Chapter 10
The Learning Dimension of Adaptive Capacity: Untangling the Multi-level Connections

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10.1 Introduction

As discussed in Chap. 1, social–ecological systems are complex and dynamic, and characterized by cross-scale feedback, rapid change, nonlinearity, surprises, and uncertainty. The governance[1] of such systems is typified by high decision stakes, conflicting interests and knowledge claims, levels of uncertainty that are often in the realm of ignorance and indeterminacy, multiple probative scales of analysis, and seemingly intractable management situations. In such a post normal context, there is a need for governance institutions[2] with high levels of adaptive capacity. Defined generally, adaptive capacity is the capability of a social–ecological system to cope with disturbances and changes while retaining critical functions, structures and feedback mechanisms (Folke 2006; Olsson et al. 2004b). Governance institutions with high levels of adaptive capacity are flexible in problem solving, innovative in developing solutions, and responsive to feedback. What's more, they are capable of learning at and across multiple levels of social organization; i.e., adaptive institutions reflect learning at individual and various collective levels (Armitage 2005; Folke et al. 2003; Walker et al. 2002).

This chapter focuses on the processes that link learning at multiple levels. Governance that facilitates multi-level learning fosters relationships, builds trust,

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[1]My definition of governance is similar to the one adopted in Chap. 1: the processes and institutions used to address challenges and create opportunities in society (Armitage et al. 2009).

[2]I have adopted Young's (2002, p. 286) definition of institutions, which is similar in approach and breadth to the definition used in the first chapter: "institutions are the conventions, norms and formally sanctioned rules of a society. They provide expectations, stability and meaning essential to human existence and coordination. Institutions regularize life, support values and produce and protect interest".

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reconciles diverse views and interests, resolves conflict, and develops shared understandings of problems and potential solutions. It encourages participants to monitor the outcomes of management initiatives, reflect upon those outcomes, and make necessary adjustments, thus enabling decision making in the face of uncertainty. Additionally, adaptive governance promotes broad-based partnerships conducive to assembling the resources (human, financial, scientific, and political) needed to generate enduring change in the face of management complexity. Further, and most importantly for the purposes of this chapter, adaptive governance involves receptive and deliberative vertical connections across various levels of social organization.

Learning has been the subject of research in resource and environmental governance for several decades. Notable early studies examined the implications of learning through public involvement in management (Glasser et al. 1975), conceptualized international development projects as learning processes (Korten 1980), and advanced the notion of learning through adaptive management (Holling 1978). In the 1990s the field continued to grow, and began to rely increasingly on conceptual or theoretical frameworks drawn from social learning (Webler et al. 1995), collaborative learning (Daniels and Walker 1996), critical pedagogy (Diduck and Sinclair 1997), and transformative learning (Alexander 1999). Since 2000, studies on learning have proliferated, branching into organizational (Fitzpatrick 2006) and policy learning (Haas 2000), and deepening earlier lines of inquiry into communicative action (Wiklund 2005), transformative learning (Diduck and Mitchell 2003), and adaptive management and governance (Armitage et al. 2007). The cross-cutting topic of social learning has attracted particular attention, yielding rich models of collaborative inquiry, concerted action and learning for sustainability (Keen et al. 2005; Leeuwis and Pyburn 2002; Pahl-Wostl et al. 2008; Schusler et al. 2003).

Despite the proliferation and diversity of recent research, numerous uncertainties and challenges remain, including lack of precision in defining basic terms and units of analysis (How is learning defined? Who or what is doing the learning?) (Armitage et al. 2008; Easterby-Smith et al. 2000), lack of attention to multi-level learning, i.e., learning at multiple levels of social organization (What are the relationships among individual and the various levels of collective learning?) (Bapuji and Crossan 2004; Pelling et al. 2008), and also lack of attention to the influence of power (How do power differentials affect learning outcomes and processes?) (Armitage et al. 2008; Ferdinand 2004).

The purpose of this chapter is to help fill these gaps by presenting a conceptual framework of connections linking learning outcomes across multiple levels of social organization. The framework was developed through an integrative (rather than a synoptic) literature review (Montuori 2005; Torraco 2005) that selectively synthesized learning constructs from various disciplines. The framework is theoretical, although aspects of it are supported by empirical evidence from resource and environmental governance experiences.

Section 10.2 offers five pertinent definitions and explanations of learning and lays out the social units of analysis used in the chapter. Section 10.3 reviews and synthesizes literature on processes that link learning at multiple levels. The term

multi-level learning connections is used throughout the chapter, and is defined as those institutions that facilitate the transmission of learning outcomes from one level of social organization to another (by either up-scaling or down-scaling the outcomes). Section 10.4 problematizes multi-level connections and other learning processes that do not adequately accommodate contested values, power imbalances, economic constraints, and social objectives of sustainability. Section 10.5 concludes the chapter with a discussion of the implications for policy and practice, and for research regarding multi-level learning and adaptive capacity in social–ecological governance.

10.2 Defining Learning and the Social Units of Analysis

The chapter does not adopt a single definition of learning applicable to multiple levels of organization. I agree with Levy (1994) that the reification of individual learning to the collective level is not analytically fruitful. Action groups, organizations and networks do not literally learn in the same sense that individuals do. It is more helpful, particularly in understanding multi-level learning connections, to follow the lead of early organizational learning scholars (e.g., Argyris and Schön 1978; Hedberg 1981) in distinguishing among conceptions of learning applicable to various levels of social organization.

