls together, and discusses further, three issues identified in previous sections which may detract from the clarity of communication around polycentricity-related concepts that will be important for progressing research on these concepts and communicating research findings to political, policy-making and practitioner communities. Proposals for resolution of these issues are also presented. Finally, these proposals are summarised in the concluding section 7.

2. POLYCENTRIC GOVERNANCE

2.1 The original concept

Governance is concerned primarily with the provision of collective goods. Since the benefits of providing such goods cannot be appropriately exclusively by the individuals parties investing time and resources in provision efforts, governance is often important for solving the problems of free riding that tend to be associated with the collective action required for provision to occur (Olson 1965). Traditional principles of public administration imply that this collective action should be organised moncentrically by ‘government’, with its decisions implemented by elaborate hierarchies of officials (V. Ostrom et al. 1999).

V. Ostrom et al. (1961) acknowledged that moncentric governance can be appropriate for providing collective goods that benefit the public at a single, large (e.g., national) scale. For collective goods benefiting more exclusive (e.g., local) publics, however, they argued that any economies of scale achieved by organising moncentrically would likely be outweighed by diseconomies arising from the complexity of the required bureaucratic and hierarchical structures. They observed that this complexity tends to make moncentric arrangements unresponsive to localised public interests, and provided an example where two or three years may be required to secure improvements to a sidewalk even where local residents have undertaken to cover the costs. Polycentric governance was seen as alleviating such unresponsiveness by enabling closer matching of the scale of decision making for a particular collective good to the scale of the public that would benefit from the good.

These authors observed that polycentric arrangements were the norm in their field of inquiry, viz. governance of metropolitan areas in the United States. Similarly, Blomquist (1992) identified governance of groundwater basins in southern California as polycentric, and

Huitema et al. (2009) and Kuzdas et al. (2014) observed that polycentricity is prevalent in water governance more generally. For V. Ostrom et al. (1961) and Blomquist (1992) the problem was not a lack of polycentric governance. It lay rather in perceptions of ‘experts’ that the multiplicity of organisations contributing to governance was necessarily pathological, and in their consequent prescriptions to centralise the functions of the multiple organisations to a single government body. As the following remarks from E. Ostrom (1999 pp. 496, 520) illustrate, the problem resides also in cultural biases against acknowledging polycentric governance where it occurs: ‘[Resource governance] groups who have actually organized themselves are invisible to those who cannot imagine organization without rules and regulations issued by a central authority ... Many scholars consider the very concept of organization to be closely tied to the presence of a central director who has designed a system to operate in a particular way’. A focus of these authors was on highlighting to scholars and policy makers the prevalence of polycentric governance, as well as arguments and evidence suggesting it can be superior to monocentric governance in circumstances when collective goods are to be provided to multiple publics.

2.2 Evolving understandings

In the more than half century since the seminal contribution of V. Ostrom et al. (1961), polycentricity has come to be understood in a number of ways. Differences have emerged particularly around the type of independence that decision-making entities⁵ need to have from one another for governance arrangements to be regarded as polycentric. E. Ostrom (2010) used the original definition of this concept (requiring formal independence of decision-making entities) in her acceptance paper when co-awarded the 2009 Nobel Prize in Economic Sciences. More recently still, others including Gruby et al. (2014), Norström et al. (2014) and Gelcich (2014) held with the original definition in identifying formal independence of entities as an attribute of polycentricity.

Elsewhere in the literature on polycentricity, however, the hurdle to be jumped for governance arrangements to be categorised as polycentric has been raised from formal independence of decision-making entities to ‘considerable’ or ‘substantive’ independence (or autonomy) of the entities. The definitions of polycentricity presented by E. Ostrom (1999, 2005) revolved around decision-making entities having ‘considerable independence’ from other entities in making decisions within a circumscribed domain of authority for a specified geographical area. Marshall (2008b, 2009b) characterised polycentric governance as involving multiple decision-making entities that retain considerable autonomy from one another, while Marshall et al. (2010) referred similarly to ‘substantive autonomy’. Although Gruby et al. (2014 p. 262) presented the original definition of polycentricity, they proceeded to assert that ‘a defining concept in polycentricity is the level of autonomy local participants have from larger units ...’. The requirement for entities to exhibit at least considerable or substantive autonomy from one another is implicit in Skelcher (2005 p. 89) specifying polycentricity to exist where ‘political authority is dispersed to separately constituted bodies ...’. It is reflected too in Lubell et al. (2014) interpreting polycentricity as involving multiple autonomous units that are formally independent of each other.

