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Abstract	Private lands are important for managing biological diversity, but tensions between a landowner's perceived property rights and conservation interests make landscape-scale conservation a challenge. To reconcile this conflict, there is a growing trend toward more inclusive, collaborative efforts to involve multiple stakeholders in land-use policy decisions. In theory, a collaborative approach is a logical framework for decision-making and action, and the benefits of collaboration are touted in the academic literature and popular press. This strategy is not without critics, however, and the merits of collaboration are at the center of debate. This chapter reviews the rhetorical and theoretical debate over collaboration; identifies the limitations of past and current approaches to measure the success of collaboration in practice; and applies a performance evaluation framework to investigate and link the process and outputs of a multi-stakeholder, conservation planning process in Maine to social and environmental outcomes. While this analysis focuses on the Vernal Pool Working Group, a state-initiated and led collaborative planning process, it offers noteworthy lessons about the possibilities and limits of using collaboration as a tool to manage natural resources on private lands. By offering an example of progressive collaborative conservation, this chapter illustrates the central role collaborative communication can play in shaping the character of local-level planning efforts and, by extension, planning at larger spatial scales.

Keywords (separated by '-')	Collaboration - Conservation planning - Private lands - Property rights - Vernal pools

Chapter 10
Protecting Natural Resources on Private Lands: The Role of Collaboration in Land-Use Planning

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Abstract Private lands are important for managing biological diversity, but tensions between a landowner's perceived property rights and conservation interests make landscape-scale conservation a challenge. To reconcile this conflict, there is a growing trend toward more inclusive, collaborative efforts to involve multiple stakeholders in land-use policy decisions. In theory, a collaborative approach is a logical framework for decision-making and action, and the benefits of collaboration are touted in the academic literature and popular press. This strategy is not without critics, however, and the merits of collaboration are at the center of debate. This chapter reviews the rhetorical and theoretical debate over collaboration; identifies the limitations of past and current approaches to measure the success of collaboration in practice; and applies a performance evaluation framework to investigate and link the process and outputs of a multi-stakeholder, conservation planning process in Maine to social and environmental outcomes. While this analysis focuses on the Vernal Pool Working Group, a state-initiated and led collaborative planning process, it offers noteworthy lessons about the possibilities and limits of using collaboration as a tool to manage natural resources on private lands. By offering an example of progressive collaborative conservation, this chapter illustrates the central role collaborative communication can play in shaping the character of local-level planning efforts and, by extension, planning at larger spatial scales.

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10.1 Introduction

Managing natural resources for the common good is a complex issue, particularly when achieving conservation goals requires management of private lands. Over 60% of the land in the United States is privately owned (USDA 2002), making private lands an essential component of any comprehensive natural resource management strategy. Yet, while private lands are important for managing biological diversity, tensions between a landowner's perceived property rights and conservation interests make landscape-scale conservation a challenge. Landowners are often reluctant to cooperate in resource management strategies that may incur a personal cost, lower the value of their land, or impose restrictions on land use. Many also resent the layers of regulation affecting their property, questioning the personal benefits of protecting or even identifying individual species or natural habitats that do not cover large areas.

Government restrictions designed to protect wildlife and other significant natural resources are often controversial. Whether land-use restrictions interfere with individual private property rights to an extent requiring compensation to the property owner has been litigated frequently in both federal and state courts (Bean and Rowland 1997; Dwyer et al. 1995; Shogren 1998). As the spiraling number of so-called 'takings' lawsuits suggests, citizen resistance to environmental regulations has significant political implications (Jansujwicz 1999). An expanded regulatory takings doctrine that redefines when a government action requires landowner compensation may effectively chill the predisposition and ability of environmental managers to implement environmental regulations (Wise 2004). Environmental managers may shy away from controversy, avoiding stringent enforcement in cases that may later be subject to intense scrutiny by the courts. Government reluctance to enforce strict regulatory limits such as is embodied in the Endangered Species Act impedes the protection of significant natural resources on private lands. This inevitably begs the question, 'Can private property and conservation coexist?' (Freyfogle 2003). Because agency mandates to protect natural resources often clash with property-rights interests, environmental regulators will continue to face the difficult task of designing resource management strategies that effectively balance property rights and economic development with environmental and natural resource protection in a manner acceptable to state legislatures and their constituents.

To reconcile these differences, there is a growing trend toward more inclusive, collaborative efforts to involve multiple stakeholders in land-use policy decisions. Called many things – public-private partnerships, collaborative conservation planning, cooperative ecosystem management, consensus decision making, and alternative dispute resolution models – these new approaches to multi-stakeholder participation in environmental decision-making are emerging in hundreds of communities across the country as citizens, environmentalists, business leaders, and public officials are meeting face-to-face to work through their differences, resolve conflicts, and design new strategies to address resource-related issues (Chap. 4).

Today, the rhetoric of collaboration is commonplace and multi-stakeholder planning processes are an important cornerstone for a rapidly increasing number of federal, state, and local natural resource and environmental programs addressing wetlands, wildlife, endangered species, water quality, and other watershed management concerns (Carr et al. 1998; EPA 1996, 1998; USDA and U.S. DOC 2000; U.S. GAO 2008; Wondolleck and Yaffee 2000). Increasingly, the term 'collaboration' is used to represent a broad array of strategies from collaborative engagement processes and informal organizations, to more formalized partnerships or super-agencies (e.g., CALFED Bay-Delta Program, a collaborative effort of 25 state and federal agencies with management or regulatory responsibilities for the San Francisco Bay-Delta system) (Sabatier et al. 2005). Under the umbrella of collaborative resource management, for example, are interagency task forces and work groups as well as many examples of local initiatives that involve the community planning process, including habitat conservation planning (Noss et al. 1997; Thomas 2001, 2003), watershed partnerships (Born and Genskow 1999; Kenney et al. 2000), community-based forestry (Carr et al. 1998; Danks 2008), and citizen-science programs (Calhoun and Reilly 2008).

Collaborative planning processes can be government-driven ('top-down') or citizen-initiated ('bottom-up'), but all share common organizing principles and theoretical underpinnings. By encouraging stakeholder participation early in the planning process, advocates claim that collaboration can temper the confrontational politics of conventional regulatory approaches and overcome inefficiencies inherent in traditional models of environmental governance, thereby offering an alternative strategy to achieve a widening array of government-mandated environmental objectives (Beierle and Cayford 2002; Busenberg 1999; Kemmis 1990; Susskind and Cruikshank 1987; Wondolleck and Yaffee 2000). While many tout the benefits of collaborative processes, others raise important concerns of accountability and legitimacy (McCloskey 1996; Moote 2008; Weber 2003; Wondolleck and Yaffee 2000), representation (McCloskey 2004–2005; Weber 2003), and scientific credibility (Coglianese 1999; Weber 2003).