This chapter distinguishes among five conceptions of learning: individual, action group, organizational, network, and societal. Table 10.1 provides a summary offering definitions for each conceptualization along with descriptions of the pertinent levels of organization (or social units of analysis). I explain the table below, but before doing so, four caveats are in order. First, for the sake of precision, I have not used the term social learning, despite the importance and growth of the recent literature on the subject. This term continues, as Parson and Clark (1995) said over 10 years ago, to mask great diversity and complexity of meaning (see the recent reviews by Muro and Jeffrey (2008) and Blackmore (2007)). Recent studies have used the term to mean, or encompass, each or combinations of what I have called action group, organizational and societal learning (e.g., Bouwen and Taillieu 2004; Hayward et al. 2007; Holden 2008; Woodhill 2002). Additionally, the best established conception is likely Bandura's (1986), which is essentially a theory of individual learning. Second, for the sake of simplicity, I have restricted the framework to five conceptions of learning and five units of analysis, excluding important concepts like government and policy learning (Levy 1994), and important units like communities of practice (Wenger 1998) and informal organizations (Pelling et al. 2008). In doing so, my intent was not to diminish the importance of the excluded items, but rather to offer a relatively simple framework to help scrutinize the linkages among the units. On a related note, the third caution is that the discussion below and Table 10.1 are somewhat hierarchical and only hint at the full range of messy, or complicated, interactions among the various levels of social organization. A fuller portrayal of the untidy mesh of relationships, acting across all levels

Table 10.1 Five conceptions of learning, and related social units of analysis

Individual learning: the process through which a person's knowledge, skills, beliefs, or behaviors are changed as a result of experience	*Individual*: much of the discussion in this chapter applies most directly to adults rather than children
Action group learning: the processes by which individual learning outcomes become part of a web of distributed and mutual outcomes in a collection of individuals	*Action group*: a cohesive but relatively informal association of individuals focused on specific objectives and tasks, often with a short lifespan
Organizational learning: the processes by which individual or action group learning outcomes are stored in and brought forth from organizational memory, such as routines, practices, procedures, and cultures in the organization	*Organization*: like an action group but often with a longer lifespan and more complex mandate, and usually framed by formal membership and institutions
Network learning: the processes through which organizational learning outcomes become part of a web of distributed and mutual outcomes in a collection of organizations (and thus effect change in network-level properties)	*Organizational network*: a collection of organizations lacking a trans-organizational structure but sharing political, social, economic or cultural interests
Societal learning: the democratic processes by which core societal institutions are modified in response to social and environmental change	*Society*: the community of people living in a particular region or country having shared customs, organizations, and laws

simultaneously, was beyond the scope of the chapter. Finally, although the distinctions among the units of analysis are conceptually sound and analytically useful, in practice some might be fuzzy and prove difficult to apply in any given case of multi-level learning, e.g., the degree of formality of structure differentiating an action group from an organization.

10.2.1 Individual Learning

In an attempt to take a complementary or integrated approach, I have defined individual learning broadly: the process through which a person's knowledge, skills, beliefs, or behaviors are changed as a result of experience (Levy 1994; Merriam et al. 2007; Parson and Clark 1995). The related social unit of analysis is the individual, and as noted in Table 10.1 the discussion applies most directly to adults rather than children. I make this distinction because the analytic focus in this section and throughout the chapter is on adult learning processes, such as critical reflection, deliberation and dialog, and socio-political empowerment (Merriam et al. 2007).

Although the emphasis here is on changes taking place at the level of the individual, individual learning is a highly social process, often facilitated in a collective setting, dependant on concerted inquiry and action, or deeply embedded

in specific socio-cultural practices (Bandura 1986; Mezirow 2000; Wenger 1998). Borrowing from Salomon and Perkins (1998), it is helpful to view the influence of social variables as being on a continuum from, say, highly solitary learning (reliant on social artifacts like cultural beliefs or historical relics and documents) to highly situated communities of practice (in which it is difficult to separate individual from collective learning outcomes).

At the social end of the spectrum, it is difficult to define and explain learning separate and apart from explaining multi-level learning connections, the subject of Sect. 10.3. In such instances, the central processes of learning themselves are the institutions that up-scale or down-scale learning outcomes. However, closer to the solitary end of the spectrum, it can be more helpful to split the definitions and explanations of learning processes from an examination of multi-level connections, which of course is what has been done in this chapter. In that vein, the following adds greater depth to the definition of individual learning presented earlier by offering insights from transformative theory, a leading theory of adult learning.

Transformative theory is in the midrange of the influence of social determinants continuum, but it is likely best placed nearer to the individual than the social end. The theory provides a detailed explanation of cognitive changes taking place at the level of the individual, but at the same time it emphasizes that communicative processes (modeled on Habermas' ideal speech situation) and social engagement are highly influential in shaping individual cognitive changes (Mezirow 1990, 1991, 2000). Additionally, the theory, which has a small but growing research base in the field of environmental governance (e.g., Alexander 1999; Diduck and Mitchell 2003; Sinclair and Diduck 2001), is helpful for the purposes of this chapter because it presents a construct, namely emancipatory learning, that assists with the politicization of learning discourse.

