Governance and the commons in a multi-level world

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Abstract: Multi-level governance may facilitate learning and adaptation in complex social-ecological circumstances. Such arrangements should connect community-based management with regional/national government-level management, link scientific management and traditional management systems, encourage the sharing of knowledge and information, and promote collaboration and dialogue around goals and outcomes. Governance innovations of this type can thus build capacity to adapt to change and manage for resilience. However, critical reflection on the emergence of adaptive, multi-level governance for the commons is warranted. Drawing on examples from the North and South, the purpose of this review is to connect three complementary bodies of scholarship with insights for commons governance in a multi-level world: common property theory, resilience thinking and political ecology. From the commons and resilience literature, normative principles of adaptive, multi-level governance are synthesized (e.g., participation, accountability, leadership, knowledge pluralism, learning and trust). Political ecological interpretations, however, help to reveal the challenge of actualizing these principles and the contextual forces that make entrenched, top-down management systems resilient to change. These forces include the role of power, scale and levels of organization, knowledge valuation, the positioning of social actors and social constructions of nature. Also addressed are the policy narratives that shape governance, and the dialectic relationship among ecological systems and social change.

1. Introduction

Governing the commons in a multi-level world requires novelty and innovation. Having moved beyond Hardin's (1968) 'Tragedy of the Commons' narrative, commons scholars have examined governance arrangements in diverse resource systems with multiple user groups at local, regional and global scales (Ostrom et al. 2002; Dietz et al. 2003). The emphasis on rules of access, exclusion and subtractability, and the identification of design principles or enabling conditions for the management of common pool resources are major contributions (Ostrom 1990; Baland and Platteau 1996; Agrawal 2002). Theories for governance of the commons continue to evolve as a result.

Recognition that governance of the commons is a complex systems problem (Dietz et al. 2003; Berkes 2006; Wilson 2006) draws attention to social and ecolog-ical system properties not amenable to conventional, top-down decision making. These properties include cross-scale dynamics and feedback, self-organization, multiple domains of attraction, emergence, uncertainty and change (Gunderson and Holling 2002; Berkes et al. 2003). Many of the new concepts shaping com-mons governance are thus emerging from recent bodies of scholarship, most no-tably from the literature on 'resilience' in social-ecological systems, and related ideas from complex systems theory (Levin 1999; Gunderson and Holling 2002; Walker et al. 2006).

Two implications for commons theory and governance emerge from this changing intellectual landscape. First, there is value in synthesizing some of the diverse strands of scholarship to elaborate a robust and coherent set of concepts and models for commons governance. Second, it is important to examine the un-derlying assumptions of these emerging governance concepts, highlighting ar-eas that require further exploration. The purpose of this review, therefore, is to examine emerging narratives associated with governance of the commons in a multi-level world where resilience, transformation, learning and adaptation are encouraged. The review takes as a starting point the need to incorporate more ex-plicitly the underlying social processes and values which shape emerging govern-ance models for the commons. In doing so, attention is drawn to the instrumental and historically de-contextualized analyses of complex commons situations, and the recent governance models ascribed to overcome unsustainable use of those commons.

To synthesize key concepts and draw attention to opportunities and limita-tions with the current governance narrative, this review integrates insights from three bodies of scholarship, including commons theory (Agrawal 2002; Ostrom et

al. 2002; Ostrom 2005), resilience thinking (Berkes et al. 2003; Folke et al. 2005), and critical perspectives on society, institutions and governance more recently encouraged by political ecology (Peet and Watts 1996; Neumann 2005) (Figure 1). The purpose in combining these bodies of scholarship is not to simply critique, but to search for complementarities and the common ground required to enhance governance outcomes. Thus, the review contributes to a growing area of scholarship seeking to build capacity to transform governance of natural resources, defined here as '...the whole of public as well as private interactions taken to solve societal problems and create societal opportunities' and including '...the formulation and application of principles guiding those interactions and care for institutions that enable them (Kooiman and Bavinck 2005, p. 17)'.

The paper begins with a brief examination of experiences with the commons resources toward which novel governance models are directed, and draws attention to widely documented patterns and multi-level drivers of commons change and degradation. These experiences highlight governance models – some formal, others less so – emerging to address multi-level challenges. Building from these experiences, the review summarizes the key precepts of these governance models, and blends commons theory and resilience thinking to identify normative attributes of governance in a multi-level world. Ideas from political ecology are then incorporated as an aid to examine the underlying rationality that frames emerging governance attributes. To highlight the valuable convergence between political ecology and resilience for commons governance, emphasis is placed on identifying the role of power, scale, and levels of organization. Knowledge valuation, the positioning of social actors, social constructions of nature, the policy narratives that shape governance, and the dialectic relationship among ecological systems and social change are also emphasized. Implications for thinking about governance and the commons in a multi-level world are considered, and recommendations for further research and deliberation are highlighted.

2. Experiences from the field

An extensive body of literature on the commons confirms a complex set of experiences, patterns and drivers of change and degradation that organize and reorganize across multiple levels of interaction. Specific experiences may vary by resource type and geographical location, yet there are broad commonalities including trends towards privatization of property rights, the desire of nation-states to extract foreign exchange value by converting natural capital stocks of commons resources into commodities, and the continued growth in the international demand for products from the commons, such as timber and fish (Zerner 2000). As Berkes et al. (2006) note, new markets for products from the commons can develop at speeds that quickly overwhelm the capacity of local institutions to respond and often lead to rapid resource exploitation.
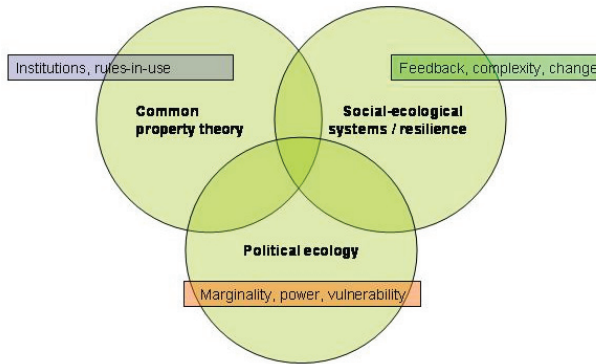
Figure 1: Three complementary bodies of scholarship.