The reasons for tightening the definition of polycentricity in this way appear not to have been stated explicitly in the literature. However, it seems plausible that this tightening arose at

⁵ The term *decision-making entities* is used here rather than *decision-making centres* since such entities cannot appropriately be regarded as centres unless the governance arrangement of which they are part is polycentric.

least partly in response to the consequences of the ‘governing at a distance’ model that has become pursued extensively under the tradition of New Public Management (NPM) that rose to international prominence from the 1990s as a strategy for operationalising neoliberalism (McLaughlin et al. 2002; Lockwood et al. 2010).

Decentralisation of responsibilities by governments to community-based and other formally independent organisations is favoured under NPM as a way of increasing transparency and accountability of governance processes (Davidson et al. 2009) and pushing for increased individual and community self-reliance (Marshall 2008a, 2011). When decentralising responsibilities to community and other civic organisations, however, governments have often sought to retain the authority to dictate required outcomes, and to some extent the means for achieving them, through their fiscal dominance (Marshall 2008b) and imposing onerous reporting and compliance regimes (Davidson et al. 2009). Andersson et al. (2008 p. 82) observed accordingly how central governments may ‘use the guise of *de jure* decentralisation policies to extend their *de facto* centralised authority, or to pass off a costly policy to subunits without the necessary administrative support’.

Neoliberal governing-at-a-distance strategies (e.g., purchaser-provider contractual or ‘partnership’ arrangements) have also involved efforts to subjectify citizens and their communities as economically-rational instruments for implementing government decisions (Lockwood et al. 2010). These efforts have succeeded considerably in embedding the logic and language of economic rationality in public discourses and private mindsets worldwide, thereby reducing the principal-agent problems faced by neoliberal-oriented governments in achieving their desired outcomes via these strategies. For instance, it is not uncommon for supporters of community-based approaches to environmental management to have been co-opted into top-down neoliberal policy agendas due to governments’ astute cloaking of this agenda in ‘partnership rhetoric’ (Lockwood et al. 2005) and because the purchaser-provider payments on offer are often ‘the only game in town’ (Marshall 2010).

A consequence of the rise to prominence of governing-at-a-distance strategies has been that formal or *de jure* independence of decision-making entities no longer guarantees them substantive *de facto* considerable autonomy in making decisions. Although V. Ostrom et al. (1961 p. 831) seemed to assume some kind of equivalence between *de jure* independence and *de facto* autonomy when in their second paragraph they characterised polycentricity implicitly as involving ‘autonomous units of government, acting on their own behalf’, such equivalence can no longer be taken for granted. It seems likely that the trend towards tightening the definition of polycentricity to require considerable *de facto* autonomy, rather than *de jure* independence, of decision-making entities has followed partly from growing recognition of this fact.

2.3 Classifying polycentric governance in contemporary settings

A summary of the implications of this trend for classifying governance arrangements as either monocentric or polycentric is presented in Table 1. In accordance with the foregoing discussion, it is recognised in the table that a governance arrangement comprising decision-making entities that are formally (*de jure*) independent from one another can constitute a monocentric arrangement when their *de facto* autonomy is less than considerable. It also recognises that lack of *de jure* independence of the decision-making entities comprising a governance arrangement does not necessarily consign the arrangement to being classified as monocentric. This is because it can be possible for decision-making entities within a *de jure*

centralised governance arrangement to experience *de facto* considerable autonomy. Such *de facto* autonomy may arise, for instance, from a central government agency lacking the institutional arrangements, resources and/or knowledge required to effectively enforce the *de jure* restrictions on the autonomy of the other decision-making entities over which it is expected to exercise control. Pahl-Wostl et al. (2014) highlighted the reality of this phenomenon when in their four-way classification of ideal-typical governance arrangements they distinguished ‘centralised coordinated’ arrangements from ‘centralised rent-seeking arrangements’. The latter arises when ‘a prevalence of rent seeking behavior impedes effective coordination, and the lack of coordination encourages rent seeking behavior’ (Pahl-Wostl et al. 2014 p. 141)⁶.