Transformative theory describes three forms of learning: instrumental, communicative, and emancipatory.[3] Instrumental learning provides competence in coping with the external world through technical control of natural forces. Communicative learning helps people negotiate their own meanings, intentions and values, rather than merely accepting those of others. Disagreements in the realm of communicative learning are typically resolved by resort to force, authority, or discourse. Resolving disagreements through discourse is emancipatory if it frees the learner

[3]Organizational theory describes three similar forms of learning (Argyris 1977, 1990; Argyris and Schön 1978; Easterby-Smith et al. 2000; Flood and Romm 1996). Single-loop learning involves improving efficacy, or getting better at fulfilling existing purposes in the context of a given set of fundamental governing variables. Double-loop learning involves evaluation of and changes to both instrumental means and ends and fundamental governing variables. Triple-loop learning asks if power structures act too much in support of selected and privileged definitions of rightness. Additionally, emancipatory learning was influenced by Paulo Freire's "pedagogy of the oppressed" (Freire 1970, 1973). This educational approach is intended specifically to counter power asymmetries and hegemonic influences. It looks to empower the disenfranchised, challenge socio-political and economic presuppositions, foster emancipatory learning, and mobilize concerted action for structural change.

from oppressive social relations (e.g., personal empowerment enabling a critique of inequitable resource sharing). Emancipatory learning outcomes are most likely to occur under the ideal conditions of learning: accurate and complete information; freedom from coercion; openness to alternative perspectives; ability to reflect critically upon presuppositions; equal opportunity to participate; and, abilities to assess arguments as objectively as possible and to accept a rational consensus as valid (Mezirow 1990, 1991, 2000).

The theory further suggests that learning occurs through changes (or transformations) in a person's frame of reference. A frame of reference consists of meaning perspectives (broad epistemic, psychological and socio-cultural predispositions) and meaning schemes (specific beliefs, feelings, attitudes and value judgments). Transformation occurs through critical reflection on the underlying assumptions of the various elements of the meaning perspective or meaning scheme. Critical reflection involves processes such as assessment of role assumptions and social expectations, recognition that one's problem may be shared by others in the community, exploring new patterns of behavior, provisional efforts to try new roles and gain feedback, and social engagement with a new perspective (Mezirow 1990, 1991, 2000). One can see that social variables are part of this process, but the extent to which they might influence the learning outcome in any particular instance is contingent upon individual and contextual circumstances.

10.2.2 Action Group Learning

Building on the conceptualization of individual learning presented above, action group learning is defined as the processes by which individual learning outcomes become part of a web of distributed and mutual outcomes in a collection of individuals. Borrowing from Friedmann (1987), the related social unit of analysis is the action group, defined here as a cohesive but relatively informal association of individuals focused on specific objectives and tasks, and which often has a short lifespan.

What individuals learn is vital to what action groups learn, and consistent with the discussion in the preceding section, the reverse is true: what action groups learn is vital to what individuals learn. Section 10.3 provides details of multi-level connections spanning individual and action group learning, but what follows is a brief overview of a selected model of action group learning, to add further depth to the basic definition provided above. Röling's (2002) elements of cognition model is summarized because its cognitive focus complements the emphasis in the previous section. Additionally, like Friedmann's (1987), Röling's model emphasizes praxis, or the connections between theory and practice. Further, it encompasses the essential idea of leading models of social learning (or what I have called action group learning) found in the resource and environmental governance literature. This idea is that through facilitated social interaction and concerted action, differing frames of reference are likely to be adapted, possibly leading to mutual or complementary

frames, further concerted action, and the development of a common social reality (Keen et al. 2005; Rist et al. 2007; Schusler et al. 2003; Steyaert and Jiggins 2007; Webler et al. 1995).

For Röling (2002), social learning consists of facilitating a transition in a collection of individuals from a state of multiple cognition to one of distributed or collective cognition. Cognition is broader than the mental process of acquiring knowledge and understanding; it encompasses perceptions and theories of one's environment (or context), and values, emotions and goals respecting the environment/context. Multiple cognition emphasizes the presence, in any given situation, of different cognitive agents with multiple perspectives. Distributed cognition emphasizes different but complementary attributes that permit concerted action. Collective cognition stresses shared attributes plus collective action. Coherence among the components of cognition is a fundamental driver of cognitive development. Another driver is correspondence between a person's cognitive components and his or her environment. In the model, the transition from multiple to collective cognitive states and the development of cognitive coherence and correspondence are facilitated by intentionally designed platforms for learning (Röling and Maarleveld 1999). Such platforms require various problem-solving and decision-making processes (see Sect. 10.3) to identify and assess interdependencies in the group, resolve conflicts stemming from the interdependencies, build enduring trust relations, and enable concerted action toward a common goal.

The ensuing section builds on the foregoing introductions to individual and action group learning by situating them in the context of organizational learning. However, before turning to that task I want to quickly mention the issue raised by Levy (1994) in his discussion of what he called the accuracy criterion of learning. I do so now because the issue often arises in definitions of social (or what I have called action group) learning. The issue is that definitions of learning are sometimes restricted to processes that result in outcomes that are empirically accurate or otherwise normatively desirable, according to a given analytical framework or set of normative criteria. An example is the efficiency conception of learning described by Tetlock (1991) in which learning involves acquiring the ability to match ends and means more effectively – either by employing more appropriate means or by pursuing goals that are more realistic. Another example is Woodhill's (2002) definition of social learning, which was restricted to outcomes that optimize the collective wellbeing of current and future generations.[4] Yet another can be seen in how Keen et al. (2005) defined social learning with reference to outcomes that improve the management of human and environmental interrelations.