Other widely experienced drivers of commons change and degradation include the spontaneous movement of people for economic and humanitarian reasons, or just as likely, the planned transmigration and resettlement of individuals and communities from overpopulated regions experiencing resource pressure, to perceived 'frontier' lands. Outsider perceptions of local commons as wasteland, unused or inefficiently used resources, exacerbate processes of degradation. Extra-local drivers of this kind often interact with local conditions in which indigenous or long-term residents already experiencing difficult livelihood conditions face access problems and declining resource availability. Often, a loss of ecological regenerative capacity results, along with a reduction in species levels, changes to the functional groups of species critical to processes of regeneration and renewal following disturbance, and ultimately, ecosystem regime shifts (Folke et al. 2004; Hooper et al. 2005) Regime shifts may involve undesirable livelihood outcomes for rural, resource-dependent communities.

Many of these patterns of commons change and degradation are produced by the influences of modernity and capitalism (Armitage and Johnson 2006; Aggarwal 2006), which lead to new sources of conflict over resources, augment economic and social inequalities in commons-dependent communities and regions, and exacerbate livelihood struggles for millions of people (O'Brien and Leichenko 2003). Such experiences indicate the critical need for multi-level governance institutions operating from the local to the national and international. In this context of commons change and degradation, Pritchard and Sanderson (2002, p. 152) highlight the need for novel governance because systems '…are not only cross-scale but dynamic, where the nature of cross-scale influences in the linked

ecological / economic / social system changes over time, creating fundamental problems for division of responsibility between centralized and decentralized agents'.

Multi-level, distributed governance concepts to address the challenges highlighted by Pritchard and Sanderson (2002) are emerging, and involve greater attention to linkages (horizontal and vertical) and learning functions (Folke et al. 2005). In practice, such models of commons governance that explicitly and convincingly embody linking and learning modalities are scarce, although I draw attention to a few opportunistically selected cases (Table 1). I do not offer a comprehensive survey and therefore make no claims on the extent to which these cases represent a complete range of experiences. Rather, the intention is to highlight examples where community, state and other civil society actors govern, sometimes in new or novel ways, commons resources in the context of multi-level drivers of change and degradation. The cases do provide insight from experience in different geographic areas and with different resource systems.

Across most of the examples highlighted in Table 1, drivers of commons change and degradation are similar in broad terms. These drivers include processes of resource intensification and commodification linked to globalization, national-level policies that encourage conversion of natural capital stocks, and perceptions of the commons as unused or inefficiently used resources. As the cases reveal, however, there are fairly significant differences in the level of intentionality or formality in terms of dealing with multi-level challenges, as well as the strength of linkages (vertical, horizontal) among different actors and institutions. Also varying are the catalysts for governance which may come from a formal policy or law, or emerge as a result of wider social/political pressures. In northern Canada, for instance, formalized co-management arrangements (often in response to comprehensive land claims agreements) impart a high degree of intentionality. These institutional conditions and pressures for change are not shared in the examples from Kerala, Cambodia or Sweden.

Consistently illustrated across the cases in Table 1 are efforts to enhance participation, collaboration and some degree of bridging among actors at different levels. In the examples from Cambodia, Indonesia and Canada, this involves shifting decision making responsibilities down to the local level, or seeking over time to build trust among local actors and extra-local authorities as exemplified in the Swedish case. As these experiences illustrate, critiques of conventional, blueprint approaches to governance (Folke et al. 2005) are resulting (albeit slowly) in new approaches and ideas. Each of the cases also reveals that any governance effort is unlikely to be socially or politically neutral. Inequities are intrinsic to shifting relations of status, power and knowledge, culture and history. In the Yukon, for instance, significant conflict over values and resource rights are common, whereas in Cambodia, the costs of local rule-making have not always been equally shared, either within local communities or at the regional level. Even where successes are

documented, notably it would appear in the case from Sweden, those successes have involved lengthy social processes to build linkages and foster learning. It should not be presumed that those contexts with low intentionality or weak linkages will remain that way, that governance efforts in these locales are doomed to fail, or that cases exhibiting success are immune from flips back into periods of poor governance.

Table 1: Selected cases of commons and governance response

Case Study	Commons resource and degree of stationarity	Drivers of commons degradation	Catalyst for governance change	Level of formality/intentionality and strength of linkages (horizontal and vertical)	Outcomes or situation	Sources
Cambodia	Coastal resources (crab, mangroves) high stationarity; fish, low stationarity	Commodification of resources; in-migration and spontaneous resettlement (driven by civil war and resource scarcity)	Acute resource degradation and local response (formation of fishing communities); extra-local support from NGO; policy context supporting decentralization and resource management initiatives	Moderate to low intentionality and strength of linkages; support of NGO required to obtain support from provincial, national bodies	Focus on local rule making inadequate to protect resources on regional scale (lack of horizontal linkages); inadequate vertical linkages required for support of local institutions with the exception of a few cases	Marschke 2005
Canada (Yukon)	Terrestrial mammals (bighorn sheep) and fisheries; moderate stationarity	Real and perceived harvest pressures (e.g., from sport hunting); increasing value of stock as commodity; competing land uses	Land claims and treaty rights	High degree of intentionality through formal co-management process; low to moderate strength of linkages because of conflict between First Nation, government biologists	Continued uncertainty over stock status and health; conflict framed by valuation of different ways of knowing	Nadasdy 2003; Natcher et al. 2005
Canada (Nunavut)	Marine mammal (narwhal); low stationarity	Commodification of resource; transition from collective to individualized harvesting	Formal Land claim agreement (Nunavut Final Agreement (NFA) 1993)	High degree of intentionality because of land claim; strength of linkages moderately high; number of vertical connections with some two-way flow of information; few strong horizontal linkages	Formalized, multi-level narwhal management process but retention of much control with higher levels; conflict over knowledge sources regarding stock health	Armitage 2005b