Table 1: Classifying governance arrangements as monocentric or polycentric

<i>De jure</i> (formal) independence of decision-making entities?	Considerable <i>de facto</i> autonomy of decision-making entities?	Type of governance arrangement
No	No	Monocentric
	Yes	Polycentric
Yes	No	Monocentric
	Yes	Polycentric

Nevertheless, this recognition of the potential for a *de jure* monocentric governance arrangement to be classified as polycentric runs counter to some definitions of polycentricity (e.g., Skelcher 2005; Lubell et al. 2014) which require for a governance arrangement to be classified as polycentric that its constituent decision-making entities be characterised by both *de jure* independence and *de facto* substantive autonomy. The stance taken here, which is consistent with E. Ostrom’s (1990, 2005) argument that the focus in institutional analysis should be on rules-in-use (or working rules) rather than rules-in-form, is that the distinction between monocentric and polycentric governance arrangements should be based not on how the arrangements are intended to operate but rather on how they actually function in practice.

3. ADVANTAGES AND DISADVANTAGES OF POLYCENTRICITY FOR ADAPTIVE GOVERNANCE

3.1 Advantages

Polycentricity has been identified as potentially increasing the adaptability and robustness of governance in a number of ways. Andersson et al. (2008 p. 77) encapsulated some of these advantages by characterising polycentricity as a governance arrangement ‘that seeks to unleash the ingenuity, and stimulate the creativity, of political entrepreneurs. It is a system that is structured so that actors within the system are given opportunities for institutional innovation and adaptation through experimentation and learning’.

⁶ As implied earlier in this paragraph, however, rent seeking is not the only reason for lack of coordination within a *de jure* centralised governance arrangement. Even where subordinate decision-making entities forego rent-seeking opportunities, for instance, disorder may result from the central authority and subordinate entities lacking the information they need to effectively coordinate their decisions.

Devolution of decision-making authority within polycentric governance can reduce the costs of enforcing rules by strengthening their legitimacy at lower levels of governance and make it easier to craft rules that match local circumstances and can be monitored affordably (Gruby et al. 2014). There is evidence that polycentric arrangements, by bringing autonomous decision-making closer to the local level, can increase reciprocity and thus voluntary cooperation by citizens in implementing the decisions made – and thereby (given the high transaction costs of coercing cooperation) reduce the risks of implementation failure (Marshall 2002, 2009b, 2011). The increased autonomy of decision-making entities within a polycentric arrangement can also, by strengthening citizens' sense of self-determination, 'crowd in' social norms that support their intrinsic motivations to cooperate with the decisions made (E. Ostrom 2000, 2005).

Polycentric forms of governance also enable 'multiple units [to experiment] with rules simultaneously, thereby reducing the probability of failure for an entire region' (E. Ostrom 1999 p. 526). Andersson et al. (2008 p. 76) referred to overlapping and redundancy among decision-making entities within polycentric governance as 'institutional back-up systems that can help to offset the imperfections' of polycentric arrangements. They observed that these attributes provide for an array of checks and balances to counter the kinds of perverse incentives that invariably arise in addressing complex environmental problems. Such forms of governance confer robustness also by complementing polycentricity's devolved aspect with more centralised levels of governance able to deal with problems exceeding the capacities of some lower-level units to solve alone (e.g., inter-community conflict).

The overlapping and redundancy of units may again contribute to robustness of polycentric governance by enabling information about innovations that have worked for one unit to be conveyed more easily to other units. It means also that 'when small systems fail, there are larger systems to call upon – and vice versa' (ibid. p. 528). This benefit follows from the modular structure of polycentric governance: the substantive self-reliance of each of its components enables the overall arrangement to keep performing when some components 'go off the rails' (Pahl-Wostl et al. 2014). This modular structure can also strengthen the adaptability and transformability of a governance arrangement by making its 'building blocks' smaller and more autonomous than they would otherwise be. The smaller these building blocks, and the more autonomous they are, the less costly will it be to reconfigure the system over time to match evolving understandings of the problems it seeks to solve (Walker et al. 2006; Marshall et al. 2010).

3.2 Disadvantages

A number of potential disadvantages of polycentricity, or at least trade-offs, in respect of adaptive governance have also been identified. Marshall et al. (2010) observed for instance that devolution of decision-making rights to lower levels of a polycentric arrangement may sometimes be difficult to reverse if circumstances change such that some centralisation of those rights becomes appropriate. This may follow from the advantages of local groups vis-à-vis the general public in acting collectively to pursue their respective interests (Olson 1982).

Marshall (2008) observed that the advantages of polycentric devolution for capturing local feedback on rules might strengthen the robustness of a social-ecological system against localised disturbances at the same time as weakening its robustness to larger-scale disturbances (e.g., if devolution results in local feedback from larger-scale disturbances

arriving less promptly and accurately to the governance units at higher levels capable of responding satisfactorily to such disturbances). He reasoned also that increasing the number of local units experimenting with rules, or of governance levels to fall back on, will not always enhance robustness of a particular kind sufficiently to justify the opportunity costs.