There are advantages to defining learning using restrictive criteria, such as being able to more clearly distinguish learning from other forms of cognitive, organizational and social change. However, a fundamental problem also arises, particularly in complicated governance situations (which is true of most pressing resource and

[4]I adopt Woodhill's (2002) definition of social learning as my definition of societal learning minus the restrictive sustainability criterion – see Sect. 3.2.5.

environmental problems), namely the lack of agreed upon standards to measure whether learning outcomes are congruent with the pertinent criterion, be it accuracy, efficiency or sustainability. This lack of standards creates a real danger of analysts using the term learning in so self-serving a manner that it becomes synonymous with the accrual of outcomes that the analyst deems correct. Additionally, narrow definitions of learning can decrease the chances of encountering useful empirical findings regarding the nature of learning outcomes (Levy 1994; Tetlock 1991). For these reasons, as the reader would have already noted, I have not taken a restrictive approach in this chapter; I have adopted a process-centered orientation and have not defined learning in reference to whether a particular type or direction of outcome has resulted.

10.2.3 Organizational Learning

I define organizational learning as the processes by which individual or action group learning outcomes are stored in, and brought forth from, organizational memory, including the practices, procedures, plans, conventions, strategies and cultures of the organization (Argyris and Schön 1978; Hedberg 1981; Levitt and March 1988). The unit of analysis is the organization, defined as being like an action group but with a longer lifespan, more complex mandate, and formal membership and institutions. As implied in the definition of learning, organizations are frequently composed of subunits, including action groups as I have defined that term (Crossan et al. 1999; Easterby-Smith et al. 2000; Pelling et al. 2008). As above, it is hard to distinguish the multi-level connections in organizational learning from fundamental definitions and explanations (e.g., Crossan et al.'s (1999) integrated model of multi-level learning discussed in Sect. 10.3). Still, to provide a slightly fuller introduction, what follows is a brief elaboration of the aspect of organizational learning that sets such learning apart from individual and action group learning, namely organizational memory.

Organizational memory is an under-researched topic empirically, but its conceptual and theoretical foundation is relatively rich. The essential idea is that, as Hedberg (1981, p. 6) put it, although members and leaders of organizations come and go, "organizations' memories preserve certain behaviors, mental maps, norms and values over time". Argyris and Schön (1978) viewed organizational memory as consisting of public maps (e.g., organization charts, diagrams of workflow, management plans, informal institutions) and private images (i.e., mental models of self in relation to others and in relation to the organization). Levitt and March (1988) emphasized routines (e.g., forms, rules, procedures, conventions, strategies, and technologies) that frame and operationalize an organization, plus the organizational cultures and paradigms through which the organization's members interpret the routines.

Olivera's (2000) framework is pertinent for our purposes here because of its emphasis on multi-unit organizations (and by implication multi-level learning

variables). Olivera defined organizational memory systems as knowledge retention devices that collect, store and provide access to an organization's experience. He developed a framework for mapping and understanding the complex knowledge environment of multi-unit organizations. The primary criteria in the framework were content (i.e., knowledge categories), structure (both the location and index of knowledge) and processes for collecting, maintaining and accessing knowledge. A nice feature of the framework is that the third criterion focuses attention on an important issue raised in the discussion on power differentials in Sect. 10.4: the equity of the processes used to construct and access organizational memory.

10.2.4 Network Learning

My conception of network learning is analogous to the conception of action group learning described earlier. Scaling up the analysis from the level of the single organization, I define network learning as the processes through which organizational learning outcomes become part of a web of distributed or mutual outcomes in a collection of organizations (and thus effect change in network-level properties). The unit of analysis is the organizational network, defined as a collection of organizations lacking a trans-organizational structure but sharing political, social, economic or cultural interests. I selected this unit of analysis not simply because it furnishes a convenient and rational entity located between the organizational and societal units of analysis. I chose it because networks play an important and growing role in both business and public management, including government learning since organizational networks are part of the complex of entities and people involved in such learning (Knight and Pye 2005; Levy 1994).

This section relies on Knight and Pye's (2004, 2005) model of network learning. That model places less emphasis on cognitive processes than most of the discussion in this chapter, but it is still applicable and has value for understanding network learning over a period of time, and this is important because more informed longitudinal perspectives are essential to adaptive governance of complex social–ecological systems. The model explained how learning occurred by a network of organizations involved in the provision of prosthetic limbs in England as the member organizations interacted and gradually solved problems that arose during five discrete learning episodes. The researchers developed descriptive and conceptual models consisting of context, process and outcome variables. The context variables, e.g., purpose, actors, history, and operations, were highly situated, and their impact on the way learning episodes developed varied from episode to episode. The process variables reflected three major themes: developing mutual meaning schemes, developing commitment for new organizational means or ends, and developing methods for achieving organizational ends. Three major themes also reflected the content variables: changes in network practices (both behavioral and cognitive), changes in structures (explicit and systemic economic priorities) and changes to aspects of the network's culture having consequences for the

identity of the network. The content variables are indicators of network learning; in the absence of changes to network-level properties, such as shared practices and structures, there is no network learning. The process elements are particularly insightful regarding multi-level learning connections.

10.2.5 Societal Learning

As noted, I have refrained from using the term social learning, and I did this in part to distinguish between group-level conceptualizations of the term and macro conceptualizations that attempt to describe and explain large scale societal change processes. To encapsulate the latter conceptualization, I have used the term societal learning, defined as the democratic processes through which core societal institutions are modified in response to social and environmental change. The unit of analysis is society, defined simply as the community of people living in a particular region or country having shared customs, organizations, and laws.