India (Kerala)	Coastal resource (lagoon and estuarine system – fish and shrimp); low stationarity	Commodification of shrimp stocks; failed licensing and regulatory system creating open access situation	Local response to loss of lucrative fishery and rights in increasingly crowded estuary/lagoon system	Low degree of intentionality across governance system; weak vertical linkages – State does not recognize local associations; coordination among local associations generally weak	Locally effective outcomes in terms of regulating resource use; challenges associated with excluding non-local fishers and region-wide capacity to govern; few multi-level linkages	Lobe and Berkes 2004
Indonesia (Central Sulawesi)	Coastal resources (mangroves) and upland forests; high stationarity	Commodification of coastal resources; in-migration of other ethnic groups; perceptions about indigenous groups as inefficient; national policies supportive of commons conversion	Indigenous rights, resource degradation and new legal context (regional autonomy process – decentralization)	Low degree of intentionality; largely informal; moderate to low strength of linkages; mostly informal and ad-hoc linkages among local and extra-local actors; limited flow of information	New opportunities provided in law; emergence of indigenous group asserting claims; complex social-political obstacles to development of multi-level linkages	Armitage 2002, 2003, 2004
Sweden	Kristianstad wetland complex; high stationarity	Historical perception of wetlands as unproductive; conversion of wetlands to other more 'productive' land uses	Gradual awareness of ecological value of wetland complex	Level of formality/intentionality and strength of linkages moderate to strong, but dependent on a few key individuals; key governance process started from bottom up with municipal level museum building vertical linkages with universities, NGOs and government agencie	Enhanced protection and sustainability of wetland complex; improved awareness of waterscapes and increased retention of associated cultural practices	Olsson et al. 2004; Olsson 2007

Each of the selected cases outlined in Table 1 offers useful insights into commons governance. First, despite changes, these (and many other) multi-level govern-

ance arrangements often struggle to deal effectively with dynamic, cross-scale commons situations. Second, these cases suggest that variations in governance form and function, and the prospects for governance change, are strongly rooted in historical, socio-political and institutional experiences. Attention to specific drivers of commons changes and degradation, arguably, are of secondary importance for governance design.

3. Blending commons theory and resilience thinking

Scholars in diverse disciplines have been concerned with governance form and function, including public administration and rural development (Johnstone and Clark 1982; Uphoff 1986; Brinkerhoff and Ingle 1989; Rondinelli 1993), management and organizational studies (Senge 1990; Wenger 1998), and natural resource and ecosystem management (Gunderson et al. 1995; Bryant and Wilson 1998; Gunderson and Holling 2002). The work of Ostrom and other commons theorists has also been very productive in terms of examining governance in different resource contexts. Ostrom's (1990) original principles (e.g., dealing with group size and homogeneity, benefit and cost distribution mechanisms, the existence of monitoring systems, and clearly defined resource system boundaries) highlighted institutional conditions for collective action and self-organizing systems for community-based management of common pool resources. These principles have been instrumental in advancing commons theory and governance involving many different actors and resource systems.

Co-management is one institutional form, for example, that encourages a multi-level perspective, and involves sharing the rights and responsibilities for a particular resource among several actors, usually involving some configuration of the State, resource users, and civil society (Berkes et al. 1991). The co-management literature provides many examples of multi-level governance arrangements (Pinkerton 1989; Wilson et al. 2003), including many analyses of these arrangements that adopt a critical stance (Nadasdy 2003; Kofinas 2005; Spaeder 2005). More recently, the evolutionary nature of co-management has become apparent (Plummer and Fitzgibbon 2004; Carlsson and Berkes 2005), and a growing body of scholarship is blending collaborative and adaptive management narratives (Brunner et al. 2005; Armitage et al. 2007).

Berkes (2006) also notes that studies of relatively simple community-based management systems and single-use resource management regimes have been central to the development of commons theory (Ostrom 2005), but that many of the institutional systems studied were in reality multi-level and far from simple. These multi-level systems are linked horizontally (across geographic space) and vertically (across levels of organization) (Young 2002; Berkes 2006). Greater attention to vertical and horizontal linkages, it has been hypothesized, should help social actors and institutions respond to change, adapt and cope with uncertainty

by improving communication, coordination and collaboration. In the context of social-ecological perturbation (see Stern et al. 2002; Dietz et al. 2003; Ostrom 2005) commons governance is increasingly recognized as a complex systems problem (Berkes 2006).

