Chapter 2
Science, Practice, and Place

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Abstract Place-oriented inquiry and practice are proposed as keys to overcoming the persistent gap between science and practice. This chapter begins by describing some of the reasons science fails to simplify conservation practice, highlighting the challenges associated with the social and ecological sciences of multi-scaled complexity. Place concepts help scientists and practitioners address the inevitably incomplete, plural, and uncertain character of all knowledge and suggest productive ways forward that not only embrace this pluralism but find greater efficacy and advantage in the multiplicity of context-dependent positions occupied by scientists and practitioners, each differentially shaped by individual life history. The chapter then highlights a growing body of literature in sociology and public administration that has begun to address the broad challenge of governing complex social-ecological systems. These emerging theories recognize that much of contemporary governance takes place outside formal government institutions and bureaucracies and involves increasingly complex linkages and collaborations among multiple public and private organizations. In governing complex systems informed practice can be conceived as guided by the emergent wisdom of networked actors and institutions governing complex systems, each informing one another in a collaborative form of rationality that operates both horizontally (place to place) and vertically (upwards and downwards in scale).

Keywords Complexity theory • Knowledge pluralism • Positionality • Phronesis • Adaptive governance

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2.1 Bridging the Science-Practice Gap

A frequently stated goal at conferences for natural resource professionals is that of narrowing the all-too-prevalent divide between scientific research findings and their application in the real world—commonly referred to as the science-practice gap. Sometimes conservation agencies bring scientists and managers together around specific areas of practice for the express purpose of closing the gap. Typical meeting sessions have dealt with a range of management practice domains—for example, endangered fisheries, fire and fuels management, and managing high-elevation wilderness trails. The fact that the gulf between science and practice is so frequently discussed suggests efforts to close the gap have been largely unsuccessful. Substantive differences aside, from a social science perspective they all seem destined to fail. This chapter argues that the science-practice gap persists and even widens over time, not because scientists and managers lack a commitment to communicate or simply fail to do so. Rather, the problem reflects fundamental differences between the aims of science, which generally seek to transcend place, and the nature of practice, which is by necessity place-based. In other words, the gap persists because science and practice are driven by divergent goals: science aspires to produce context-independent principles whereas practice requires context-dependent synthesis.

One case exemplifying this predicament occurred in discussions among U.S. federal agency scientists concerning managers' needs for improved science-based information in making decisions about managing wildfires in riparian areas, particularly when endangered fish species are at risk. In keeping with ecological complexity theory, much of the discussion focused on dynamic landscape processes and identifying criteria for defining a resilient landscape. Research ecologists pointed to ever greater complexity of the multi-scaled, dynamic landscapes under consideration, which effectively made the appropriate prescription for any one stream network elusive if not undeterminable. These ecologists argued that no singular riparian condition could be considered necessarily better or healthier than another, because the viability of endangered fish populations actually hinged on a dynamic spatial variety in which some patches (streams) were in the process of becoming better habitat for a given species and some worse habitat.

Adding to the complexity and uncertainty for management prescriptions, one could arrive at contradictory recommendations, depending on disciplinary focus. For example, because stream culverts disrupt the movement of fish through a network of streams, they may be viewed as impediments to the adaptive dynamics sought by systems ecologists. From this perspective removing culverts would increase the connectivity of streams, ostensibly benefitting fish survival. At the same time if a manager is concerned about the spread of invasive aquatic species, removing culverts also facilitates the spread of such species, with potentially negative impacts. Rather than clarifying best management practices, scientific advances can generate confusion among managers over effective management options. Best practice in any given situation often depends on conditions and actions in adjacent

landscapes, as well as interactions at both high and lower scales of decision-making. In managing complex systems, the overarching challenge, then, is sorting out how each manager, applying his/her expertise in meeting their responsibilities—in effect taking partially informed actions—can best accommodate the knowledge and actions of other managers who seek to do the same.