Huitema et al. (2009) also identified some possible disadvantages of polycentricity for adaptive governance, even though he ultimately found that governance scholarship provides theoretical grounds for concluding that, overall, polycentricity is advantageous for adaptive governance. He observed that distribution of decision-making authority under polycentricity may lead to loss of economies of scale, especially where the lowest-level governance units are very small. He noted also the challenges (discussed further in the next section) that polycentricity creates for coordinating a dispersed array of governance units. They identified also a risk that the dispersal of governance responsibilities under polycentricity may reduce democratic accountability, particularly where the bodies to which responsibilities are assigned are subject to lower standards of public accountability than conventional governmental bodies.

4. POLYCENTRIC GOVERNANCE AS A SYSTEM

4.1 Distinguishing polycentric governance *arrangements* from polycentric governance *systems*

The communication and coordination challenges faced within monocentric governance arrangements in responding to multi-scale problems of collective action were noted in section 2. V. Ostrom et al. (1961) recognised that similar challenges are faced also within polycentric arrangements. In the polycentric case the challenges occur among substantively autonomous entities, compared with among the hierarchically-organised entities of centralised governance. They observed that the challenges faced by monocentric arrangements were conventionally assumed to be solvable, so that these kinds of arrangements could be regarded as ideal, while the challenges faced by polycentric governance were generally assumed to be terminally pathological.

These authors noted that this latter assumption followed from a preceding one that autonomous decision-making entities within a polycentric arrangement will invariably act without regard for each others' interests. They judged this assumption to have limited validity and proceeded to observe that that question of whether such entities actually function independently or coherently (i.e., interdependently), can only be answered case-by-case. They argued in turn that such coherence or 'jurisdictional integrity' (Skelcher 2005) can emerge 'to the extent that [the constituent decision-making entities] take each other into account in competitive relationships, enter into various contractual and cooperative undertakings or have recourse to central mechanisms to resolve conflicts ... To the extent that this is so, they may be said to function as a 'system' (V. Ostrom et al. 1961 p. 831).

The distinction implied here between polycentric governance in general, and a polycentric governance system⁷ in particular, is made in the first two columns of Table 2; i.e., polycentric governance can be said to function as a system only where the behaviour of the constituent decision-making entities is judged to be reasonably coherent. In a departure from the V. Ostrom et al. (1961) characterisation of polycentricity as connoting any governance arrangement comprising multiple decision-making entities that are formally independent of each other, Pahl-Wostl et al. (2012) and Pahl-Wostl et al. (2014) defined polycentricity as referring only to polycentric governance systems rather than to polycentric governance arrangements generally. We shall consider the significance of this inconsistency in section 6.

Table 2: Classifying polycentric governance arrangements

Is the behaviour of decision-making centres reasonably coherent?	Does the governance arrangement constitute a polycentric system?	What is the quality of governance outcomes?	Does the governance arrangement constitute a <i>well-performing</i> polycentric system?
No	No	Poor	No
		Poor	No
Yes	Yes	Poor	No
		Good	Yes

4.2 A complexity science perspective

The argument of V. Ostrom et al. (1961) that it is possible for coherent behaviour among the autonomous decision-making entities constituting a polycentric arrangement to arise on a self-organised basis has since achieved respectability within scientific and policy communities due to the inroads made by complexity science over the last decade or so. Central to this scientific tradition is the concept of a complex adaptive system (CAS) which consists of multiple autonomous elements in ongoing interaction with one another and the system itself. This ongoing interaction leads to system behaviour which is described as ‘emergent’ in the sense that it cannot be understood by focusing on the behaviour of the system elements (Camazine et al. 2001).

To the extent that the entities comprising a polycentric governance arrangement take each other into account when making their respective decisions, such that the arrangement fits the V. Ostrom et al. (1961) definition of a polycentric governance system, the arrangement can also be regarded as a CAS. Authors who have identified polycentric governance systems as CAS include E. Ostrom (1999, 2005), Pahl-Wostl (2009), Lubell (2013), Marshall et al. (2010) and Marshall (2010). The emergent behaviour of such a governance system arises as series of outcomes from its constituent decision-making centres self-organising in the sense of adapting to one another and the evolving structure of the whole system (E. Ostrom 1999).

⁷ In anticipation of introducing this seminal characterisation of a polycentric governance *system*, I have refrained up to this point from referring to governance as a system. More general terms like ‘governance arrangements’ and ‘polycentric governance’ have been used to avoid any presumption that governance arrangements, and polycentric governance arrangements more particularly, actually behave as the kinds of systems characterised here.