Resilience thinking provides a useful entrée into the challenges and implications of complexity for commons governance (see Holling 1973; Gunderson and Holling 2002; Anderies et al. 2004; Anderies et al. 2006). Walker et al. (2002) describe resilience as the potential of a system to remain in a particular configuration, and maintain feedbacks, functions, and an ability to reorganize following disturbance-driven change. Thus, resilience incorporates: (1) the ability of a system to absorb or buffer disturbances and still maintain its core attributes; (2) the ability of the system to self-organize; and (3) the capacity for learning and adaptation in the context of change. The implications for governance that arise from resilience thinking are significant. Specifically, the primary goal for policy makers and managers is not to maximize output or sustainable yield, or control change in systems considered stable, but to manage the capacity of the social-ecological system(s) to cope with and respond to change (Folke 2006), given that surprise is likely and future events unpredictable.

To achieve this goal, a number of system dynamics must be accounted for, such as the existence of multiple thresholds, non-linearities in system behaviour, feedbacks and scale mismatches, cascading effects, system collapse and reorganization (Anderies et al. 2006). A special feature of Ecology and Society (2006) has examined the various dimensions of resilience and the implications for governance, while Folke (2006) provides an historical review of resilience thinking and its main features. A key conclusion from these contributions is that resilience thinking is a useful guide, not in a predictive sense, but as a way to highlight social-ecological system attributes that require novel forms of governance and new types of management interventions (see Anderies et al. 2006).

Fostering resilience requires governance that is adaptive, multi-level and focused on learning. However, resilience is a normative concept (Carpenter et al. 2001) and efforts to define resilience must be situated in the context of contested and evolving human interests and the uncertainties of human interaction (Armitage and Johnson 2006). Governance is thus crucially dependent on collaboration of multiple social actors across levels and scales of organization. Berkes (2006) notes multiple terms used to describe the growing number of institutional forms available to deal with commons as complex systems in which collaboration and learning are key, including epistemic communities, boundary organizations, policy networks, and institutional interplay. Other terms to describe multi-level governance approaches informed by resilience thinking and complexity include adaptive co-management (Ruitenbeek and Cartier 2001; Olsson et al. 2004; Armitage et al. 2007), adaptive governance (Folke et al. 2005; Brunner et al. 2005), polycentric or multi-layered governance approaches (Ostrom et al. 2002; Ostrom

2005), interactive governance (Kooiman et al. 2005), and resilience management (Walker et al. 2002).

Adaptive co-management is perhaps the most specific in making the connection between learning and collaboration. Ruitenbeek and Cartier (2001, 8) define adaptive co-management as a long-term management structure that permits stakeholders to share management responsibility within a specific system of natural resources, and to learn from their actions. Olsson et al. (2004, 75) suggest adaptive co-management is a flexible, community-based system of resource management tailored to specific places and situations, and supported by and working with, various organizations at different scales. Folke et al. (in Olsson et al. 2004) further define the approach as a process by which institutional arrangements and ecological knowledge are tested and revised in a dynamic, self-organizing process of learning-by-doing. This requires that actors and institutions learn to live with change and uncertainty; nurture diversity for re-organization and renewal of social and ecological systems; combine different types of knowledge systems for learning; and create opportunities for self-organization in support of social-ecological sustainability (Folke 2006). Collaborative decision-making arrangements, flexible policy conditions and social organization have been identified as the stimulus for this social learning and adaptive capacity (Woodhill and Roling 1998; Armitage 2005a). Systematic learning and purposeful adaptation under conditions of uncertainty are also recognized as more likely to emerge in the context of meaningful social interaction in which the role of social capital, relationships, learning and trust building are emphasized (Folke et al. 2005).

While varying in terms of scalar focus and disciplinary roots, each of the governance approaches identified above share to some extent the iterative learning orientation of adaptive management as a way to deal with change and uncertainty, and the linkage orientation of collaborative forms of management in which rights and responsibilities are jointly shared and clearly defined. This expanding and hybridized literature emphasizes a suite of governance attributes (some well-established, others more novel) to deal with the complexity of the commons in a multi-level world (Table 2), including participation, interaction and collaboration, leadership, trust and networks. The terminology used in this expanding body of literature is employed in varying ways and with varying specificity, although the normative usage of the terms can be broadly described.

Table 2: Selected features of adaptive, multi-level governance.

Features, attributes	General use of term in literature	Example sources
Participation, collaboration and deliberation	Emergence of these related attributes is a response to top-down, hierarchical or command and control management in which the value of multiple actors and perspectives is recognized. Participation, collaboration and deliberation are seen to create opportunities for different interests, perceptions and interpretations to be scrutinized.	Berkes et al. 2005; Stern 2005; Lebel et al. 2006; Armitage et al. 2007