This science-practice conundrum originates partly from the widespread assumption that scientific understanding produces an increasingly definitive and integrated body of knowledge—a kind of "gods-eye" (objective and integrated) grasp of the world (see Chap. 1). However this supposition is challenged by the mounting evidence of the spatially situated quality or "positionality" of science claims (Finnegan, 2008; Rose, 1997). This work suggests that every scientist occupies a subjective position or place in the world, shaped by culture, training, personal experience, etc., which limits and conditions that scientist's knowledge (Livingston, 2003). Likewise, for citizens and practitioners, knowledge is always partial and liable over time to become more fragmented rather than integrated (Whatmore, 2009). Described another way,

> [Even] after the best of scientific studies a judgment must be made about the relevance of a piece of scientific research to a manager's ... practical question at hand. In this judgment science is not at all helpful ... [H]ow to integrate the kind of knowledge that science can give with the practical judgment about what the [managerial] situation requires [remains one of the] great unresolved questions. (Hummel, 1994, p. 314)

Addressing this "great unresolved question" requires an exploration of the realm of practice, beginning with an examination of how place concepts illuminate the challenges in trying to bridge the science-practice gap. This chapter posits that beyond trying to inform problems with an integrated top-down view of knowledge, informed action can be conceived as guided by the collective wisdom of networked actors and institutions governing complex systems, each informing one another in a collaborative form of rationality that operates both horizontally (place to place) and vertically (upwards and downwards in scale).

2.2 Why Science Fails to Simply Practice

While the idea that science can perfect environmental decision-making is largely taken for granted among professional environmental managers, some social scientists have been more skeptical (Allen, Tainter, Pires, & Hoekstra, 2001; Flyvbjerg, 2001; Sarewitz, 2004). Drawing from anthropology and ecology for example, Tainter and colleagues (Allen et al., 2001; Tainter, 1988) point to social/institutional limits on managing complex systems by examining how system complexity has contributed to the collapse of civilizations in the past. In particular Tainter (1988) details the history of collapse in arguing that the evolution of a complex social-ecological system (i.e., a given society and its resource base) tends over time to outstrip that society's own institutional capacity to manage such systems. As a society grows and mature humans tend to apply the easiest and least costly solutions to problems first. Over time, as

new problems emerge solutions come at higher costs or require proportionally more inputs—that is, there's a diminishing return on problem-solving, resulting in societal collapse or a deliberate decision to return to a more simplified system. While a society can employ energy or technology to manage complexity to some degree the cognitive challenge of complexity (i.e., the need to synthesize and integrate the exponential growth of knowledge at multiple scales) persists.

Drawing from contemporary political science, Sarewitz (2004) argues that science makes environmental controversies worse for several reasons. First, science allows contesting parties to assemble their own bodies of relevant and legitimate facts (which is compounded by universal access to information via the Internet). Second, the embeddedness of these facts in a variety of disciplinary perspectives brings with them a diversity of normative implications. Third, despite the progressive expansion of scientific understanding, overall scientific uncertainty persists and grows due to the irreducible plurality and disunity of scientific disciplines. This problem is further amplified by the diverse political, cultural, and institutional contexts involved in the conduct and interpretation of scientific research. In spite of widespread belief to the contrary, a strong case can be made that the growing complexity of knowledge decreases institutional efficiency, increases scientific uncertainty, and amplifies policy conflict.

2.3 Place and Pluralism

The persistent, if not widening, gap between science and practice cannot be solved by more, better, or more focused science. Nor can it be solved simply by finding more effective ways to communicate new science to practitioners. Continuing to address the gap based on a hierarchically oriented mindset that excludes context and operates within a unidirectional, *from*-science-*to*-practice framework exacerbates the problem. In such a model knowledge will always expand much faster than individual and collective capacities to absorb, process, and apply it to particular situations and circumstances. But knowledge need not be conceived of as a collection of ideas, facts, and values waiting to be integrated into some grand unifying model that presumably any manager could easily and effectively apply. What might we gain by conceiving of the structure of knowledge in context-dependent, spatial-ecological terms that account for places and the people associated with them? What leverage on the science-practice gap might be gained by recognizing that important knowledge is produced and distributed within a network of emplaced, partially informed practitioners representing various aspects of experience and understanding and organized within both vertical and horizontal planes of relationships?