Over the past 2 decades, the debate over the merits of collaboration has been largely rhetorical and theoretical, and little empirical evidence suggests whether collaboration has positive or negative impacts on the environment (Layzer 2008; Thomas 2008), the community, government officials, and future policy decisions. For the most part, existing research on collaboration has focused on process (e.g., Kenney et al. 2000; Leach and Pelkey 2001; Wondolleck and Yaffee 2000), policy outputs (e.g., Koontz 2005), and more recently on social outcomes (e.g., Sabatier et al. 2005), but very little is known about environmental outcomes (Koontz and Thomas 2006; Thomas 2008). Moreover, few empirical studies link the process and outputs of collaboration with both social and environmental outcomes (Mandarano 2008). Such evaluation is necessary to support collaborative theory or validate critical claims.

This chapter has four main objectives. First, we discuss principles of collaboration, specifically focusing on how the structure and process of collaboration differs from more traditional decision-making processes. In this section, we review the

literature on collaboration particularly with respect to key concepts and organizing principles characteristic of a multi-stakeholder, consensus-driven approach.

Second, we review the rhetorical and theoretical debate on collaboration to answer questions such as: What are the driving forces behind this movement toward collaboration and partnerships? What are some of the benefits and pitfalls of using a collaborative approach? In our discussion of the theoretical underpinnings of collaboration, we address both the expected outcomes and critical concerns of collaboration as they relate to conservation planning at any number of spatial scales and geographic regions.

Third, we assess the limitations of past and current approaches used to measure the success of collaboration in practice. We follow this assessment with a practical application of a performance evaluation framework to investigate and link the process and outputs of a multi-stakeholder, collaborative planning process in Maine to social and environmental outcomes. In our analysis, we focus on a 10-year collaborative communication process – the Vernal Pool Working Group, a state-led collaborative planning initiative. While our chapter focuses on a case of vernal pool conservation planning, problems associated with natural resource conservation on private land transcends vernal pools and also relates to conservation planning at any number of spatial scales and geographic regions. Given the nature of vernal pool habitat (small and difficult to map, ephemeral, dependent on wetland and upland components, and widely distributed), we believe it is an important focal topic because conservation of this resource will be as challenging as any, and the results will be widely applicable to other natural resource protection issues (Hunter 2008).

We then conclude the chapter with lessons learned on the barriers and opportunities for using collaboration as a planning tool for protecting natural resources on private lands. Our goal in offering an example of progressive collaborative effort at conservation planning for vernal pools is to illustrate the central role collaborative communication can play in shaping the character of local-level planning efforts and, by extension, planning at larger spatial scales.

10.2 Traditional and Collaborative Planning in the United States

Traditional models of environmental governance (now commonly referred to as 'command-and-control') are characterized by a 'top-down' hierarchical structure, emphasizing rules and regulations promulgated and enforced from above. Authority is centralized with the federal government delegating responsibility to specialized agencies, states, and local governments. Within this fragmented system of government, resource management agencies (at least prior to the 1990s) rarely cooperated with one another or with other agencies (Thomas 2003). Each agency carried out public functions following different missions, cultures, and 'standard operating procedures.'

Traditional governance systems tend to be reactive, often evolving in response to public outcry and concern. They focus on remedial rather than preventive actions (Meiners and Yandle 1993). Environmental laws, policies, and programs are

compartmentalized to address a specific medium – air, land, or water. Decision-making is technocratic or expert-driven and public involvement is encouraged or allowed only at certain entry points in the policy process as permitted by formal administrative procedures. For example, public laws including the National Environmental Policy Act (NEPA; 1969), the National Forest Management Act (1976), the Federal Advisory Committee Act (FACA), PL 92463 (1972), the Freedom of Information Act, 5 U.S.C.A. §552 (1966), and the Administrative Procedures Act (APA), 5 U.S.C.A. §501 et seq. (1946) ensure public access to agency records and decision-making processes for public land management.

In contrast to the technocratic model of environmental governance, the collaborative partnership model emphasizes a consensus-based decision-making process. Authority and responsibility is decentralized and shared horizontally among agencies, organizations, and individuals with a direct stake in the outcome. Collaboration infers shared power, and ideally all participants in a collaborative partnership have a high degree of freedom over the process and influence over decision-making. Collaborative partnerships encourage voluntary, face-to-face information exchange and problem solving in which multiple stakeholders can voice opinions in a consensus-driven decision-making process (Conley and Moote 2003). Some degree of public interaction is encouraged from the onset and not necessarily restricted to certain entry points as defined by formal administrative procedures. Rather than pursue narrow objectives such as water quality or habitat restoration, partnership objectives tend to be more broad-based, and collaborative initiatives often pursue more than one resource-related issue at a time. Collaborative partnerships are often formed proactively, organizing before an issue reaches a critical turning point.

Ranging along a continuum of formality, collaborative partnerships and planning processes vary considerably along several dimensions distinguished by the legal framework or form of agreement, by the specific issues they face, and by the character of its membership. The varying role of government in partnerships (e.g., leader, facilitator [through grants or non-regulatory incentives], or follower) may influence the structure and process of collaborative partnerships (Koontz et al. 2004). For example, the government's role may affect the way issues are defined, the resources available for collaboration, and the organizational processes that are established (Koontz et al. 2004). Thus, collaboration can be either 'top-down' – and often initiated in response to impending legislation – or 'bottom-up' partnerships originating and sustained at the grassroots or community level, although government rarely disappears entirely from collaborative initiatives.

10.3 Rhetorical and Theoretical Benefits and Limits of Collaboration

In theory, a collaborative approach is a logical framework for decision-making and action, and the benefits of this inclusive approach are touted in the academic literature and popular press. For the most part, those who write about collaboration tend

to be advocates, and their narratives emphasize ideal scenarios of collaborative natural resource management. This strategy is not without critics (e.g., McCloskey 1996), however, and the merits of collaboration are at the center of a lively debate (Kenney 2000). The following sections review the theoretical underpinnings of collaboration, including both the expected outcomes and critical concerns.

10.3.1 Expected Outcomes

Much of the impetus for a collaborative approach is attributed to perceived shortcomings of traditional models of environmental governance. Collaboration is offered as a better way to address issues of diffuse pollution sources and overlapping jurisdictions and to resolve environmental disputes on private lands.

Diffuse Pollution Sources The traditional regulatory model of environmental governance is credited with many successes. By setting tough regulatory standards and procedures, federal statutes including the Clean Air Act, 42 U.S.C. § 7401 et seq. (1970) and the Clean Water Act, 33 U.S.C. § et seq. (1972) significantly curbed the emission of hazardous substances into the environment. As a result, surface waters are cleaner today than at the onset of the modern environmental movement (Council on Environmental Quality 1997; Mazmanian and Kraft 1999). While technocratic, regulatory fixes worked well for point-source pollution, non-point source pollution (e.g., agriculture runoff) proved more challenging to control under a regulatory approach. Despite recent improvements in environmental quality over the past 3 decades, reliance on traditional 'command-and-control' regulation is not sufficient to achieve government-mandated environmental objectives (Chertow and Esty 1997; John 1994; Mazmanian and Kraft 1999), particularly where private lands are concerned.