Discussions of large-scale learning of the sort contemplated here often begin with reference to the politics and epistemology of John Dewey, who argued that public policy decisions should be viewed as a series of experiments. He argued that, guided by the principles of scientific inquiry and bounded by democratic debate, experimental politics will yield progressive social improvement (Dewey and Sidorsky 1977; Friedmann 1987). Habermas' (1979, 1984) universal pragmatics and communicative action, concerned with social change processes driven by citizen engagement in deliberative processes in public spaces, provide yet another important theoretical foundation. Recently, Waddell (2005) framed societal learning as the development of new relationships, strategies, and organizational structures that span the public, private and civic sectors and which foster innovation to address chronic problems and develop new opportunities. The approach taken in this chapter is consistent with the broad parameters of each of these frameworks. I based the approach on Woodhill's (2002) conception of social learning, although a definitional difference is that I did not restrict learning as he did to those outcomes that optimize the collective wellbeing of current and future generations.

As noted earlier, institutions are defined broadly in this chapter, and are inclusive of social norms and values and political and economic structures. Institutions and their interplay create incentives for individuals, action groups, organizations and networks to act in particular ways. Some institutions, either formal (e.g., policy and law) or informal (e.g., customs and codes of conduct) are deeply embedded and relatively impervious to change, and thus lock societies into a particular development trajectory. Reforming such core institutions can rely on traditional authority, existing institutional imperatives, political expediency, vested interests, economic or political power, or technocratic and instrumental thinking. Alternatively, reform can be driven by societal learning processes: open dialog, democratic constraint of inequality, investment in education and social capital, the establishment of mediating forums, open policy processes, questioning of basic assumptions, and greater

democratization of politics and the technocratic sphere (North 1990; Woodhill 2002; Young 2002).

10.3 Multi-level Learning Connections

As mentioned earlier, it is difficult to separate the discussion of multi-level connections from the discussion above, which attempted to define and elaborate five conceptions of learning and related social units of analysis. More often than not, multi-level linkages are integral to basic definitions and explanations of learning. Nevertheless, I split the discussion to underline the importance of the multi-level aspects of the various conceptualizations.

Pelling et al. (2008) have described a promising approach for examining multi-level connections. In their study of a local dairy farmers association and two supporting public sector organizations in Great Britain, they developed a conceptual framework consisting of pathways for learning and adaptation which are established by the interplay between formal and informal institutions. Crossan et al. (1999) have also offered a valuable framework, involving the articulation of four fundamental learning processes and the explanation of how these processes create feed-forward and feed-back loops spanning the individual, action group and organizational levels of analysis. Figure 10.1 is adapted from their model, modified to encompass network and societal units of analysis and to envision the linkages as multi-level learning connections. Accompanying the figure is Table 10.2, which summarizes the five conceptions of learning connections depicted in the graphic.

10.3.1 Social-Cognitive Filters

Social-cognitive filters, shortened to filters in Fig. 10.1, encapsulate a range of social and psychological influences on individual learning (recall Salomon and Perkins' (1998) influence of social variables continuum). The term is adapted from Andrews and Delahaye (2000) who investigated individual-level factors influencing the flow of knowledge in organizations. They developed the concept of the psychosocial filter (individuals' perceptions of approachability, credibility and trustworthiness) as a mediator of how knowledge is imported and shared in organizations. I view socio-cognitive filters broadly; they encompass Andrews and Delahaye's (2000) psychosocial factors as well as a host of processes and mechanisms that influence both informal and nonformal adult learning.[5]

[5]Nonformal adult learning results from deliberate education for adults occurring outside of educational institutions, such as facilitated activities found in community groups and organizations. Nonformal learning is different from informal learning, which refers to the experiences of everyday living from which individuals learn something (Merriam et al. 2007).

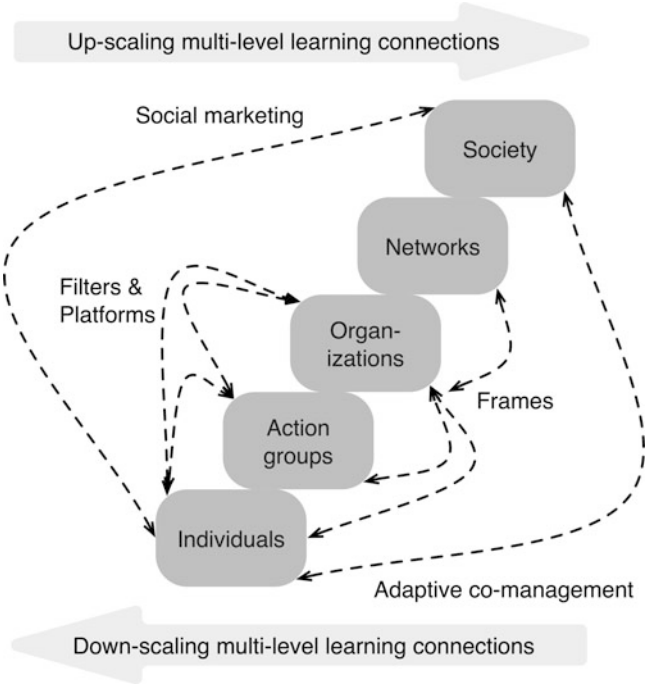

Fig. 10.1 A conceptual framework of multi-level learning connections, showing basic social units of analysis and types of up- and down-scaling linkages. Adaptive co-management arrangements and community-based social marketing touch every level of organization, but for the sake of simplicity are only shown as connecting the individual and societal levels