Multi-Layered	The literature draws attention to organizational structures with multiple, relatively independent centers. Several advantages are suggested, including enhanced potential for level-dependent management interventions, development of mechanisms to address cross-level interactions, and greater capacity to improve monitoring, understand feedback, and encourage appropriate institutions and incentives.	Young 2002; Dietz et al. 2003; Ostrom 2005; Lebel et al. 2006;
Accountable	Linked to distributed institutional arrangements in which accountable authorities pursue just distribution of benefits. Accountable governance can be expected to reduce threats to vulnerable groups and build adaptive capacity.	Lebel et al. 2006
Interactive	An attribute that fits well with networked, multi-layered and participatory ideals. Interactive governance involves a mutually influencing relationship between two or more actors possessing an intentional and structural dimension. Interactive elements must be considered in the context of the system to be governed (e.g., between key social, economic and ecological components of a fishery system), as well as between the actors and components involved in governance of that system.	Kooiman et al. 2005
Leadership	Emphasis is on evolving styles and roles for managers, policy makers, etc. to encourage a move from authoritarian decision maker to facilitator or catalyst. In this capacity, leadership plays a key role in helping create a system 'vision' as well as in sense making. Leadership roles can vary by actor but will likely involve an individual or individuals with the ability to connect with key actors (Brunner et al. 2005 refer to this as 'horseback diplomacy').	Olsson et al. 2004; Brunner et al. 2005; Folke et al. 2005
Knowledge pluralism	Recognition of the value in drawing from multiple sources of knowledge, including knowledge from formally-trained scientists, policy makers and managers, and resource users (fishers, hunters). Emphasis is placed on using multiple sources of knowledge to build a holistic, integrated or systems understanding, rather than understanding in a reductive sense.	Folke et al. 2005; Olsson et al. 2006
Learning	Learning is viewed as a social process and outcome (i.e., social learning) achieved through the collaborative and mutual development and sharing of knowledge by multiple actors. Different types of learning are highlighted (e.g., single, double and triple-loop learning), each of which demands greater focus on the sub-text of learning (individual and collective).	Walker et al. 2002; Folke et al. 2005; Armitage et al. 2007
Trust	Trust is highlighted as a feature of social interaction required for true partnership and collaborative engagements, and one that is underestimated in conventional or top-down management. Discussions of trust are often framed in the terminology of social capital, and therefore, reduced to measurable components (i.e., an outcome of bridging, bonding and social networks).	Berkes et al. 2005; Brunner et al. 2005; Folke et al. 2005
Networked	Linked to the concept of multi-layered governance (nodes and links), networks of actors across scales (e.g., from local users to municipalities to regional and national or international organizations) are expected to play a key role in better coordinating people, improving information flows, synthesizing and mobilizing knowledge of ecosystem dynamics. Networked arrangements should confer resilience on the institutional system because of enhanced capacity to diffuse negative effects and distribute benefits.	Olsson et al. 2004; Wilson 2006

These attributes are productive and important, but they are circumscribed by context, and as will be outlined below, provide only partial direction for governance innovation. They represent a set of 'prescribed' and normative governance values or principles. Li (2006) explains how such principles 'render technical' a very non-technical process. The principles may encourage the belief, for instance, that if levels of participation or collaboration are appropriately adjusted, positive governance outcomes can be expected; or that if the right networks or linkages at the right organizational level are configured, governance challenges will be overcome. Most illuminating perhaps is what Anderies et al. (2006) state about experiences with governance for resilience, adaptation and learning; specifically, that despite the attention to the prescribed values suggested in this growing body of governance literature for the commons, '…much variation in the association between governance arrangements and the capacity to manage resilience remains unexplained'. I draw two insights from this observation.

First, contextual understanding of the exogenous and endogenous variables that influence how social actors and institutions respond proactively to change, support social learning and social capital formation, and maintain collaboration across levels must be recognized as an important component of resilience and governance. Commons scholarship has addressed such issues as collaboration, cooperation and linkages. Yet, a concern with individual incentive structures and group processes using a rational actor or neo-institutional lens (see McCay 2002; Johnson 2004) has arguably de-emphasized context (see Edwards and Steins 1999) and the less tangible processes that determine governance outcomes, or what McCay (2002, 362) has also referred to as 'situation'.

Second, despite the morality of intentions, notions of governance involve what Foucault (in Li 2006, 2) termed the project of 'government'. As Li (2006, 3) notes, at the core of this project is an attempt to 'shape human conduct by calculated means', by educating desires, configuring habits, aspirations and beliefs. The project of governance building as Li (2006) argues, inevitably emerges as a calculated or rational effort to shape human conduct and make complex and historically-evolved institutions and patterns of behaviour a technocratic challenge. There is recognition of this other form of complexity in the emerging governance literature at the intersection of commons theory and resilience thinking (Table 2) - that 'context matters' is now well-documented. However, where prescribed values and normative principles for governance are typically afforded more attention, there is merit in benefiting from insights provided by critical theory, including those insights offered by political ecologists.

4. Engaging with political ecology

Critiques of conventional, command and control or top-down management are well established, and encourage a move towards more adaptive forms of governance (Folke et al. 2005). As noted, however, scholarship in this area often

emphasizes the identification of prescriptive values and principles for govern-ance, along with a concern with structural arrangements (e.g., multi-layered). The varied, complex and messy social processes that determine whether, if and how those prescribed values are 'actualized' so that governance structures lead to sus-tainable outcomes has been less of a focus (although see Adger et al. 2005; Lebel et al. 2005). Political ecology can thus be helpful in understanding the variation between governance arrangements and capacity as identified by Anderies et al. (2006), and offers additional tools to critique the cross-scale drivers that under-mine local property rights and management practices. Continued efforts to engage political ecology with commons theory (see McCay 2002) and resilience thinking offers a way to render less technical, governance of the commons in a multi-level world. To illustrate the particular value of political ecology, the complementari-ties between political ecology and resilience thinking for commons governance are highlighted below. When linked with core themes in political ecology, explicit consideration of context is provided for normative governance values and princi-ples. A brief overview of political ecology is offered in advance.

Over the past 15 years, political ecological research has contributed analyses of common pool resource management, the challenges created by overlapping in-stitutional arrangements, local access and distribution conflicts, and the narratives concerning 'science' and 'modernization' that have led to the marginalization of certain groups and the devaluation of local knowledge systems (Peet and Watts 1996; Zimmerer and Bassett 2003; Robbins 2004). Political ecology thus inte-grates political economy critiques and ecology to analyze the underlying contexts and processes of human-environment relations (Blaikie and Brookfield 1987). Scale and interaction across levels are core themes.