Overlapping Jurisdictions Overlaying the ecological landscape is a political, legal, and administrative landscape. Natural resources do not conform to these arbitrary political boundaries (Thomas 2003). Wildlife species often use multiple habitats to meet their life-history needs, and wetlands and other ecological systems are rarely confined within the boundaries of a single jurisdiction or ownership. In the U.S., the landscape is further complicated by a system of government that is fragmented among specialized agencies with different missions, culture, and methods of operation and by a series of environmental laws that tend to be limited in purpose, focusing on a single species, patch of habitat, or medium (air, land, or water). Current policies and programs are often criticized for being costly to administer and enforce (Meiners and Yandle 1993), and in many instances, regulations are inconsistent and difficult to enforce across administrative boundaries.

Because species and ecosystems transcend human-imposed boundaries, jurisdictional and habitat fragmentation necessitates both interagency cooperation (Thomas 2003) and the involvement of private interests in conservation planning decisions. When management units are defined ecologically rather than politically, greater coordination among local landowners and between private landowners and natural

resource management agencies is required (Cortner and Moote 1999). This partnership idea is a cornerstone principle of 'ecosystem management' (Cortner and Moote 1999; Grumbine 1994; Kernohan and Haufler 1999; Noss and Cooperrider 1994; Norse 1993). Under the rubric of ecosystem management, collaborative partnerships grow from the involvement of all those affected in the decision-making process. In theory then, by partnering with various levels of government and the private sector, collaboration can facilitate greater coordination among stakeholders, offering a diversity of expertise and financial assistance not available in a single agency or organization (Endicott 1993; Chap. 4).

Conflict Resolution Participatory strategies are expected to temper the confrontational politics that typify environmental policy decisions (Beierle and Cayford 2002; Busenberg 1999; Kemmis 1990). Government regulation of private property rights is politically unpopular, and emotionally charged debates between conservation and development interests have been common when wildlife and wetlands are involved (Bean and Rowland 1997; Freyfogle 2003; Meltz et al. 1999; Noss et al. 1997; Shogren 1998). Often developers and landowners find traditional regulatory models intrusive, cumbersome, adversarial, and in some instances, insufficient to address economic concerns (Ceplo 1995). They argue that environmental laws create uncertainty in planning, imposing costly delays on development projects (e.g., Marceau 2009; Pierce Atwood LLP 2006). They are also concerned that layers of regulation will lower the value of their land, raise the costs of operation, or impose restrictions on the use of their land.

Manifestations of property rights interests have a long history in the U.S. reaching back first to the Sagebrush Rebellion of the late 1970s and later the Wise Use Movement and the County Rights Movement of the 1980s and 1990s, respectively. These movements took place in the western states and were based largely on claims that federal resource management agencies were applying rules and regulations to landowners' operations in ways that made their properties less profitable (Wise 2004). Over the last 2 decades, however, heightened tensions between a landowner's perceived property rights (especially in terms of potential economic gains) and the legislative mandates of federal, state, and local agencies has galvanized the property-rights movement (Jansujwicz 1999), and property rights claims are increasingly being played out on a case-by-case basis in federal and state courts across the nation. The standard objection raised by property-rights advocates is that regulation 'takes' private land without compensation in violation of the Fifth Amendment to the U.S. Constitution. In the mid-1990s, as these interests began to question or resist land-use regulations, a reinvigorated property-rights movement gained increased momentum and visibility. After the 1994 congressional elections, a surging wave of anti-government, pro-property rights rhetoric swept the nation and dozens of grassroots groups became organized in opposition to the power of government to regulate private property for environmental or other purposes without compensation (Jansujwicz 1999).

Today, property-rights advocates continue to exert considerable political pressure, resulting in a regulatory climate where government often lacks the political will to impose strict regulations. Thus, while private lands harbor valuable habitat

for flora and fauna and perform numerous environmental services, access, data collection, and relationships with landowners impede the protection of significant natural resources on private lands (Hilty and Merenlender 2003). To reconcile the increasing number of conservation-development conflicts on private lands, government agencies responsible for managing natural resources are embracing collaboration as a promising non-regulatory planning tool.

In theory, by involving the affected community throughout the planning process, adversarial decision-making is avoided, local citizens become invested in the process, and better environmental outcomes result (Sabel et al. 2000; Susskind and Cruikshank 1987; Wakeman 1997; Wondolleck and Yaffee 2000). Theory suggests that collaborative approaches are more likely to achieve program objectives because participants work together to identify mutually acceptable goals (Susskind and Cruikshank 1987). Collaboration is perceived as 'a process through which parties that see different aspects of a problem can constructively explore their differences and search for solutions that go beyond their own limited vision of what is possible' (Gray 1989). Wondolleck and Yaffee (2000), for example, cite a case in California (Quincy Library Group) where environmentalists and loggers were able to draw on their common interests, fears, and perceptions to craft a joint vision statement in a process that encouraged communication between disparate interests. In this case, theory holds that participants were more likely to accept the outcomes of a process that they perceived as fair and legitimate. Moreover, as Innes and Booher (1999) found based on their empirical research and practice in a wide range of consensus building cases, social learning during a consensus building process changes a participant's understanding of their own interests, leading them to conclude that consensus building can work more effectively than confrontational tactics.

In an idealized narrative, collaboration with stakeholders builds trust, support, and local capacity by fostering a sense of place, responsibility, and commitment (Brick et al. 2001; Wondolleck and Yaffee 2000). By involving the affected community throughout the planning process, adversarial decision-making is avoided, local interests become invested in the process and better environmental outcomes result (Sabel et al. 2000; Susskind and Cruikshank 1987; Wakeman 1997; Wondolleck and Yaffee 2000; Chap. 3).

Stakeholder participation provides a foundation for the development of social capital (that is, social networks and the associated norms of reciprocity) (Coleman 1988; Pretty and Smith 2004; Putnam 1995, 2001; Putnam et al. 1993), leading to more resilient decisions (Sabatier et al. 2005; Salamon et al. 1998). For example, in a review of international agriculture and rural conservation programs, Pretty and Smith (2004) found that stronger bonds within and between groups lead to more positive outcomes for both biological diversity and human livelihoods. In this example, bringing together farmers to deliberate on how to make changes to food production systems fostered new social relations and created new stores of social capital, which in turn helped sustain change. Not surprisingly, Pretty and Smith (2004) found that where social capital was high, new ideas spread more rapidly. Locally led cooperative planning also creates new social capital that supports further planning (Salamon et al. 1998). A study of local advisory groups (or task

forces) participating in the Ohio Farmland Preservation Planning Program suggests that collaborative communication processes provide a useful first step in building community capacity to address future land-use issues (Koontz 2005). By engaging local communities, collaborative processes can generate innovative solutions tailored to local conditions (Landy et al. 1999).