Table 10.2 Five conceptions of multi-level learning connections

Social-cognitive filters	Psychological and social mediators of individual and action group/organizational learning; e.g., communication, peer engagement and social action
Facilitated platforms	Deliberate interventions in which interdependent stakeholders are brought together to interact in a forum for collective decision making towards concerted action
Organizational frames	Cultural, strategic and structural arrangements that enable individual and action group learning within the organization plus the development and use of organizational memory
Adaptive co-management arrangements	Flexible, community-based systems of management tailored to specific places and situations; supported by and working with various groups and organizations at different scales
Community-based social marketing	Principles, strategies and practices for influencing human behavior to achieve public goals; emphasizes the involvement of the people whose behavior is targeted

The bidirectional arrows representing the filters in the figure reflect that the filters often act as both up- and down-scaling multi-level connections. That is, they show the mutuality of many instances of individual learning that occur in social

situations. Not only do social variables affect individual learning, individual learning in turn affects learning processes and outcomes at higher levels of social organization. The figure shows the filters as linking: (a) the individual with the action group level (e.g., the development of mutual from multiple cognition); (b) the individual with the organizational level (e.g., development and use of organizational memory by one of the organization's leaders); and, (c) the action group with the organizational level (e.g., when action groups are part of or otherwise engaged with organizations).

Examples of filters that operate largely by down scaling to the individual from the action group or organization during informal learning include communication, peer engagement and socially oriented action, as contemplated by transformative theory (e.g., Diduck and Mitchell's (2003) study of individual learning outcomes brought about by involvement in the environmental assessment of a large-scale hog processing plant). Filters that are bidirectional across the individual, action group and organizational levels include deliberation, collective inquiry and concerted action, which are key in more communally centered, context focused theories (e.g., Holden's (2008) study of group learning in the Sustainable Seattle initiative and Elkjaer's (2004) application of Dewey's pragmatism to organizational learning). Such filters are influential during informal learning episodes, but are more likely to be manifest in facilitated nonformal education. I view facilitation, with its suite of techniques and mechanisms (e.g., dialog, negotiation, visioning, mediation), as a particularly important subset of social-cognitive filters. The following section discusses facilitation in more detail, focusing on a specific form developed in the context of resource and environmental governance.

10.3.2 Facilitated Platforms

Researchers at Wageningen University in Holland developed the concept of facilitated platforms, which are the vehicles by which individual learning outcomes become part of a web of distributed and mutual outcomes (Leeuwis and Pyburn 2002; Maarleveld and Dangbégnon 1999; Röling and Maarleveld 1999). As described in Sect. 10.2.2, platforms are planned interventions in which a set of interdependent stakeholders in some resource are brought together to interact in a forum for conflict resolution, negotiation, and collective decision making towards concerted action. In effect, platforms are contrived situations of nonformal education for individual and action group learning.

Platforms are a subset of social-cognitive filters, and as described above, link individual and action group, individual and organization, and action group with organization. The platform arrow in the figure is best thought of as a rather messy set of iterative facilitation processes. An important example is helping stakeholders recognize their interdependence. Another is helping participants resolve conflict (through negotiation, mediation and other methods), given that interdependencies can highlight differences and lead to disjoint and counterproductive action. A third,

linked to conflict resolution, is helping to design shared goals and the means of accomplishing those goals, which sets the stage for concerted action and collective inquiry. Maarleveld and Dangbégnon's (1999) investigation of fisheries in Benin and water resources in Holland provides practical instances of these platform processes. Important for the purposes of generalization, similar multi-level connections are seen in studies that do not explicitly adopt the notion of facilitated platforms (e.g., Webler et al.'s (1995) Swiss case study of the environmental assessment of a waste disposal facility).

10.3.3 Organizational Frames

The preceding sections alluded to multi-level connections that affect organizational learning, such as psychosocial factors influencing the uptake and transmission of knowledge, social-cognitive filters affecting the development and use of organizational memory, and learning by an action group embedded in an organization. Organizational frames, called frames in Fig. 10.1, encompass such variables in a broad way, but their emphasis is slightly different. They center on organization-level arrangements that enable individual and action group learning within the organization plus the development and use of organizational memory. The section draws from a recent review of the literature on facilitators of organizational learning. Bapuji and Crossan (2004) classified facilitators as being cultural, strategic, structural and environmental. Relying on this work, I have emphasized facilitators with obvious implications for multi-level connections.

Like social-cognitive filters, organizational frames influence both informal and nonformal learning. Further, as with filters, they often act as both up- and down-scaling multi-level connections. Figure 10.1 shows frames connecting organizations with individuals, action groups and networks. It is helpful to think of these frame arrows as overlapping sets of complex organizational arrangements. Important framing arrangements across the organizational and individual levels include a culture of openness, a learning orientation, participative decision making, transformational leadership, cognitive diversity, positive organizational support, and goal and supervision autonomy. At least four of these arrangements were factors in Hayward et al's (2007) case study of the connections between individual and organizational learning in the environmental assessment of a major flood control infrastructure in southern Canada.

Key framing arrangements linking the organizational and action group levels are cross-functional communication, stability of team membership, and manufactured crises to foster innovation. While not an explicit study of the connections between action group and organizational learning, Fitzpatrick's (2006) investigation of organizational learning in the assessment of diamond mines in the Canadian north confirmed the importance of two aspects of cross-functional communication, namely information sharing and information interpretation, as internal organizational arrangements that enable learning.

Finally, arrangements that connect organizations and networks include an emphasis on both internal and external learning, access to knowledge resources such as talent, collaboration partners and research institutions, and knowledge sharing with national and global innovation systems (Knight and Pye 2004, 2005).