The positive-feedback dynamics driving such self-organising processes can lead to multiple equilibria, and the equilibrium ultimately ‘chosen’ can be sensitive to contextual details and random events the importance of which often becomes apparent only in retrospect (North 1990; Marshall 2005). Pahl-Wostl et al. (2014 p. 147) observed accordingly that polycentric governance systems ‘result from emergence and self-organization in combination with purposeful design’.

4.3 Distinguishing the coherence of polycentric governance from its performance

Hence where the entities comprising a polycentric governance arrangement take each other into account when making their decisions, and thus can be characterised collectively as a polycentric governance system, the emergent performance of the system can vary widely depending on the structural details of the particular context at issue and what random events happen to unfold. For instance, the success of efforts by some decision-making entities to initiate collaboration with others will be influenced by how the structural details of the particular context and the past histories of the entities combine to determine whether the trust and reciprocity required for success develops in virtuous cycles or dissipates in vicious cycles (E. Ostrom 1998; Marshall 2005). Similarly, the contribution of competitive rivalry towards a well-performing polycentric system depends on whether institutional arrangements exist, or can be crafted, to forestall perverse outcomes of such rivalry like withholding information, ‘turf protection’ and ‘empire building’, while maximising positive outcomes including efficiency, innovation, accountability, and entrepreneurship (Marshall et al. 2013). The contribution that recourse of decision-making entities to conflict resolution mechanisms makes towards the performance of a polycentric governance system depends similarly on the details of those mechanisms including equity of access and perceived legitimacy (e.g., in respect of freedom from corruption or political influence).

The distinction made here between the coherence of a polycentric governance arrangement and its performance is highlighted in Table 2. An assumption made in developing this part of the table, which seems implicit in the V. Ostrom et al. (1961) characterisation of a polycentric governance system, is that good performance from a polycentric governance arrangement (as assessed in accordance with the values of those it is intended to serve) requires reasonably coherent behaviour from its constituent decision-making entities. While this may be a *necessary* condition for good performance, however, the table highlights that coherence is not in itself *sufficient* for achieving a well-performing polycentric governance system.

4.4 Crafting well-performing polycentric governance systems

Designing a well-performing polycentric governance system is a complex exercise beyond the cognitive capabilities of any single decision-making entity. Hence, ‘no perfect polycentric system exists’ (Andersson et al. 2008 p. 77). Even if an optimal design were stumbled upon for a particular context, this optimality would soon be overtaken by changes in the context and the emergent behavior of the system (Marshall et al. 2010). For E. Ostrom (1999), the appropriate approach in striving for a well-performing polycentric system is to understand the exercise as one of crafting, or tinkering with, combinations of institutions (e.g., laws, regulations, policies, etc.) in an effort to find combinations that work more effectively than others, all the while treating this as an ongoing adaptive-management process of policy experimentation. For McGinnis et al. (2012 pp. 15-16) this crafting process involves ‘a delicate balancing act between strategic entrepreneurship and emergent dynamics’ and the

‘weav[ing of] an ever-changing web of cooperation and competition’ among the constituent decision-making entities.

As we have seen above, however, it has become common for governments under the sway of neoliberalism to employ governing-at-a-distance strategies as a way of exercising greater control over lower-level decision-making entities in order to improve the performance of polycentric arrangements that they presume can only behave pathologically. Andersson et al. (2008) commented along these lines upon the frequency of policy reforms seeking to streamline natural resource governance arrangements. Reform efforts of this nature necessarily tend to be applied on a ‘one size fits all’ basis despite the wide diversity of circumstances faced by lower-level entities. These entities are thus left with considerably diminished autonomy to adapt their modes of operation to evolving local circumstances. The robustness or adaptability of governance arrangements is thereby reduced due to the lessened capacities of constituent decision-making entities to adapt or transform their behaviours in response to shocks (Marshall et al. 2010).