Although many studies point to the benefits of collaboration, such a strategy is not always appropriate, and critics have raised important concerns of accountability, legitimacy, representation, and scientific credibility.

10.3.2 Critical Concerns

Accountability and Legitimacy Many fear that an arrangement involving multiple stakeholders in an open collaborative process slows decision-making (Coglianese 1999) and reduces accountability (Wondolleck and Yaffee 2000). Because management is horizontal under the collaborative paradigm, unclear lines of authority and responsibility result, and critics are particularly concerned about this devolution of agency power. They argue that it is not fair, legitimate, or wise to devolve the authority invested in federal agencies by Congress to implement laws and regulations to an unelected and perhaps unrepresentative collaborative group (McCloskey 1996; Wondolleck and Yaffee 2000). Moreover, the structure of collaboration often makes it difficult to determine whether partnerships remain accountable to the interests they serve (McCloskey 1996; Moote 2008; Weber 2003) or whether policy outcomes of collaboration serve few at the expense of many (Weber 2003). For example, agencies and interest groups that delegate decision-making authority to stakeholder partnerships need to know whether priorities established at the national or regional level are upheld locally. In many instances, collaborative exercises are designed to address local concerns and not the interests of the broader public.

Representation Critics also argue that collaborative initiatives lack adequate representation (Weber 2003). They suggest that stakeholders with the best access to current information tend to dominate collaborative exercises, and often few participants are members of the general public and unaffiliated, undermining any claim that these forums have some larger civic importance (McCloskey 2004–2005). Concerns over inequities in power and resources between members of a consensus group align with the principles of communication theory. This theory recognizes that communication practices are infused with power (Martin 2007), and these existing power relations may undermine meaningful citizen participation in collaborative efforts (e.g., Moote 2008). Recent communications research has questioned whether collaborative communication processes privilege the objectives of entities that already hold the decision-making power or serve the interests of dominant actors in the larger socio-political context in which they are embedded (Martin 2007). This raises concerns about whether a collaborative process is easily captured by interest groups with economic and political power (Katz and Miller 1996).

Scientific Credibility Opponents of collaboration stress that the outcomes of collaboration may lack scientific credibility (Coglianese 1999; Weber 2003). They argue that because consensus is the primary mechanism for reaching decisions, any agreements, plans, or policies chosen risk representing the decision causing the least controversy, and this may not necessarily be the one that is best for the resource (Coglianese 1999). Critics argue that the most intractable disputes are 'sidestepped' and others 'glossed over' with 'broad language acceptable to all sides' (Coglianese 1999). In an effort to attain consensus, 'extreme' views may be excluded or marginalized, more contentious issues ignored or avoided, and solutions imposing costs on participating stakeholders with the most power may not be considered (Beierle and Cayford 2002; Coglianese 1999; Peterson et al. 2002).

These critical concerns highlight the growing importance of empirical analysis. Because collaborative planning processes represent a new management tool with uncertain success (and because defining and measuring 'success' is difficult and often problematic), it is important to proceed with caution. Empirically derived evidence must be generated to support, refute, or elaborate on critic's claims. Such evaluation is necessary both to guide future efforts and policies and to identify variables associated with success.

10.4 Evaluating Collaboration in Practice

In practice, success is frequently assessed using two criteria: (1) evaluation of process and (2) a measure of outcome. For the first criterion, researchers identify the factors that contribute to or impede the success of collaborative partnerships. This assumes that the quality of a process influences the effectiveness of collaborative planning (Margerum 2002) and that several process factors can positively influence the chances of success (Gray 1989; Wondolleck and Yaffee 2000). In general, a 'quality' process meets certain criteria, including sufficient representation, effective leadership and facilitation, an efficient organizational structure (e.g., well-managed meetings), committed, knowledgeable participants, and the use of the best science available. In addition to these criteria, a quality process is also measured by determining whether the effort builds future capacity.

The second measure of success is based on outcomes: Do collaborative efforts achieve on-the-ground objectives? Do they result in a measurable improvement of the resource? This criterion is measured by a number of outcomes including the adoption and implementation of plans, projects, or policies, a measurable change in the resource (e.g., restored wetlands, improved water quality), or a change in land use or in local-level planning processes.

In theory, where process criteria are met and where the process is perceived as fair, legitimate, and transparent, better outputs and outcomes result. Outcomes of collaborative planning are directly related to the strength or weakness of the process, which affect long-term implementation (Margerum 2002). While it may not be possible for a process to fully meet all the criteria, failure to meet any one

of them hinders the effectiveness of the process and the quality of its outcomes (Innes and Booher 1999).

10.4.1 Process Evaluation

Since the late 1980s, collaborative scholars have developed a set of principles and criteria against which collaborative efforts can be evaluated (e.g., Born and Genskow 1999; Coughlin et al. 1999; Gray 1989; Innes and Booher 1999; Kenney et al. 2000; Leach et al. 2002; Margerum and Born 1995; Moote et al. 1997; Susskind and Cruikshank 1987; Yaffee et al. 1996). From these studies we now know a great deal about the process of collaboration and can readily refer to a long list of ingredients, including both member factors and organizational factors that are recommended for success. However, while these studies offer important insight on the collaborative process, they offer comparatively little about whether a representative and well-structured process leads to better policy decisions and social and environmental outcomes.

10.4.2 Outcome Effects

Defining outcomes is often problematic. For one thing, the literature on collaboration does not clearly distinguish between outputs and outcomes. Thomas (2008), for example, finds that in some instances, studies that claim to measure environmental outcomes actually use outputs as proxies for outcomes. Without a clear definition of outputs and outcomes, the line between them is blurred. Outputs are the plans, projects, and other tangible items generated by collaborative planning efforts (Koontz and Thomas 2006). These are products that can be easily pointed to and recognized, including a set of agreements generated by the collaborative planning process (Margerum 2002). Agreements may be formal (e.g., final plans, policy statements, legislation, and new regulations) or informal proposals for voters or public officials to consider. Outcomes are defined as 'the effects of outputs on environmental and social conditions' (Koontz and Thomas 2006). Innes and Booher (1999) identify both tangible and intangible products as outcomes of collaboration. In their definition, tangible products include formal agreements such as plans, policies, legislation, and new regulations. Aligning with Margerum (2002), however, we consider agreements as outputs and choose to look beyond the plans to determine outcomes. To define outcomes, we use Innes and Booher's (1999) definition of 'second and third order effects' or 'activities triggered by the consensus building process,' including 'spin-off' partnerships (consensus building groups set up to work on implementation), collaborative projects, and innovations (e.g., strategies, actions, and new ideas). Environmental outcomes can be described as tangible outcomes (e.g., improved water quality, changed land management practices), and