10.3.4 Adaptive Co-management Arrangements

Adaptive co-management is a complex, incipient concept, but its defining features are flexible, community-based systems of management tailored to specific places and situations, and supported by and working with various action groups and organizations at different scales (Olsson et al. 2004a). Working with this definition and looking through a lens emphasizing multi-level learning, I view adaptive co-management arrangements as up- and down-scaling multi-level learning connections reaching from the societal to the individual level, and touching all levels of organization in between. Figure 10.1 shows only the direct connections between the individual and societal levels for the sake of graphical simplicity, and to emphasize adaptive co-management's potential for influencing societal learning.

As above, the bidirectional arrows represent the mutuality of learning across the various levels of organization. Further, as with social-cognitive filters and organizational frames, adaptive co-management arrangements are highly influential for both informal and nonformal learning situations. A conceptual strength of adaptive co-management for the purposes of this chapter is that it provides a logical means for expanding on processes of societal learning. It does so by focusing attention on relationships among collaboration, management, governance and institutional reform. These relationships are evident in the conditions for successful adaptive co-management identified by Armitage et al. (2009), which include having:

- Identifiable stakeholders with shared interests
- Access to a varied assortment of governance options
- A long-term commitment to shared governance
- Resources for enhancing stakeholder capacity
- Individuals and collectives who champion the process
- Openness of participants drawing upon multiple knowledge systems and sources
- A national and regional policy environment supportive of collaborative governance

Given Woodhill's (2002) definition of societal learning adopted in the chapter, with its emphasis on institutional reform through democratic processes, the conditions for successful adaptive co-management help illuminate the path for societal learning. Empirical evidence of aspects of this proposition is found in Olsson et al.'s (2008) case study of governance and institutional reforms affecting the Great Barrier Reef, which included analysis of interplay among actors at the individual, action group, organizational, and governmental (a form of network, as defined here) levels.

10.3.5 Community-Based Social Marketing

Community-based social marketing involves principles, strategies and practices for influencing human behavior in order to achieve public goals and for doing so in a manner that emphasizes the participation of those whose behavior is targeted (McKenzie-Mohr and Smith 1999). These principles, strategies and practices represent another bundle of multi-level connections spanning the societal and individual levels of analysis. Similar to adaptive co-management arrangements, these connections reach all levels of organization discussed in the chapter, but Fig. 10.1 depicts just the direct links between the individual and societal levels for the sake of simplicity and to highlight social marketing's potential in down-scaling societal learning to the level of individual behavioral change. As above, social marketing is influential in both informal and nonformal learning contexts. The bidirectional arrow used in the figure represents reciprocity in learning outcomes because, despite social marketing's important potential in down scaling societal learning, community-based approaches include multiple up-scaling feedback loops.

Based on a rich literature of peer reviewed studies and informal reports on how to foster behavior for resource conservation and sustainable development, McKenzie-Mohr and Smith (1999) described four basic steps in community-based social marketing. The first is identifying barriers and benefits to the selected socially desirable activity, typically done through research using multiple methods (including situated, place-based studies). The second step is designing a strategy with a mix of techniques for aligning existing behaviors with the socially desirable activity. Techniques that have proven to be effective include providing regular prompts, securing pledges or commitments, creating incentives, altering community norms, and using vivid communications tools with engaging messages and images. The third step is piloting the strategy in a segment of the community, and the fourth is evaluating it after implementing the strategy on a broader scale.

10.4 Power Differentials

The previous section presented five conceptions of learning applicable to five levels of social organization, and then introduced five sets of multi-level learning connections (i.e., institutions that facilitate the transmission of learning outcomes from one level of organization to another). Such a learning orientation has advantages for understanding uncertainty, complexity and change, and for building adaptive capacity, but learning discourse can too often mask important political and power-related variables. This result is unfortunate because politics and power[6]

[6]I have adopted an expansive definition of power: an expression of human agency in the context of enduring structural preconditions that has coercive, constraining, and systemic consent-producing dimensions (Raik et al. 2008).

are central factors in governance, especially the decentralized forms seen with increasing frequency in the resource and environmental field (and which are essential for building adaptive capacity) (Raik et al. 2008). Moreover, power issues, particularly finding ways of leveling differentials, are the key to achieving important normative endpoints of resource and environmental governance, such as certain economic and social objectives of sustainability (e.g., poverty alleviation, equity, empowerment and social justice).

Two recent studies have highlighted important power-related issues affecting individual and action group learning. Muro and Jeffrey's (2008) review and critique revealed fundamental points requiring further attention in the theory and practice of social learning in resource and environmental governance, including:

- Consensus and mutual cognition can hide how less powerful members of learning platforms changed their views to match those of the others.
- In some instances there is "an irreducible plurality" of viewpoints, and better solutions are found because of this (through conflict and competition) rather than because of consensus, compromise and mutual understandings.
- In cases of highly contested issues, strategies other than collaboration, learning and mutuality (such as penalties or incentives) might be more appropriate for initiating new practices and social interests.

Similarly, Armitage et al.'s (2008) comparative case study of experiences in Canada, Vietnam and Cambodia identified basic concerns needing attention in community-based resource management, including how to:

- Lower barriers and create incentives to encourage participation in learning platforms, given that the ability and willingness to experiment and learn are not likely to be distributed evenly in heterogeneous communities.
- Design effective and safe platforms for deliberation and conflict resolution that enable different segments of heterogeneous communities an opportunity to transform traditionally disadvantageous political relations.
- Establish protections for marginal stakeholder groups (especially in rural, resource-dependent regions) who become involved in learning processes.