5. SUBSIDIARITY AND WELL-PERFORMING POLYCENTRIC GOVERNANCE

5.1 The principle of subsidiarity

E. Ostrom (2005 p. 270) drew on insights from Simon (1981) in observing that ‘where one begins a search to improve the performance of a complex system ... makes a substantial difference in the quality and speed of the search process’, and that guidelines for designing polycentric governance derived from research will often therefore be superior to *ad hoc* hunches as starting points for such design efforts. Consistent with this observation, the principle of subsidiarity has been proposed by researchers (e.g., Reeve et al. 2002; Lane et al. 2004; Marshall 2005, 2008b, 2009b, 2009a; Moran et al. 2009; Steffen et al. 2009; 2010; Marshall et al. 2010; Bixler 2014) as an appropriate starting point for assigning decision-making rights across the various levels of polycentric arrangements for environmental governance. This principle prescribes that decision-making rights each be assigned to the lowest level of a governance arrangement at which they can be exercised proficiently (Marshall 2009a).

E. Ostrom (2005) proposed that the design principles for robust governance of common-pool resources she first presented in E. Ostrom (1990) be used as an appropriate starting point in a broad search for improving polycentric governance of natural resources. The principle of subsidiarity is implied by a number of these design principles, including the seventh of these which requires that ‘the rights of appropriators to devise their own institutions are not challenged by external government authorities’. Andersson et al. (2008) observed similarly that a key assumption of the polycentric approach to institutional analysis is that the self-governing capabilities of groups of citizens should form the foundation for the design of broader-scale governance arrangements.

The original justification for the subsidiarity principle was moral, founded on a conviction that each human individual is endowed with an inherent worth and dignity, and accordingly that all social groups should ultimately be at the service of the individual (Schumacher 1973; Marshall 2008b). By positioning higher-level entities as subsidiary to lower ones, not the reverse as conventionally presumed (Marshall et al. 2010; Stafford Smith et al. 2010), this

principle accords with the polycentricity concept by bestowing on all decision-making entities, progressively upwards from the level of individuals, as much decision-making autonomy as can be applied effectively.

5.2 Challenges in applying the principle

A persistent obstacle to authentic application of the subsidiarity principle is the common mistake made by governments and policy makers in under-estimating the capacities of decision-making entities at any level to self-organise governance arrangements to address problems for which they are currently 'too small'. It can sometimes be possible for entities at one level to deal with higher-level (i.e., spatially broader) problems by reconstituting themselves to represent all key interests at that higher level. They may otherwise be able to close mismatches of this kind by collaborating with one or more entities operating at a similar level, possibly agreeing to federate to deal with such problems (V. Ostrom et al. 1961). Even where the former two self-organising possibilities are beyond them, they might still attempt to play key roles by participating in negotiations over the design of higher-level governance arrangements – particularly to ensure that the new arrangements add value to the self-organising capabilities that already exist (Marshall 2008b). Participation of this kind is consistent with the third of E. Ostrom's (1990) design principles: 'Most individuals affected by the operational rules can participate in modifying the operational rules'.

Polycentricity therefore requires that the subsidiarity principle be applied to its own application; i.e., decision-making entities at any level should participate as far as their capacities allow in deciding whether or how decision-making rights should be assigned to a higher level. Wagner (2005) observed how this perspective differs from that of economists working in the field of fiscal federalism (e.g., Oates 1999) who view subsidiarity as a top-down administrative exercise in decentralising tasks as appropriate to lower levels of governance.

The crux of applying the subsidiarity principle lies in assessing the capacities of entities at each level to effectively exercise various decision-making rights, and it here that the mechanistic methodology of mainstream economics has served to subvert the principle's intended devolutionary spirit. This methodology assumes away the positive-feedback (or, in economic parlance, 'increasing-return' (Arthur 1999)) dynamics that make it possible to understand how entities other than governments might self-organise to solve at least some of their collective action problems (Marshall 2005, 2013). Entities other than governments are thus presumed incapable of solving for themselves any market failure (e.g., externality or information) problems they face (Marshall 2008b, 2014). Observing that the exercise of decision-making rights normally involves market failures of some kind, Frey et al. (1999) commented that it has not been difficult to argue on the basis of mainstream economic logic that centralisation is compatible with the subsidiarity principle.

To the extent that calls for a shift towards more adaptive, polycentric forms of governance are associated with recognition of the escalating uncertainties faced as a result of increasingly having to manage social-ecological systems (SES) which are themselves CAS (Anderies et al. 2004)), it follows that mechanistic interpretation of the subsidiarity principle is inappropriate. Nevertheless efforts to gain acceptance of the need to reinterpret this principle in accordance with SES-based methodology often confront formidable obstacles from the continuing hold of mechanistic mental models on the worldviews of many politicians, public officials, community leaders and citizens more generally, as well as from vested interests.