social outcomes are best described as intangible outcomes (e.g., increased trust, new relationships, or knowledge gained by participants). Intangible outcomes are often thought of as 'social, intellectual, and political capital' (Gruber 1994). Again, social capital refers to the social networks and the associated norms of reciprocity (Coleman 1988; Putnam 1995, 2001; Putnam et al. 1993). Intellectual capital includes mutual understanding of each others' shared interests, shared definitions of the problem, and agreement on data, models, projections, or other quantitative or scientific descriptions of the issue (Innes and Booher 1999). Political capital is defined as the ability to work together outside the consensus-building process to influence public action in ways they were unable to when acting individually (Innes and Booher 1999).

Once defined, significant methodological constraints also impede evaluation of environmental outcomes. Evaluations require assessments over a long time frame, and sampling methods amenable to statistical evaluations require large sample sizes of comparable entities. Identification of causal links between management activities and ecological trends are often difficult to make (Conley and Moote 2003; Thomas 2008). Moreover, because in many cases the only readily accessible data regarding partnership initiatives are provided by the members through newsletters, websites, videos, and presentations or through surveys completed by the very same participants, an underlying bias may result in an overly optimistic assessment of the effort's progress (Kenney 2000). Collaborative partnerships also compete for grant funds and other sources of financial support, and this provides an incentive to exaggerate the positive attributes of the effort, while downplaying the negative. While consideration of active participants is valid and even necessary, the research challenge is to balance insights of that population with other sources of information and analysis (Kenney 2000).

Given the significant methodological constraints, it is not surprising that most of the literature on collaboration has focused on process (e.g., organizational and membership factors). With the exception of social outcomes (e.g., Sabatier et al. 2005), little empirical research links collaborative outputs with environmental outcomes (Koontz and Thomas 2006), and few studies assess the long-term effects of collaboration on the development and implementation of natural resources policy. To fill this gap in knowledge, researchers are slowly shifting their focus, moving beyond a process-oriented approach to include in their analyses consideration of outcomes, including environmental outcomes (Layzer 2008). Mandarano (2008), for example, evaluates the process, outputs, and long-term effects of a specific collaborative planning effort, the Habitat Workgroup of the New York-New Jersey Harbor Estuary Program. Using a set of performance criteria, Mandarano (2008) described observed changes in social and environmental conditions and the apparent linkages between the Habitat Workgroup's process and outputs. In another study, Koontz (2005) used a multiple-case analysis of county-level, community-based task forces working on farmland preservation in Ohio to examine the impact of stakeholder participation on policymaking at the local level. While the quality of the process remains important, these studies go a step further to link the quality of the process with the quality of outputs and social and environmental outcomes. In the next section, we follow the

lead of these investigators and use a performance evaluation framework to assess the process, outputs, and outcomes of a collaborative vernal pool conservation planning process in Maine.

10.5 Collaborative Management in Practice: The Vernal Pool Working Group

Using a case study of vernal pool conservation planning in Maine, we examine the role of collaboration and evaluate whether consensus-based decision making was a more efficient and effective way to meet regulatory objectives and ensure the long-term viability of the State's vernal pool resources. In the following sections we also discuss how proactive, multi-stakeholder decision-making processes can be integrated with traditional planning strategies. For example, we investigate whether engaging stakeholders in an open dialogue about vernal pool conservation and management ultimately led to better policy outcomes and greater 'buy-in' than a sole reliance on traditional forms of environmental governance and formal administrative procedures. By linking theory to empirical data, we also hope to identify the barriers and opportunities for using collaboration as a planning tool to manage natural resources on private lands.

In the following sections, we review the ecology and regulatory context for vernal pool conservation planning at the state and local level in Maine. These sections provide an overview of the origin and organization of the Vernal Pool Working Group (VPWG) and then apply criteria integrated from the various published performance evaluation frameworks to evaluate the process, outputs, and social and environmental outcomes of VPWG deliberations. The process and outcomes described below can serve as a template for approaching any conservation issue that requires management of resources on private lands. The framework offered here may be applied to the management of any natural resources on private lands that, due to their transboundary nature, require action by multiple stakeholders at the local and higher level.

10.5.1 Ecology and Management of Vernal Pools in Maine

Vernal pools in Northeastern North America are ephemeral to semi-permanent wetlands that obtain maximum depths in spring or fall and lack permanent surface water connections with other wetlands or water bodies. Pools typically fill with snowmelt or runoff in the spring, although some may be fed primarily by groundwater sources and may begin to refill in the fall. Pools are generally less than 0.4 ha, with the extent and type of vegetation varying widely. They provide optimal breeding habitat for animals adapted to temporary, fishless waters including, but not limited to mole salamanders (*Ambystoma* spp.), wood frog (*Rana sylvatica*),

Eastern spadefoot toad (*Scaphiopus holbrookii*), and fairy shrimp (*Eubranchipus* spp.) (Calhoun and deMaynadier 2008; Colburn 2004; Semlitsch and Skelly 2008). In addition, vernal pools provide foraging and resting habitat for many state-listed species in the Northeastern U.S. In Maine, these include spotted turtle (*Clemmys guttata*), wood turtle (*C. insculpta*), Blanding's turtle (*Emydoidea blandingii*), and ringed boghaunter dragonfly (*Williamsonia lintneri*).

While vernal pools are unique ecosystems that perform important functions at the landscape scale (Hunter 2008), protecting pools is a challenge for natural resource managers because they are small, ephemeral wetlands that are difficult to remotely identify. Furthermore, animals that breed in vernal pools require additional, adjacent terrestrial habitat for migrating, dispersing, foraging, and hibernation (Faccio 2003; Semlitsch 2002; Semlitsch and Skelly 2008). At the state level in the U.S., a number of approaches protect wetland resources (ELI 2005) and currently 15 states have their own comprehensive wetland regulatory programs (Mahaney and Klemens 2008). Within the Northeastern United States, Maine currently has the strongest vernal pool protections, designating a subset of ecologically outstanding vernal pools as 'significant wildlife habitat' under the Natural Resources Protection Act (NRPA), which provides for the regulation of wetlands and other important natural resources (38 M. R. S. A. §§ 480-A to 480-Z).