To the extent that action group learning is linked to an organization, the preceding issues need to be accommodated in descriptions, explanations and prescriptions regarding organizational learning. In addition, although power is an under-researched topic in organizational learning, the literature on this subject reveals a further complicated set of political and power-related variables (Argyris 1990; Blackler and McDonald 2000; Coopey and Burgoyne 2000; Ferdinand 2004). The following factors are important in triggering, blocking and shaping learning, and should be considerations in most comprehensive accounts of organizational learning:

- Technical, social and economic structures
- Resource dependencies
- Shifting coalitional patterns

- Bargaining and exchanges
- Unilateral control of problems
- Inequitable access to organizational routines
- Fragmentation of interests and values
- Bureaucratic inertia, rigidity and co-optation

Scaling up the analysis, the foregoing is pertinent to network and societal learning. For example, many of the issues related to power asymmetries raised in the context of action group learning are directly relevant to the design, implementation and evaluation of social marketing strategies, and create a powerful imperative for the participative, community-based approach to social marketing. In addition, the literature on international and foreign policy learning underlines a fundamental issue that needs to be considered in societal learning and in some forms of network learning, specifically government learning (Brown 2006; Haas 2000; Levy 1994; Tetlock 1991). The issue is deceptively simple, but is of primary importance. Since government and societal learning involves policy and institutional reform, there is a risk of confounding all policy and institutional change with learning outcomes. Not all such changes are reasonably attributable to learning, when political and power-based explanations are more trustworthy and meaningful.

10.5 Conclusion

This chapter has presented an integrative review, selectively synthesizing constructs to help conceptualize the processes that link learning at multiple levels of social organization. The review was interdisciplinary, covering works from adult education and learning, organization and management studies, political studies and foreign policy analysis, environmental and resource management, and planning. A more comprehensive review would undoubtedly have revealed alternative, reasonable conceptions of learning, units of analysis, and processes that link the various units.

However, the conceptual framework presented here is useful for its implications for adaptive capacity in social–ecological governance. First, it develops the notion of multi-level learning, which is an essential feature of adaptive governance systems. It summarizes learning processes at five important levels of social organization, and provides details respecting some of the connections that link learning outcomes across those levels. Understanding such processes and connections can enable flexible, innovative and responsive governance initiatives. Further, it can facilitate initiatives founded on transformative and emancipatory (or double- and triple-loop) learning intentions or experiences. Second, it builds on an important lesson from Young's (2002) work that a key to success in multi-level governance regimes is to ensure that cross-scale interactions produce complementary rather than conflicting results. By providing details of learning-related interactions, the framework helps crystallize ways to produce complementarity, e.g., setting

compatible learning objectives, establishing congruous learning environments, and using consistent methods. Third, at the conceptual level it supports Pelling et al.'s (2008) conclusion that relational spaces in and among organizations are essential for creating adaptive capacity. In that study, the authors found that such spaces yielded six discrete pathways, the potential or actual existence of which they interpreted as indicators of adaptive capacity. Deliberative and communicative processes (which produce relational spaces) are a unifying theme among the five sets of multi-level connections reviewed here.

The chapter is also helpful for revealing important research needs at the interface of multi-level learning, adaptive capacity and social–ecological governance, including the requirement for conceptual and theoretical development. Pelling et al. (2008) and Crossan et al. (1999) offer valuable frameworks and excellent entry points, but more work needs to be done in accounting for network and societal levels of analysis, assessing promising linking institutions such as community-based social marketing and adaptive co-management, and addressing power asymmetries in learning dynamics. On this last point, a promising avenue lies in giving more attention to learning's flip side, education, and particularly critical, nonformal education. (For a broader discussion of the implications of education for learning, sustainability and resilience, see Lundholm and Plummer's (2010) synopsis in which they lay out, a resilience agenda in environmental education.) Opening the discourse in this manner would provide access to well developed theory, methods and practice on how to enhance capacity by fostering personal and socio-political empowerment. A leading approach to critical education, one that has already made inroads in resource and environmental analysis (e.g., Diduck 1999; Diduck and Sinclair 1997; Fitzpatrick and Sinclair 2003), is Paulo Freire's "pedagogy of the oppressed" (Freire 1970, 1973). This approach is intended specifically to counter power asymmetries and hegemonic influences. It looks to empower the disenfranchised, challenge socio-political and economic presuppositions, foster emancipatory learning, and mobilize concerted action for structural change. Adopting this pedagogy or a similar framework would help counter power imbalances, and thereby enrich multi-level learning and adaptive capacity in resource and environmental governance. It would also improve the prospects of achieving economic and social objectives of sustainability, such as poverty alleviation, equity, empowerment and social justice.

In addition to theoretical and conceptual development, the chapter uncovers the need for place-based empirical studies of existing institutions. Too little of the conceptual framework is grounded in empirical evidence from resource and environmental governance experiences. In line with Lundholm and Plummer's (2010) take on education and learning for resilience and sustainability, research on multi-level learning and adaptive capacity can be reasonably guided in the short run by basic who, what, how and why questions:

- Who are the learners, e.g., people, action groups, organizations, and networks?
- What motivated the learning experiences?
- What was learned, e.g., knowledge, skills, beliefs, behaviors, and routines?

  - Did the learning outcomes lead to governance effectiveness, flexibility or innovation?
- How did the learning occur, i.e., what were the social, political, economic and organizational variables that enabled and inhibited the learning?
  - What was the influence of multi-level factors?
- What was the influence of power asymmetries?
  - Was there a role for critical nonformal education in offsetting power differentials?

In the long run, the research of course will branch out, ideally seeking greater depth of inquiry, breadth of application, and a convergence of theory and practice respecting multi-level learning and adaptive capacity in resource and environmental governance.

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