Two key features of such a spatial/relational view are the subjective *positionality* (as opposed to gods-eye objectivism) of observer-actors and the irreducible *pluralism* of knowledge (contra a singular unity). Positionality recognizes that all observers can attain only a partial, incomplete understanding of the world due to their unique positioning within any particular slice of spatial-temporal reality (Livingston,

2003). This varied positioning means that there is no unified platform from which all knowledge can be gathered and integrated into a single understanding. Rather, by comprehending the world from multiple, competing vantage points the pluralistic view enriches each perspective and reveals assumptions that otherwise may have remained hidden—particularly to those playing dominant roles in producing knowledge (Hayles, 1995).

Geography and spatial studies highlight three varieties of knowledge pluralism. The first involves an *ontological* focus on place (Patterson & Williams, 2005). Ontological pluralism is strongly associated with cultural differences and competing systems of meaning across groups of stakeholders and domains of expertise. It represents the aspect of multiplicity in the nature of what exists—that is, the contents of reality and the physical location of those contents. The ontological pluralism of place encompasses the different material qualities and meanings people associate with a place, which is often discussed in terms of competing senses of place held by various groups of stakeholders (Williams, 2002).

Whereas research on place is typically occupied with ontological descriptions, some philosophers and geographers have drawn on place and spatiality to advance an *epistemic* perspective on knowledge—place as a way of seeing and thinking about the world (Entrikin, 1991; Sack, 1992). As Sack (1992, p. 1) argues, place is more than mere setting or container of reality. It is integral to how human beings experience and organize their world, a "fundamental means through which we make sense of the world and through which we act." Likewise for Hayles (1995), our positioned, embodied, human-situated interaction with the world conditions how we can understand it.

Accordingly, place provides a way to organize diverse disciplinary viewpoints that represent both context-independent (objective, scientific) and context-dependent (subjective, local) lenses or positions through which knowledge is generated (see also Chap. 1, Fig. 1.1). This epistemic pluralism helps transcend what geographers regard as a deep and long-running tension within Western intellectual traditions between universalist (context-independent) and particularist (context-dependent) views of knowledge (Entrikin, 1991; See also Fischer, 2000; Flyvbjerg, 2001; Williams, 2002). Specifically, place helps to tackle the growing disciplinary fragmentation of knowledge, bridges the epistemological divide between local/contextual knowledge and global/generalizable knowledge, and validates and organizes knowledge originating in a bottom-up synthesis of networks of actors.

The knowledge and wisdom required to manage complex social-ecological systems is not likely to emerge solely out of top-down, expert-driven knowledge systems (which become too unwieldy and expensive), but through the combined and less formally coordinated efforts of more embedded practitioners (managers) learning though their own local efforts. In other words, the future of practice and solving problems is more likely to be organized and directed from what Entrikin (1991) refers to as the epistemological position of *betweenness*. This position is informed by top-down scientific discourse and invigorated through bottom-up engagement in which practitioners play a more prominent role in the production and validation of knowledge.