Politicians and public officials, for instance, can have vested interests in obstructing subsidiarity whenever this principle commends devolution of decision-making rights on which their power, status or remuneration depends. The influence of these vested interests on how subsidiarity has come to be interpreted in practice is amplified by the fiscal dominance of central governments relative to lower-level decision-making entities (Marshall 2010).

5.3 Exploring options for institutional innovation

A need for institutional innovation capable of surmounting such obstacles to sophisticated application of the subsidiarity principle has been identified (Steffen et al. 2009; Marshall et al. 2010; Marshall 2014). On the basis of their assessment for Australia's Natural Resource Management Ministerial Council of the vulnerability of the nation's biodiversity to climate change, for instance, Steffen et al. (2009) recommended that a new national institution – a statutory biodiversity authority – be established to deal with these and other obstacles that they identified in reducing this vulnerability. This recommendation followed from an observation that the most effective arrangements by which independent expert advice has been provided to Australian governments has been through statutory bodies. The role of the new national statutory authority would include:

... aud[iting] the partnership arrangements between the Commonwealth, the states and community-based bodies to determine that they conform to the agreed partnership principles. Subsidiarity and polycentricity should be central to these principles. Lingering monocentric tendencies would be addressed by providing communities with an effective voice in how the commission is constituted and operates. Given the complexity of this undertaking – especially in building the ownership and trust of those whose on-ground cooperation is ultimately essential – the efficiency and effectiveness of this strategy would require it to be planned, assessed, reviewed and adapted in a decentralised and devolved way. The new institution would play a particularly crucial role in fostering polycentricity by ensuring that arrangements exist for accountability both upwards and downwards through the governance system (Steffen et al. 2009 p. 164).

Following from the preceding discussion, the judgments of such an independent authority would be guided by a SES-based methodology which could draw from existing frameworks including those of resilience thinking (Walker et al. 2006, 2012) and institutional cost-effectiveness (Marshall 2005, 2013).

The statutory authority model of institutional innovation may be less suitable for other nations (and indeed the Steffen et al. (2009) recommendation along these lines for Australia was not acted upon), but alternatives could be explored. The thrust of this paper (see also Marshall 2014) indicates an increasingly urgent need for research into, and development of, institutional options enabling sophisticated application of the subsidiarity principle in accordance with SES-based thinking.

6. DISCUSSION

In the preceding sections some issues in the interpretation of polycentricity and associated concepts have been identified which could impede clear communication of theoretical developments and empirical findings among the growing community of scholars exploring

the value of these concepts for crafting more adaptive forms of governance. These issues may also confuse and perhaps alienate the political, policy and practitioners communities which could potentially incorporate these developments and findings into their deliberations. The following discussion summarises these issues and indicates my preferred position in respect of each.

One issue revolves around the definition of polycentric governance. As defined originally by V. Ostrom et al. (1961), the decision-making entities comprising a governance arrangement need to be formally independent of each other in order to qualify as a polycentric governance arrangement. Other scholars have revised this definition by requiring that the decision-making entities exhibit considerable autonomy, as well as formal independence, from one another in order to be characterised as constituting polycentric governance. Still others require only that the entities exhibit considerable or substantive *de facto* autonomy from each other.

My preference is for this last definition of polycentric governance since it is consistent with the approach to institutional analysis followed in the influential Bloomington school of political economy which focuses on *de facto* institutions (working rules) as the appropriate unit of analysis rather than *de jure* institutions (formal rules) (E. Ostrom 1990, 2005). This position acknowledges that formal independence of decision-making entities is neither necessary for the entities to experience considerable autonomy from one another nor sufficient for this to occur. As discussed above, formal independence of entities is no guarantee of them experiencing *de facto* considerable autonomy from one another, particularly as governments come increasingly to employ neoliberal governing-at-a-distance strategies. As observed above also, decision-making entities sometimes experience *de facto* considerable autonomy from one another despite lacking formal independence. Where this is the case the entities have potential to realise the key advantage of polycentric governance as identified by V. Ostrom et al. (1961); i.e., enabling citizens to self-organise remedies to the problems of collective action they face at multiple scales⁸.

A second issue concerns the meaning of polycentricity. It appears that nearly all scholars, following V. Ostrom et al. (1961), understand this concept as the defining attribute of polycentric governance; i.e., the degree to which decision-making entities comprising a governance arrangement are either (depending on the scholar's definition of polycentric governance) formally independent and/or autonomous from one another. However, one research team undertaking important empirical research into the links between polycentricity and governance adaptive capacity has interpreted this concept as the defining attribute specifically of polycentric governance *systems* rather than of polycentric governance *arrangements* more generally (Pahl-Wostl et al. 2012; Pahl-Wostl et al. 2014). Pahl-Wostl et al. (2012 p. 29) stated, for instance, that 'the idea of polycentricity is that power is distributed without loss of coordination'.