Although a subset of exemplary pools were designated as 'significant wildlife habitat' by the State in 1995, the requirement that these Significant Vernal Pools (SVP's) be defined and mapped by the Maine Department of Inland Fisheries and Wildlife (MDIFW) before they could be regulated was never acted on due to lack of agency resources. After 10 years of work by stakeholders, in April 2006, Maine adopted a definition for identifying SVP's (Significant Wildlife Habitat Rules, Chapter 335, Section 9 under NRPA) based on the abundance and presence of vernal pool indicator species – fairy shrimp, wood frogs, and blue-spotted (*Ambystoma laterale*) and spotted salamanders (*A. maculatum*) – or use by state-listed threatened or endangered species. An SVP includes the adjacent terrestrial habitat within a 76-m radius around the pool from the high-water mark. New regulatory protections became effective on September 1, 2007. While still short of the 159–290-m conservation zone recommended as essential for the long-term survival of pool-breeding amphibian populations in human-dominated landscapes (Calhoun and Klemens 2002; Semlitsch 1998), the enactment of this legislation marked a positive step toward protecting vernal pool resources. By extending the area of terrestrial habitat that is regulated around SVP's and by removing the requirement that vernal pools needed to be 'mapped' to be 'identified,' Maine established the most comprehensive and stringent measures for protecting vernal pools in Northeastern North America (Mahaney and Klemens 2008).

Maine's role in proactive management of vernal pools evolved slowly, taking more than 10 years to address the regulatory gaps for their protection. This protracted decision-making process highlights the confusing array of factors that can influence the pace at which institutional change occurs. In the following sections we discuss the evolving process of vernal pool conservation planning in Maine, specifically focusing on the origin and activities of the VPWG.

10.5.2 Origins of the Vernal Pool Working Group

Historically vernal pools did not receive much attention except on a case-by-case basis by government agencies charged with protecting wetland resources. This often resulted in conflicting signals from regulatory agencies weighing in on the same proposed project. For example, in the mid-1990s, a number of projects in the mid-coast area of Maine passed through the Maine Department of Environmental Protection (DEP) screening and were significantly delayed by review at the federal level (Army Corps of Engineers, ACOE). Whatever the reason (e.g., concerns from EPA or U.S. Fish and Wildlife Service, [USFWS], or even neighbors), incidents such as these highlighted the overlapping and often confusing regulatory process governing activities affecting vernal pools.

Perhaps as a response to these or similar incidents, Maine legislators began hearing much discontent from their constituents about the lack of coordination between federal and state wetland regulations. Prior to the revised 1995 state legislation that streamlined the permitting process, applicants would have to apply for permits from both federal and state agencies, each with differing requirements. In response to this, the state legislature passed a Legislative Resolve in 1993 that set up a Wetlands Task Force to recommend changes to the state wetland program and charged the DEP and the Maine State Planning Office (SPO) to oversee this process. The SPO also received EPA funding to produce a Wetland Conservation Plan for the State (Maine State Planning Office 2001). The Wetlands Task Force set up a number of working groups to address wetland conservation issues, including regulation, assessment, inventory, and mitigation. The VPWG had many of the same members as the Assessment Work Group under the broader Wetlands Task Force but was specifically formed to address the vernal pool issues that were never adequately addressed in the 1995 legislation. Under the 1995 NRPA, Significant Vernal Pool rules were added as a placeholder, and the VPWG was charged with implementing the changes to the legislation.

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10.5.3 Process

Chronologically, the VPWG can be divided into two different processes. An earlier process (1995–2003) convened by SPO shortly after adoption of the 1995 legislation and a later process (2004–2006) reconvened by DEP. In the earlier process, VPWG participants met regularly at the SPO in Augusta, Maine. Employees of SPO facilitated the meetings, took and distributed minutes, and coordinated and disseminated materials for review prior to meetings. SPO's role in facilitation ended in 2002 when the lead facilitator left public service. A vacuum in leadership followed the departure of SPO as facilitator, and momentum was lost. The VPWG remained without direction until a representative of DEP reconvened the group in 2004. Despite changes in leadership, however, membership and process elements remained fairly consistent over time.

The VPWG included key stakeholders from federal, state, private, academic, and non-profit NGO's each contributing expertise in science, forestry, outreach, natural resource planning, and regulation. Stakeholders, many of whom were also members of the larger Wetlands Task Force, included MDIFW, Maine Forest Service (MFS), DEP, SPO, Maine Audubon Society, Maine Natural Areas Program (MNAP), University of Maine, and private environmental consultants. Although primarily a state-driven work group, federal agency representatives also attended meetings. The U.S. Army Corps of Engineers attended meetings as regulator, and the U.S. Fish and Wildlife Service, while not a formal partner, attended occasionally meetings to share their perspective on vernal pool issues.

Typically, the VPWG met several times a year, but the frequency of meetings varied from year to year depending on the issues and tasks at hand. Not every meeting was fully attended (and even when the table was full, not all members contributed to the discussion). Those absent had the opportunity to contribute through electronic mail. Membership of key interests remained consistent over time, although the group expanded as participating agencies brought in additional representatives with specific expertise to address emerging issues. While most decisions were made by the larger policy group, an ad-hoc technical group met to address issues, concerns, and topics identified by the broader group. In addition, while division leaders did not always 'sit' at the table, they remained actively involved in the policy decisions of the group.

The process was largely a state-driven interagency committee charged with a specific objective and was not a stakeholder process or broad collaboration. The process consisted largely of internal meetings of biologically based and oriented stakeholders and did not explicitly include public participation 'at the table.' Efforts were made to represent these interests by proxy of the invited stakeholders, and each stakeholder had input from his or her constituents throughout the process.

The VPWG had no formal mission statement. All members, however, had a basic understanding of their objective: to come to terms on the science of vernal pools and to discuss mechanisms to fulfill the legislative mandate designed to protect them. An agenda was loosely followed and decisions were made by an informal consensus rather than formal voting procedures. All members of the VPWG were considered equals and opportunities to contribute were given to all stakeholders at the table.

10.5.4 Outputs

Outputs can be divided into two general categories: (1) principal outputs that emerged as a result of face-to-face deliberations between VPWG members ('at the table') and directly addressed the mission to implement the NRPA and (2) ancillary outputs that were accomplished in tandem with these efforts but addressed non-regulatory concerns (e.g., public education, outreach, and local stewardship). We use the term ancillary to describe activities occurring outside of the VPWG's stated mission to fulfill the legislative mandate to define vernal pools and determine

significance. While we distinguish between these outputs, the two approaches were not mutually exclusive. We acknowledge that non-regulatory approaches fostered public acceptance of vernal pool resources and protection mechanisms, thereby adding significant support to the mission of the VPWG.