The third variety of pluralism is *axiological,* which focuses on normative lenses or prescriptive valuations about place. It seeks to recognize the diverse social processes for prescribing particular valuations, preferences, and choices. These may range from the technical lenses of economics and decision science, to legal-political systems and institutions, to moral-ethical systems embedded in culture, religion, and moral philosophy. Axiological pluralism contrasts with monistic theories of value (see Norton, 1996) that dominate the fields of economics and rational choice theory in political science. Accordingly, all goods are assumed to be commensurable on a single-value dimension such as utility or money. Within natural resource management the monistic approach reached its zenith with operations research thinking in which experts would identify the outcomes of plan alternatives, economists would measure their values, and analysts would calculate the most efficient alternative. In contrast, pluralist theories of value (Anderson, 1993; Price, 2004) highlight the incommensurability of values. The reconciliation of the plurality of values for places cannot be reduced to a singular metric as in economics. Rather it requires reconciling a plurality of social processes and institutional arrangements by which society orders, evaluates, and decides about their relative production, maintenance, and distribution.

The interactions among the three types of pluralism (ontological, epistemological, and axiological) compounds the pluralism associated with each dimension. For example, the pursuit of universal, context-independent knowledge has served to constrain the ontological meanings and values of nature to the tangible utilitarian realm; epistemologically narrow what counts as legitimate means to knowledge; and marginalized the context-dependent knowledge of place and the particular (Entrikin, 1991). This same impulse for context-independent knowledge has also constrained the methods for adjudicating among competing values and preferences in conservation policy and resource management (Williams, 2002). For practice the core challenge is to recognize the diverse ways in which a community or society orders or chooses among alternative courses of action and learns how to negotiate within and across these different kinds of pluralism. In other words, practice requires social institutions that can recognize and negotiate among pluralistic conceptions of the good to be pursued and address the political and pragmatic task of adjudicating among competing representations of a place that are produced as a result of ontological and epistemological pluralism.

Place is important for understanding the persistence of the science-practice gap and the irreconcilable ubiquity of knowledge pluralism. When dealing with complex social-ecological systems, all attempts to close the gap and overcome plurality and uncertainty ultimately rely on being able to attain a universal, context-independent, gods-eye view of reality. Alternatively adopting a spatial (place-based) perspective helps to recognize that all knowledge—even exalted scientific knowledge—is to a significant degree local (context-dependent), because all observers/actors occupy a particular position from which to observe the world. Still, any diverse pluralistic culture must somehow manage to coexist in shared spaces despite unrelenting social differences (Healey, 1997; Kemmis, 1990). Pluralism operates in the realm of practice by recognizing and profiting from different kinds of knowledge and skills.

Conservation practice requires the cultivation of the capacity or habit for collective sense-making that moves beyond the mere application of science and technical know-how. In other words, it is through practice embedded in actual places that knowledge pluralism and value differences are ultimately reconciled.

The point here is not to argue against investing in science, only that it is unreasonable to expect those investments alone to deliver efficient and effective solutions to complex problems. At the very least we need to recognize that those engaged in practice cannot be expected to absorb all the latest, often conflicting science that might be relevant to their duties. Rather the need is to develop strategies for using and accessing practitioners' accumulated wisdom to help harmonize their particular local efforts across efforts in adjacent spaces and at different spatial scales. Addressing the science-practice gap requires a rethinking of how practical knowledge is produced and applied. This needs to happen at the level of the individual practitioner, as well as in the realms of management institutions and governance.

2.4 Place and Practice

Given chronic system complexity and ambiguity (plurality) and limited institutional and cognitive capacities to process ever-grander, yet unrelentingly incomplete models of reality, one strategy for addressing the science-practice gap is to elevate practice as a form of knowledge production and management. Place and spatiality facilitate such an elevation by highlighting different ways of knowing and acting that emphasize "knowledge nested in a context of time and local circumstance" (Fischer, 2000, p. 69). A number of social scientists (Fischer, 2000; Flyvbjerg, 2001; Scott, 1998) have focused on a kind of epistemic pluralism that can be found in the Aristotelian intellectual virtues of *epiteme* (abstract scientific knowledge), *techne* (technical knowledge found in a craft), and *phronesis* or *mētis* (prudent, practical wisdom). These authors make the case that we could do more to integrate and profit from the practical and informal knowledge that exists among both occupants/users of places and emplaced professional practitioners.