Political ecology links human-environment processes with critiques about power within social relationships, formal and non-formal institutions of govern-ance, and the mediating influence of class, gender, identity and knowledge. Cri-tiques of economic globalization, neo-liberal development strategies, and inequi-table power relationships, for example, have been linked by political ecological scholars to the loss of access to the commons, knowledge systems and manage-ment practices, and increasing livelihood vulnerability (Escobar 1995; Peet and Watts 1996; Zerner 2000). Political ecology, however, is not without its critics. For example, the tendency of political ecology scholarship to offer critiques but few solutions has limited its appeal (Robbins 2004; Walker 2006). Another com-mon critique suggests that most political ecological analysis involves little if any ecology (see Vayda and Walters 1999; Walker 2005), and may be more accurate-ly labeled environmental politics. Such critics have argued that rigorous political economy explanations of human-environment interactions should first examine and articulate the ecological changes and events taking place (Vayda and Walters 1999), while also recognizing the influence of ecological conditions on human responses and power relations (Zimmerer and Bassett 2003).

The diversity of scholarship situated under the banner of political ecology has constrained the emergence of a unified sub-field (Walker 2006). Yet, recent volumes on political ecology (Forsyth 2003; Zimmerer and Bassett 2003; Robbins 2004; Neumann 2005; Paulson and Gezon 2005) are attempting to synthesize key features of this body of scholarship, consolidate insights and address critiques. Neumann's (2005) synthesis is particularly interesting because he argues a defining feature of political ecology is the merging of critical social theory and non-equilibrium ecological concepts (as employed in resilience thinking). Four themes are identified by Neumann (2005), each of which has implications for governance of the commons as complex adaptive systems: (1) a need for critical examination of the scientific basis regarding human-environment interactions and awareness that objective, science-driven claims about degradation and culpable parties have often proven inaccurate; (2) recognition that ecological systems are not passive recipients of human action but that ecological agency can shape human-environment interactions; (3) examination of the role of temporal scale to highlight the non-linear and non-cyclical character of environmental change and the social construction of nature; and (4) identification of the need for flexibility in institutional designs that match dynamic ecological systems.

With the linking of complex systems ideas and political ecology, important bridges to resilience thinking are forming. At the same time, Folke (2006) notes that social scientists are taking a more active role in examining dynamics of social-ecological resilience. Critical social theory contributed by political ecologists (and others) can continue to make crucial insights. Thus, while political ecology and resilience emerge from different disciplinary perspectives and intellectual traditions, they do intersect in productive ways for thinking about commons governance. Adger's (2000) analysis of social and ecological resilience in Vietnam, and Peterson's (2000) use of political ecology and resilience to assess management of salmon in the Columbia River of the U.S. Pacific Northwest, provide examples to highlight general complementarities (e.g., scale and human-environment interactions). Relatively few other authors (see Scoones 1999), however, have been explicit in drawing attention to specific points of intersection between these two approaches.

Further efforts are required to highlight the array of conceptual tools for thinking about cross-scale connections and multi-level governance when political ecology and resilience are combined. I outline several key points of intersection below (see Table 3).

Table 3: Selected points of intersection between political ecology and resilience

Points of Intersection	Resilience directs attention to…	Political ecology directs attention to…
Nested hierarchies and scales	Interactions of nested systems (holonarchy) Limited utility of single scale perspectives (or one hierarchical level)	Socio-political (institutional) and organizational levels and interactions, mediated through power relations Inter- and intra-scale dynamics of decision making (community vs. state; within community, etc.)

Multiple pathways and trajectories	System changes that may be unknowable and discontinuous, and involve sudden and dramatic flips – thus the possibility of multiple steady states in a given system Manner in which factors of multiple types and at multiple scales coalesce to shape system direction – often a function of chance and history	How socio-political, institutional, economic and ecological factors coalesce in unpredictable and unintended ways The significant role of historical conditions (human-ecological interactions and power relations) in current system trajectories
Self-organization	Complexity of living systems and manner in which they reorganize and/or adapt in the face of change (internal or external disturbance)	Understanding ways in which ecosystems and environmental systems shape and form self-organizing, often self-perpetuating power relationships and resource control at different scales
Importance of contextualization	Systems as integrated wholes whose properties are more than the sum of parts Emergence as neither foreseeable nor expected – emergent properties of systems can only be understood within the broader context in which they are enmeshed	Differentiated role of stakeholder groups and actors in the creation of knowledge, the legitimization of knowledge frameworks or 'ways of knowing', and representations of reality Embedding current system conditions in an historical ecological framework and an understanding of power relationships
Core themes	Unpredictability of nature-society interactions and the dynamics of scale that foster unpredictability	Power, power relationships and the mediation of power relationships across scales

A first point of intersection involves a shared emphasis on nested hierarchies, levels and scale. As articulated in both political ecology and resilience, scale is a crucial concept and directs attention to the diversity of social and ecological variables and processes involved in the articulation of change and responses to change. A second point of intersection is recognition of possibilities for multiple system trajectories and pathways. As Scoones and Wolmer (in de Haan and Zoomers 2005, p. 34) note, '… pathways of change are non-linear and appear non-deterministic inasmuch as various actors starting from different positions of power and resource endowments may have arrived at similar configurations by very different intermediate steps'. This logic is shared by both political ecology and resilience thinking. A third point of intersection includes an awareness of the self-organization of complex social-ecological systems, despite some difference in emphasis placed on constituent components. Finally, political ecology and resilience converge around the recognition that contextualizing analyses of social-ecological systems is crucial, particularly where attention is directed at identifying interventions (i.e., governance).