Principle Outputs First, a scientific foundation was laid for developing a conservation policy based on the best available science. Research gaps noted by the VPWG developed into research projects for University of Maine graduate students, often partially funded and overseen by MDIFW and University of Maine faculty. During this time, five master's and five doctoral students produced data on life history needs of pool-breeding amphibians, two state-listed species of turtles dependent upon pools, and on amphibian responses to forestry practices (e.g., Baldwin et al. 2006a, b; Joyal et al. 2001; Lichko and Calhoun 2003; Oscarson and Calhoun 2007; Patrick et al. 2007; Vasconcelos and Calhoun 2004, 2006).

Second, definitions of vernal pools and Significant Vernal Pools were developed. The VPWG worked for 10 years to develop a definition of a vernal pool and the criteria for designating a subset of ecologically outstanding SVP's. The following definition was finally accepted by the State of Maine in April 2006, with new regulatory protections becoming affective on September 1, 2007:

> *A vernal pool, also referred to as a seasonal forest pool, is a natural, temporary to semi-permanent body of water occurring in a shallow depression that typically fills during the spring or fall and may dry during the summer. Vernal pools have no permanent inlet or outlet and no viable populations of predatory fish. A vernal pool may provide the primary breeding habitat for wood frogs* (Rana sylvatica)*, spotted salamanders* (Ambystoma maculatum)*, blue-spotted salamanders* (Ambystoma laterale)*, and fairy shrimp* (Eubranchipus spp.)*, as well as valuable habitat for other plants and wildlife, including several rare, threatened, and endangered species. A vernal pool intentionally created for the purposes of compensatory mitigation is included in this definition (Significant Wildlife Habitat Rules, Chapter 335 Section 9 under NRPA).*

SVP's were defined based on research results that described the range of egg mass numbers found in Maine vernal pools from a citizen-science program (VIP program discussed below). Ranges of egg mass numbers for each breeding amphibian were calculated, and the definition of SVP's was based on the intent of DEP that no more than half of the identified pools would potentially be regulated in the future (representing a political and biological compromise). Hence, significance was based on egg mass abundances to meet this criterion and the presence of state-listed threatened and endangered species.

Ancillary Outputs These were seen primarily in the numerous documents and citizen-science programs that were developed. Three representatives of the VPWG – Maine Audubon Society, MDIFW, and the University of Maine – designed and implemented projects to address the education, public outreach, and research gaps identified by the VPWG. Using the best available information on vernal pool ecology, including vernal pool manuals produced by other New England states, Maine Audubon Society produced *The Maine Citizen's Guide to Identifying and Documenting Vernal Pools* in 1999, with a second edition in 2003. Two more manuals, *Best Development Practices: Conserving Pool-Breeding Amphibians in*

Residential and Commercial Developments (Calhoun and Klemens 2002) and *Forestry Habitat Management Guidelines for Conserving Vernal Pool Wildlife* (Calhoun and deMaynadier 2004) were developed through a multi-year stakeholder process and published to promote voluntary protections – the first approach recommended by the VPWG. These documents targeted two practices likely to directly impact vernal pools and the adjacent terrestrial habitat: forestry and development. Dozens of workshops were given around the State to introduce the concepts developed in these voluntary guidelines to key stakeholders, including the industrial and small-woodlot forest communities and private landowners.

Maine Audubon Society developed a citizen volunteer program, the Very Important Pool (VIP) program, to inventory vernal pools statewide using the previously mentioned *The Maine Citizen's Guide to Identifying and Documenting Vernal Pools* as a training tool. This outreach program was initiated in 1999 and ran for 5 years to collect data on pool-breeding amphibians and their reproductive behavior in pools in Southern, Central, and Northern Maine (see Calhoun et al. 2003 for a summary). The goal of the VIP program was to raise the profile of vernal pools through statewide citizen participation, to engage the news media to help introduce vernal pool ecology and the importance of these small wetlands to the public, and to gather baseline inventory and assessment data on vernal pools in Maine that could help the VPWG understand the resource statewide and craft a definition of vernal pools and SVP's.

10.5.5 Environmental and Social Outcomes

While even a process without any agreement may be a success if participants have learned about the problem, about each other's interests, and about what may be possible (Innes and Booher 1999), an emphasis on both environmental and social outcomes requires looking beyond the process to assess the implementation of VPWG outputs. Several specific principal and ancillary outcomes can be identified as having emerged from the VPWG process:

Principal Outcomes First, deliberations surrounding the new legislation raised the visibility of vernal pools, creating increased interest in federal agencies, the State legislature, and the general public. Regulatory agencies (ACOE and DEP) requested training workshops for upper-level enforcement personnel on vernal pool identification and ecology. Personnel were requested to be enthusiastic when relaying information about vernal pool values and services to the public. Even though the regulation represents a political compromise (and hence not completely grounded in the best-available science), it has fostered discussions on vernal pool conservation at all political levels, most markedly, at the local level where science-based policies have greater potential to be implemented (Klemens 2000; Preisser et al. 2000).

While it may be difficult to precisely measure how the implementation of the new vernal pool rules affects habitat conditions and, by extension, populations of

pool-breeding amphibians, the VPWG has stimulated an interest in these ecosystems. Growing interest, knowledge, and concern for vernal pools continues to motivate academic research and to build new partnerships. As a result, support for graduate student research has continued at the University of Maine, and a new multidisciplinary team is currently designing a research program focused on the social, ecological, and economic aspects of vernal pools.

Second, as mentioned above, the VPWG directly or indirectly contributed to an evolving literature on vernal pools. In addition as a result of the VIP program, 120 trained citizen scientists collected amphibian breeding data on 97 'adopted' pools over 5 years. A description and the results of this initial study, as well as recommendations for advancing vernal pool conservation in New England, are described by Calhoun et al. (2003).

Third, relationships among stakeholders were strengthened. Perhaps one of the best illustrations of the benefits of personal, long-term relationships cultivated by the VPWG is the Significant Vernal Pool legislation drafted by the MDEP, MDIFW, Maine Audubon Society, the University of Maine and others. Agreement on the substance and wording of vernal pool and significant vernal pool definitions was not easy. The definition of vernal pools required compromises from both biologists and regulators, reflecting science tempered by political and practical exigencies. It had to incorporate language that was clear to lay people, supported previous legislative efforts, addressed stakeholder concerns, and practical for enforcement. For example, in the regulatory definition of vernal pool, anthropogenic breeding habitats (e.g., gravel pits, roadside ditches, and farm ponds) were excluded in the definition to avoid public concern that 'every mud puddle' would be regulated. Also, the wording (emphasis added) that a vernal pool '…*typically* fills during the spring or fall and *may* dry during the summer…' provided for a more flexible hydrologic regime. And lastly, vernal pools 'intentionally created for the purposes of compensatory mitigation' were added to the definition so as not to undermine past mitigation practices.