Scott (1998) characterizes local, practical knowledge as the lost art of *mētis*—local, experiential knowledge that resists simplification into deductive principles that can be readily transferred through book learning, which has been systematically replaced by state-inspired projects of rational management. Scott documents numerous examples of "natural and social failures of thin, formulaic simplifications" (p. 309) imposed on society through the agency of state power. (His first case example deals with the failures of utilitarian logic that inspired mono-cropped, even-aged forestry in early modern Europe.) He notes that large-scale processes and events are inevitably far more complex than any models we can devise to map them. What these management schemes "ignore—and often suppress—are precisely the practical skills that underwrite any complex activity...variously called know-how...common sense, experience, a knack or *mētis*" (p. 311). He argues that the state has sought hegemony over the former as a form of social control rather than an ongoing dialogue between practical knowledge and formal scientific knowledge.

The application of fire science offers an example of this distinction. One of the most exalted topics in fire science is fire-behavior modeling, which is intended to help fire-fighters anticipate how a wildfire will spread. But as one highly experienced fire manager once explained, he would never rely on such models, which he saw as over-simplified and exceedingly poor at factoring in local topography and meteorology. He would much rather rely on his experience in fighting wildfires in his district and elsewhere.

Flyvbjerg (2001, 2006) offers a similar line of reasoning. Whereas Scott examines the failure of certain state-inspired schemes, Flybjerg directs his gaze more generally at "why social inquiry fails" and "how it can succeed again" (Flyvbjerg, 2001). He seeks to resurrect the idea of *phronesis* as the primary domain of the social sciences—in sharp contrast to the natural science model rooted in *episteme* and *techne*. He employs *phronesis* to highlight the comparative advantages of practical wisdom based on "an intimate familiarity with the contingences and uncertainties of various forms of social practice embedded in complex social settings" (Caterino & Schram, 2006, p. 9). *Phronesis* concerns the kinds of value judgments and decisions that are "so commonly involved in political and administrative practices that any attempts to reduce them [to *episteme* or *techne*] or comprehend them in those terms are misguided" (Flyvbjerg, 2006, p. 68). According to Flyvbjerg, *phronesis* was deemed most important to Aristotle because it balances instrumental rationality with value-rationality, which he considered crucial to the sustained happiness of citizens in any society. Yet it is that very balance that has been upset by the dominance of instrumental rationalities behind *episteme* and *techne,* as evidenced in part by the fact that modern languages no longer have a word containing a variant of *phronesis*.

In comparing Scott's use of *mētis* to Flyvbjerg's *phronesis*, *mētis* appears closer to the idea of local knowledge or wisdom. It is not as refined and systematized as *techne* (which by Scott's reckoning is more universal, organized, and ultimately expressible in the form of rules, principles, and propositions), but is rooted in a history of local problem-solving. For Flyvbjerg *phronesis* is tied more closely to political/administrative skills involved in reasoning about values, the good life, and the exercise of power. Both emphasize *emplaced* knowledge and stand in contrast to the god's-eye view from nowhere, or what Scott calls "thin simplifications" that "can never generate a functioning community, city or economy" (p. 310). Both kinds of knowledge exist among practitioners and can be cultivated within organizations and institutions.

A key argument of Flyvbjerg is that social science (and arguably practice) should not seek to emulate natural science by trying to build predictive models, but instead focus on case-study knowledge, which typically reveals a kind of practical wisdom emphasizing value rationality and power rather than the maximization of specific outcomes or objectives. This kind of practical wisdom is difficult to organize from above. It is shaped and evaluated by the practitioners themselves rather than produced and transmitted via expert systems (though experts can certainly help). Finally, such a distributed, bottom-up system of knowledge creation tends to counter the otherwise diminishing returns and escalating costs of traditional hierarchically directed information systems.