In reporting the statistical findings of Pahl-Wostl et al. (2012), Pahl-Wostl et al. (2014 p. 139) stated that those findings 'provided evidence that performance increased with increasing polycentricity of the governance system defined as having a distribution of power along with effective coordination structures'. Although these authors were careful in defining what they meant by polycentricity, the risk remains not only that their departure from the original

⁸ As highlighted by Pahl-Wostl et al. (2014) such *de facto* autonomy may also enable decision-making entities to pursue rent-seeking strategies at the expense of the citizens they are intended to serve. The outcome of such autonomy in any case is a matter for empirical investigation.

understanding of polycentricity will make clear communication around this concept more difficult for scholars and policy makers but also that the findings they reported may be misinterpreted by less careful readers as evidence that governance performance increased with polycentricity as conventionally understood (i.e., substantive autonomy and/or formal independence of decision-making entities). Hence, my position in respect of this issue is that polycentricity should be understood generally as an attribute of polycentric governance arrangements rather than more specifically of polycentric governance systems.

A third issue concerns a blurring in some of the literature around polycentricity and related concepts in respect of the distinction between the coherence of a polycentric governance system and its performance. Although E. Ostrom (e.g., 1999, 2005) made clear this distinction when elucidating the complexity of adaptively crafting the institutional arrangements required for a polycentric governance system to perform reasonably well, some authors seem to presume that coherence of a polycentric governance system is not only necessary, but also sufficient, for satisfactory performance. The research of Pahl-Wostl et al. (2012) and Pahl-Wostl et al. (2014) is to be commended for not only making clear this distinction but also for investigating empirically the contribution of polycentric governance systems to actual governance outcomes. Pahl-Wostl et al. (2012 p. 29) reported that their quantitative research results ‘support claims that polycentric systems are more adaptive and have a higher overall performance’ than both fragmented and centralised governance arrangements. Pahl-Wostl et al. (2014 p. 146) reported likewise that their quantitative analyses ‘confirm the hypothesis that polycentric governance regimes defined as combining decentralization of power with effective coordination are characterized by high adaptive capacity⁹’.

My position in respect of this issue is to encourage fellow researchers in this field to follow more generally the lead of authors like E. Ostrom (1999, 2005), Pahl-Wostl et al. (2012) and Pahl-Wostl et al. (2014) in clarifying that the coherence of a polycentric governance system is not in itself sufficient for it to perform reasonably well. As might have been anticipated given the attention given to the subsidiarity principle in section 5, I also encourage fellow researchers in this field to give more explicit attention to this principle when studying the performance of polycentric governance systems or considering how such systems might be made to perform better. An important research challenge in this area, as flagged in section 5, lies in achieving improving our knowledge of the kinds of institutional innovations that might enable application of the subsidiarity principle consistently with the CAS-based thinking through which the self-organising capabilities of polycentric governance arrangements can be understood.

7. CONCLUSION

Although polycentricity and related concepts have become associated closely with calls for more adaptive forms of governance, the discussion in this paper has identified a number of issues in respect of their interpretation that could weaken clarity of communication both within the research community and between this community and the political, policy and practitioner communities that might benefit from the insights that these concepts offer for

⁹ Adaptive capacity was defined in this study as ‘the ability of a water governance system to respond to challenges arising from and triggered by climate change’ (Pahl-Wostl et al. 2014 p. 146). The authors cautioned that this measure captures more the planning and policy development phases of response than the implementation phase.

crafting such forms of governance. My preferred position on each of these issues has been provided above. These positions can be summarised as follows:

- a governance arrangement should be regarded as polycentric when its constituent decision-making entities exhibit *de facto* considerable autonomy from one another, regardless of whether the entities are formally independent of one another;
- polycentricity should be understood generally as an attribute of polycentric governance *arrangements* rather than more specifically of polycentric governance *systems*; i.e., it should refer to the degree to which the decision-making entities comprising a governance arrangement exhibit *de facto* considerable autonomy from one another;
- a clear distinction needs to be maintained between the coherence of a polycentric governance arrangement (where sufficient coherence connotes a polycentric governance *system*) and its performance, and the subsidiarity principle should be used as a key guide to crafting arrangements that are well-performing as well as coherent.

These positions are presented with the intention of stimulating wider discussion of how the issues identified in this paper might best be resolved.

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