Framing these points of intersection are the core themes of each approach. In political ecology, the core themes include power, power relationships and how different interests mediate those relationships across levels. This is a valuable contribution given the normative dimension of resilience, and fits well with commons scholarship addressing cooperation, cross-scale institutional issues and the

decline of local property rights. In the resilience perspective, the core themes are unpredictability, social-ecological change, and the dynamics of cross-scale interactions. Resilience thinking suggests that flexible and distributive forms of governance are required, offering a useful conceptual link to commons literature addressing horizontal and vertical linkages and redundancy (Dietz et al. 2003; Ostrom 2005).

These points of intersection provide a canvas upon which the more traditional foci of political ecology may be explored. Such traditional concerns in political ecology include: (a) the role of power, scale and levels of organization; (b) the positioning of social actors; (c) social constructions of nature and the policy narratives that shape governance; and (d) knowledge valuation. Combining these insights and foci seems a laudable contribution given the efforts to modify governance arrangements in line with the attributes identified in Table 2. A few examples are provided from the commons experiences previously outlined (Table 1).

Understanding pathways of change, system trajectories and processes of self-organization are central to effective governance. Resilience thinking suggests systems experience change in ways that are not always knowable, and that cross-scale interactions can lead to 'flips' or rapid system transformations. First, the drivers that determine pathways, trajectories and self-organization may be ecological or social or both. Second, interpretation of these processes invariably draws in human values. A 'critical perspective' (i.e., political ecology) on how social actors construct different interpretations of nature-society interactions, and therefore, corresponding policy interventions and governance strategies, has the opportunity to make resilience interpretations of system behaviour more robust. This constructivist turn encouraged by political ecologists and others does not imply that distinguishing '…better from worse explanations (Sayer in Neumann 2005, p. 47)' of change is impossible. Rather, a constructivist perspective suggests that certain types of discourse (e.g., around science and modernization) and representations of marginalized actors will influence how the prescribed governance values (see Table 2) will be interpreted and actualized in particular places and at particular times (e.g., resilience of what as determined by whom?). For instance, the social construction of environmental problems, guided in large part by modernization and mainstream 'population growth-environmental degradation' narratives, has played a key role in shaping specific management interventions. In the Indonesian case (Table 1), policy narratives linking the shifting agro-ecological systems of subsistence groups, processes of deforestation and biodiversity loss have led to policies encouraging settlement, removal of people from forested lands, and a shift to sedentary forms of agricultural production (Li 1999; Armitage 2004). This narrative has created barriers to learning from traditional groups and their customary practices, and has undermined opportunities to test novel institutional strategies (such as forging multi-level alliances among local community groups, NGOs and government actors).

In the case of narwhal management in Nunavut (Table 1), emerging governance arrangements are consistent with many of the prescribed values highlighted above. Yet, a complementary emphasis on hierarchy, scale and interactions from both resilience and political ecology perspectives offers some useful insight. For example, control and decision-making processes concerning narwhal have until recently been securely located within Canada's Department of Fisheries and Oceans (DFO). This has played an historically important role in undermining local resource control and patterns of narwhal use (Armitage 2005b). Even with the recent governance changes, power differences among local and non-local actors still influence efforts to link actors vertically to improve decision making. The ability to make meaningful change is still centralized in many respects at higher management levels. Inuit hunters are thus embedded in a mainstream, conventional resource management system. The relatively recent move to formalize a community-based co-management process and build multi-level governance will not easily overcome the historical legacy of centralized decision making. Resilience thinking further draws attention to the limited utility of a single-scale perspective given the importance of understanding and managing feedback. In governance, there is a need to address not only structural arrangements, but the historic and hegemonic role of formal authorities and cross-cultural difference.

Specific groups (often vulnerable communities or groups within communities) can be negatively perceived and under-represented in decision making processes, despite participation and partnership rhetoric. In the northern Canadian examples (Table 1), the various actors involved in the governance of commons resources appear to exert different claims to power. Local level actors should make most harvest decisions while the territorial or federal government bodies have a primarily oversight role. Yet, in practice the local resource management bodies in these cases still rely quite heavily on the regional and national level management authority (e.g., the Nunavut Wildlife Management Board and the Department of Fisheries and Oceans in the case of narwhal) for guidance on rule-making, knowledge dissemination and other types of technical and financial support. A positioning of actors in the governance process remains despite the move away from the conventional management regime. Historical legacies of power and ongoing value conflicts influence how actors actually interact today (see Nadasdy 2003; Natcher et al. 2005), despite the language of partnership, accountability, trust building and knowledge valuation.

Even more challenging circumstances exist in the examples from Indonesia and Cambodia. In Indonesia, for instance, representations of the 'other' (i.e., marginalized, rural or traditional communities) are often encapsulated in pejorative terminology connected to broader worldviews among the bureaucratic and management elite (e.g., masyarakat terasing in Indonesia referring to isolated or backward communities (Dove 1999; Li 1999). Such generalizations and representations form a language of power. As Dove (1999, p. 215) noted, '…the persistence of these views [backward, irrational] of the peasantry, in spite of changes in

time, place and culture…suggests that they are not sociological but ideological in origin. It suggests that they are based less on social reality, the local variation in which they would otherwise reflect, than on an ideological reality, consisting of a… political and economic agenda'. Studies using a broadly political ecological framework thus help to document and explain the specific instances in which marginal groups may be situated within evolving governance processes, as is the case in many of the decentralization trends in Southeast Asia including those in Indonesia and Cambodia (Table 1).