Flyvbjerg makes a number of recommendations for how to practice "social science that matters." He advocates conducting context-dependent, case-study research, in keeping with Aristotelian *phronesis*, which involves deep knowledge of circumstances and concrete examples. This approach doesn't necessarily exclude generalizations, but they would be based on the examination of many particular instances. This occurs in business, medicine, law, and other professions, in which learning cases is fundamental to developing practical knowledge applicable to a range of situations.

A second recommendation is to balance instrumental/technical rationality with what Flyvbjerg calls value rationality to describe the social analysis of societal goals, values and interests. The purpose of social science should be to help individuals, organizations, and societies to think and act with greater value rationality. Emphasizing value questions over the technical rationality typically sought in natural science, forces practitioners to face the contextual nature of problems instead of assuming some universal foundation. Social scientific validity comes from testing assumptions through the comparison of cases or contexts (e.g., different positionality) where competing interpretations can be examined and deliberated.

His third recommendation is to make the subject of power a core part of analyses. Questions for consideration might include: Who gains and who loses? What kinds of power relations are involved? Are there possibilities to change these power relations and would it be desirable to do so? What kinds of power relations apply to those asking the questions? In other words, who governs and what governmental rationalities are at work? A broad consideration of power-related issues contrasts starkly with the traditionally utilitarian emphasis in natural resource management, which has avoided power questions in the vain hope that technical rationality would render them irrelevant.

Fourth, in addition to asking the usual "why" questions, Flyvbjerg recommends focusing on narrative or "how" questions as a way to develop descriptions or interpretations of a situation from the perspective of the participants. Histories and narratives are fundamental to social inquiry and practice because they acknowledge the past in consideration of the future and help humans to anticipate situations before they arise. They also distinguish a place-based approach from a resource-oriented one. While places are imbued with natural and social histories, the notion of resource focuses on present and future utility. Indeed, the idea of resource ignores context, strips the landscape of history, and eliminates pre-existing meanings that might constrain its use.

Finally, according to Flyvbjerg the aim of social science is to provide input for ongoing social dialogue and practice in a society rather than to produce generalized, unequivocally verified knowledge. Thus social scientists should aim to build dialogue between diverse stakeholders using social knowledge to inform and facilitate the dialogue without taking it over.

Although intended more for individual social science researchers, these recommendations could also benefit the training of practitioners in many professional fields. As suggested earlier the relatively greater emphasis on learning from real-world practice marks an important distinction between the professions and academic

disciplines. Professional knowledge places greater emphasis on inductive, situational, bottom-up learning than on a top-down, deductive extension of theory.

Part of the challenge of such a bottom-up knowledge system involves the structuring of the interactions among practitioners. Professionals of one sort or another spend a great deal of time sharing their case knowledge. But applying this to complex social-ecological systems suggests another aspect of case-based knowledge. In such contexts the health of the overall system depends on the combined actions of many practitioners, each responsible for various parts, whether divided by geography (e.g., a wilderness), resource (e.g., wildlife), and/or process or function (e.g., wildfire). The overall performance of a system at any scale depends on the collective actions or inactions of managers distributed across space, scales, and functions.

The solution is not likely to be found in traditional approaches to the transfer of knowledge from expert to practice but by learning to take into account the actions and individual partial understandings of diverse practitioners distributed across resource specialties, landscapes, and scales. Envisioning practice as *emplaced knowing* reframes the practitioner as part of a network and knowledge/learning as a distributed product/process of learning that occurs within a community of practice.

According to Wenger (1998), such communities are distinguished by their shared identity based on a common domain of interest. They act as a community by sharing information, engaging in joint activities, and assisting and learning from each other. Over time and sustained interaction they develop a shared practice in some domain, which typically builds on shared resources, experiences, tools and methods, and so forth. Practice communities draw from members' knowledge and experience to advance situation-specific problem-solving. They might do this by requesting information from community members, seeking out people with specific experiences suited to a particular problem at hand, making site visits, documenting cases and solutions, and mapping knowledge and gaps in knowledge. In sum, it is at least as important to help practitioners better organize themselves as communities of practice as it is to produce the next scientific synthesis of knowledge, which by necessity will emphasize context-independent knowledge.

2.5 Place and Governance

Thus far the science-practice gap has been described as a knowledge problem without much regard to the structures within which practice is ultimately carried out. While a pluralist conception of knowledge gives greater recognition to the wisdom and experience of emplaced practitioners (and citizens), learning and operating in real places and developing context-dependent knowledge also needs to be addressed at an institutional or governance level. An expanded conception of practice that nevertheless remains embedded primarily within the existing institutional structures of hierarchical governance will do little to escape the vice of complexity and uncertainty. Recognizing this, Scott (1998) concludes his

work by making a case for *mētis*-friendly institutional structures that emphasize plurality and diversity. He notes that in natural systems diversity is "demonstrably more stable, more self-sufficient, and less vulnerable" (p. 353). As with complex natural systems, *mētis*-friendly institutions benefit from diversity, redundancy, and decentralization.

Within natural resource conservation many have turned to various forms of adaptive management (Stankey, Clark, & Bormann, 2005) or adaptive governance (Scholz & Stiftel, 2005) as place-based strategies for confronting the chronic insufficiency of knowledge in the face of complexity, uncertainty, and change typically faced by natural resource managers. In theory adaptive management involves multi-scalar, place-sensitive policy experimentation (and by implication more case/context-sensitive knowledge). As often practiced, however, adaptive management tends to privilege formal scientific knowledge (*episteme*) over other forms of knowledge held by practitioners and citizens and is insufficiently adaptive in its conception of values as fixed, immutable preferences (Norton, 1999; Norton & Steinemann, 2001). As a pragmatic approach to adjudicating among the plurality of competing management prescriptions for a place or landscape, adaptive management "pays little attention to the question of what types of institutional structures and processes are required for the approach to work on a large scale basis" (McLain & Lee, 1996, p. 446). This approach also tends to be costly and time-consuming, making it a less-than-attractive means for improving the benefit-cost ratio of problem-solving. Prompted by a recognition that effective institutions for adaptive management defy standardization (Stankey et al., 2005, p. 51–52), social scientists have offered the concept of adaptive governance to emphasize the importance of context and the value of institutional diversity in sustaining complex social-ecological systems (Folke, Han, Olsson, & Norberg, 2005).

The emerging discourse on adaptive governance coming out of ecological systems theory conveys strongly prescriptive ideals in citing such positive virtues of institutional diversity, wider public participation, and enlarged social capacity and flexibility to respond to unplanned change. A less normatively disposed discourse examining how governance practices have evolved in response to global-scale social complexity has emerged in sociology (Ilcan & Phillips, 2008; Urry, 2003) and public administration (Pierre, 2000; Pierre & Peters, 2005; Rhodes, 1997). First and foremost, governance is distinguished from government. The traditional notion of government is "state-centric" and addresses how government institutions steer society and the economy. On the other hand governance tends to be associated with a "society-centric" examination of the coordination and self-governance that occurs via networks and partnerships. What was previously thought of as the indisputable role of government is increasingly seen as the province of various societal institutions (Pierre, 2000). Accordingly much of contemporary governance takes place outside formal government institutions and bureaucracies. Thus it involves increasingly complex linkages and collaborations among multiple public and private organizations (see Chap. 3). The governance of complex systems emphasizes the need to reconcile traditional top-down, hierarchical public administration (built along vertical

lines of authority) with emerging, complex, social networks of stakeholders and governmental and nongovernmental organizations—all linked by horizontal lines of interaction. These perspectives contrast with the early-twentieth century technocratic institutions of governance developed during the heyday of scientific management, which nowadays are not as well suited to administering social-ecological systems marked by dynamic, multi-scaled complexity.