The importance of contextualized systems understanding is highlighted in both political ecology and resilience, although different dimensions of context are emphasized. For example, in many northern resource wildlife management situations (Table 1), the manner in which issues are constructed is context and actor-dependent (e.g., in terms of stock conservation or access rights) (see Nadasdy 2003; Natcher et al. 2005). Notably, when conflicts are constructed in conservation terms, the governance challenge can be rendered technical and biological (e.g., adjusting quotas, improving participation in planning). For local groups, however, construction of the problem in terms of access is intrinsically tied to images of who they are and their historical socio-cultural experience. These insights may emphasize negative historical relations with colonial or mainstream institutions, while also highlighting how certain actors see themselves as part of an integrated and emergent system. In this light, notions of participation, collaboration and accountability become potentially polemic, rather than universal values for governance. As Neumann (2005, 48) summarizes with regards to constructions of nature-society interaction and environmental problems, 'models of nature can neither be naively accepted as objective reality divorced from social and power relations, nor as merely an illusion produced through discourse'. However, 'discursive relations and representational practices are constitutive of the very ways that nature is made available to forms of economic and political calculation and the ways in which our interventions in nature are socially organized (Castree and Braun in Neumann 2005, p. 47)'. Resilience scholarship has not always engaged with these types of concerns, although they fit well with understanding social-ecological system behaviour (i.e., multiple pathways, trajectories and self-organization).

The interplay of power, the positioning of various actors within nested hierarchies and the role of context all exert a powerful influence on the knowledge used to understand environmental change. An expected benefit of multi-level governance, for example, is the linking of formal science and local or indigenous knowledge systems. Knowledge integration is not an a priori outcome, however, even though indigenous resource users and some government managers view such an outcome as desirable. Despite the move towards multi-level co-management systems in Canada's North, for example, formal science is still considered more relevant and legitimate. While efforts to draw on different knowledge systems have

increased in places like northern Canada (Gearheard and Shirley 2007), many challenges remain, including the continued strength of Euro-Canadian planning and management techniques (e.g., biological stock assessments) (Nadasdy 2003 2005). In the Yukon, Natcher et al. (2005, p. 247) also document the divide between First Nation and non-First Nation worldviews in terms of the environment, and find that the governance process has '…to a large extent failed to capitalize on the cultural experiences of group members and at best has expressed mixed messages about the degree to which the contributions of group members are actually valued'. At the same time, political ecologists have also been critical of the simplifications and representations of the 'local' in community-based conservation and natural resource management generally (Kellert et al. 2000). Caution is required not to privilege local knowledge systems, without identifying the productive role of Western science, or represent traditional knowledge as a self-contained body of knowledge disconnected from interplay with Western knowledge systems (Agrawal 1995).

5. Conclusions

Governance of the commons as complex systems necessitates flexible and distributed institutional forms. Advances in commons theory and emerging bodies of scholarship like resilience can contribute to the development of these novel institutional forms and help to elaborate valuable principles for governance. Insights from political ecology, however, draw attention to the historical, socio-political context and dialectic human-environment experiences that play a fundamental role in the actualization of those principles and governance outcomes. Such insights do not provide the 'missing piece'. Rather, complementing commons and resilience scholarship with political ecology supports an explicit and systematic focus on key social processes. Several implications for commons governance, research and deliberation can be identified.

First, rendering governance a technical process (see Li 2006) framed by a suite of prescribed principles or attributes (Table 2) may contribute to the discounting of crucial but less tangible components of governance. Over-attention to normative principles, even when directed at building flexible and distributive institutional forms, can impart a perspective that governance is much like a recipe. Yet, attention to who makes decisions about which recipe is followed, who gets access to the ingredients, and who benefits from the outcome is equally important. Issues of power and control, the social construction of problems, knowledge valuation and the positioning of different groups suggest that adaptive, multi-level governance in specific places and at specific times is dependent on variables and events that require thoughtful deconstruction. These processes play a significant role in determining system trajectories and self-organization, and actor relations across hierarchies and scales. Deliberative processes which encourage reflection, observation and opportunities for communication and persuasion among social

actors where uncertainties are high (see Stern 2005) will be important in helping to articulate the full range of principles, values, models and assumptions.

Second, governance examined through a disciplinary lens is unlikely to account for the reality of the commons as complex adaptive systems. Hybridized analyses are required and the bodies of scholarship linked here offer one example of this approach. Methodological and conceptual tensions are an inevitable consequence. Johnson (2004) has suggested a tension within commons scholarship among those who adopt an historical-ethnographic or entitlements perspective, and those collective action scholars adopting a deductive model to build theory. Such tensions are not uncommon and anecdotes of similar tensions are evident in anthropology and geography, economics and psychology. Observations of the papers and presentations at the 2006 International Association for the Study of the Commons (IASC) conference in Bali, Indonesia, suggest there may be a certain degree of 'imagining' in regards to these tensions. There appears to be much cross-fertilization in terms of ideas with contributions adopting a broad and integrated range of theoretical positions and methodological approaches as encouraged by McCay (2002). The continued cross-fertilization of ideas is crucial for the evolution of commons governance.

Third, efforts to foster these intersections and hybrid analyses will exert additional pressure to remove disciplinary boundaries, while also linking social and natural scientists, policy makers, managers and communities. This requires further effort to find commonalities and areas of overlap, rather than difference, among disparate perspectives. Finally, in light of the need for hybridized perspectives to examine governance and the commons, improved capacity to document outcomes (ecological, social) of novel institutional forms is also necessary. As this review suggests, the interests of certain groups are not often met by engaging productively in novel forms of governance where collaboration and accountability are valued. Thus, conceptually consistent frameworks will enable researchers and policy makers to assess commons governance approaches and foster systematic learning across multiple sites. Evaluative tools will need to be suitable for complex systems, sensitive to the core themes and concepts outlined in this paper, and directed towards three broad components: ecosystem conditions, livelihood outcomes, and power, process and institutional conditions. Outcomes of those evaluations will provide important direction for governance of the commons in a complex and multi-level world.

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