Traditional models of governance start with the organization as the basic building block in a system in which top officials direct management practice to accomplish program goals. The idea of governance coming out of public administration and sociology describes the ways in which government increasingly relies on partnerships and networks to accomplish its programs, partly driven by the growing complexity of global-scale social interactions. The growth of governance by complex networks of governmental and non-governmental (NGO) actors and institutions has been propelled by a sense that government has become "'overloaded,' that is, unable to resolve all the tasks and demands placed upon it by society" (Pierre, 2000, p. 4). Some have even suggested that government has largely been replaced by "self-organizing" markets and networks of organizations and actors (Rhodes, 1997).

Such a view of governance comports well with the view of complex adaptive systems in which pluralism and uncertainty dominate and institutional capacities struggle to keep pace with complexity. The challenge of governing in the face of excessive complexity and uncertainty can be addressed, especially at local scales, when self-organizing networks of practitioners, institutions, NGOs, and others come together and begin to direct the system. This is particularly evident in dealing with large-scale ecological disturbances such as the mountain pine beetle outbreak in Colorado where the scale and complexity of the problem exceeds the capacity of any existing organization to address the problem on its own (see Chap. 3). One potential downside to place-based conservation is the potential for parochial interests to trump larger-scale policy interests, as demonstrated by the NIMBY ("not-in-my-backyard") response to many proposed projects. Recognizing this problem, Williams and Matheny (1995) show how various models of democracy play different roles depending on scale. At larger, wider geographic scales, politics involving traditional interest groups provides a means for settling on the basic rules to govern site selection decisions. But once these rules are established context-specific dialogue (NIMBY) ensues because decisions begin to matter to local constituencies in ways that are obscure and remote to all but the most committed interest groups when viewed from afar. Others similarly note that at the local level place provides an important basis for forming a polity (e.g., Kemmis, 1990). Whatever social differences exist over the management of a place, often there is at least a shared concern for that place. In other words, place-focused deliberation promotes some degree of commonality among stakeholders to facilitate and motivate political action as propinquity encourages people to "make sense together while living differently" (Healey, 1997). A key task of any area governance process is to work toward some shared, pragmatic sense of place.

2.6 Conclusion

Faced with irreducible pluralism in the knowledge and meanings of places, irreconcilable diversity in the practice and products of science, and incommensurable differences in valuation, what practitioner wouldn't wish for some all-powerful analytic tool to close the gap between knowledge and practice? But framing the science-practice gap as a failure to communicate—as is often the case in a top-down conception of expertise—constitutes a major source of the problem: knowledge will always expand faster than the capacity of professionals to learn and apply it to particular situations and circumstances. Clearly, investing in science and the expansion of knowledge will always be important, but it is unreasonable to expect those investments alone to yield increasing efficiencies in solving complex problems. Those engaged in practice cannot be expected to absorb or master all the latest science that might apply to their practice. Place helps us rethink the science-practice nexus. It does this by putting more emphasis on the capacity of emplaced and experienced agents to act and learn in networked systems that underscore horizontal linkages. In a model of hierarchical governance, practice responds to direction from above. In a networked, partnered, deliberative model of governance knowledge emerges from the network of actors—each possessing some partial, context-dependent knowledge.

A focus on specific places helps to ameliorate the disciplinary fragmentation of knowledge. First, it confronts the subjective positioning of scientific observers, reminding us of the inherent selectivity of all representations of knowledge. Second, by helping to organize and validate knowledge originating in a bottom-up synthesis of networked practitioners, a focus on place reduces the epistemic tension between local/context-dependent and global/context-independent knowledge. Finally, a place perspective can help address the capacity limits of top-down, expert-driven knowledge systems by recognizing and capitalizing on the accumulated wisdom of emplaced practitioners acquiring and sharing case-specific knowledge.

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