Clearly, the eventual adoption of these definitions would not have been possible without the significant stock of social capital (trust, relationships), intellectual capital (mutual understanding, agreed upon data), and political capital (ability to work together for agreed ends) created by the deliberative planning process. In the process, stakeholders had to appreciate varying views and learn to consider the potential impacts of the proposed legislation on interests other than their own. For example, scientists had to consider the increased burden of the proposed regulations on regulators (e.g., increased workforce), while regulators needed to appreciate the ecological implications of weakening the definition.

In the case of the VPWG, relationships among federal, state, local, and private interests were strengthened, and collaborations created during the process persist today. For example, relationships forged among the University of Maine and environmental consultants during the early stages of the VPWG process resulted in later collaborations such as the vernal pool town mapping projects that shared funds, technology, and expertise. Because of the strength of this partnering, the University gained access to mapping technology that would not otherwise have

been available. In investing in new technology, the consulting firm expanded their business, created productive relationships with the University and local towns, and improved the accuracy of potential vernal pool maps. Towns have begun directly contacting the consulting firm for help in custom designing projects to meet their town's needs.

Finally, the VPWG accomplished an incredible 'coup.' While most participants acknowledge that the new vernal pools rules fall short of adequately protecting vernal pool resources (in terms of species requirements), 10 years of deliberation resulted in the strongest vernal pool mechanisms in the country.

Ancillary Outcomes First, the process led to the adoption of Best Development Practices (BDP's) (Calhoun and Klemens 2002) and Forestry Habitat Management Guidelines (Calhoun and deMaynadier 2004) by key resource managers. The New England District of the ACOE issues State Programmatic General Permits (PGP's) that expedite review of minimal impact work in wetlands within each New England state. To date, the Vermont and New Hampshire PGP's use the standards set forth in Calhoun and Klemens (2002) for evaluating impacts to vernal pools. ACOE also expects to incorporate language from the BDP's into their permit review process. Similarly, the USFWS in New England uses the BDP's as a standard when reviewing impacts to ecologically significant vernal pools that may not be regulated by the State. The Forestry Habitat Management Guidelines were embraced by the Maine Forest Service and Bureau of Public Lands and by a number of private commercial forestry companies. These guidelines must be followed in order to receive 'green certification' from the Sustainable Forestry Initiative or the Forest Stewardship Council.

Second, initiatives for mapping vernal pools by towns were accelerated. Fourteen towns in Maine have or are in the process of doing town-wide mapping and assessment projects in collaboration with Maine Audubon Society and the University of Maine. One town is considering an ordinance that provides stricter regulations for vernal pools than the State model. Justifications for this are based on the Town's mission to base town natural resources policy on the best-available science. Research based on gaps identified by the VPWG provided this scientific foundation. In 2008 and 2009, Maine Audubon Society received grants to provide seed money for seven towns to use the most advanced technology to map and assess vernal pools in collaboration with the University of Maine and a private environmental consulting firm. SPO has also contributed funds to a University of Maine project to assess the economic cost of conservation on public lands using five of the 15 towns engaged in the vernal pool project.

Fourteen Maine towns are at some stage of completing vernal pool mapping projects. Many more 'potential vernal pools' have been mapped but assessments are limited by a typically less than 50% rate of permission for access by private landowners. However, the towns still retain a map of potential vernal pools in their databases to help in permit review and natural resource planning exercises.

Finally, public attitudes, values, and behavior related to vernal pools have changed. In the case of the VPWG, these changes were an outcome of the development of personal, hands-on experience with vernal pools by local citizens.

In evaluating vernal pool citizen-scientist programs, for example, Oscarson and Calhoun (2007) found that as a result of volunteering as citizen scientists, 40% of 30 survey respondents had become more active by attending conservation commission meetings, joining committees, and bringing more knowledge to commissions and land trusts. The majority of respondents indicated that they had increased awareness and concern for the impacts of development in their town. Ninety-four percent of the volunteers shared knowledge about the importance of conserving vernal pools with friends, family, and co-workers.

10.6 Lessons Learned

Collaboration represents a promising non-regulatory planning tool for managing transboundary natural resources in a way that links actions at the local level to landscape-scale conservation goals. But collaboration should not be considered a panacea. Caution should be used in accepting overly optimistic views of partnership accomplishments advocated in the academic literature and popular press. By using the performance evaluation framework presented here, both the theoretical principles (or assumptions) supporting collaboration as well as the critical concerns can be evaluated and the ways in which multi-stakeholder collaborative processes can work alongside traditional forms of environmental governance can be better understood.

While we focus on collaborative conservation of vernal pools primarily at the state level, this case study illuminates the barriers and opportunities of using a collaborative strategy for other natural resources such as a listed species or timber management at various spatial scales. In our case, the substance and process of the VPWG offers noteworthy lessons about the possibilities and limits of collaborative communication processes.

First, collaboration coordinates activities, promoting more efficient use of limited human and financial resources. The VPWG brought together the capabilities and expertise of multiple stakeholders (and their associations) that otherwise may not have been united to work on issues of common concern. As our example of a statewide, vernal pool conservation initiative suggests, collaboration can support the sharing of financial and technical resources, stretching already tight agency and municipal budgets. Collaboration among agencies, private companies, municipalities, and academia can produce a prolific amount of research to support conservation strategies, including the new legislation, and improve access by town planners to state-of-the-art technology.

Collaborative vernal pool conservation planning has had other effects as well. Because vernal pools are difficult to remotely identify and are ubiquitous across the landscape, agencies with regulatory authority over vernal pools simply cannot be aware of every vernal pool and every project potentially affecting them. Federal agencies and state agencies often regulate the entire state from one (ACOE) or three (DEP) regional field offices. The ACOE has a Maine Project Office in Manchester

and often weighs in on projects they consider important, yet a large area of the State is perhaps not regulated as thoroughly as it should be. Many pools go undetected and enforcement remains limited by personnel and financial constraints. In such areas, a municipal role will be critical. Mapping and assessment efforts at the town-level have the potential to proactively protect vernal pools that may have otherwise gone undetected by regulatory agencies. Thus, an important product of VPWG deliberation has been an increase in municipal awareness of vernal pools that has motivated a greater participation by local interests.

Second, collaboration is promoted by a shared sense of place or community, a focus on local problems and a common concern. While motivations (and willingness) varied, federal, state, local agencies, non-profit organizations, and consultants agreed to 'come to the table' to discuss their ideas and concerns regarding vernal pool protections. All participants were committed to using the best science available, and collaboration by VPWG members was motivated by a common concern: meet the State's mandate to protect vernal pools. Federal and state agencies participated to fulfill their mandate. MDIFW, for example, participated to ensure their input on policy decisions, as efforts of the VPWG would ultimately lead to guidelines for land-use regulation. SPO played a major role in shepherding the 1995 revisions to NRPA through the legislature, and they participated in the VPWG to develop a way forward and fulfill the legislative mandate to protect vernal pools.

Interests without legal requirements chose to participate for other reasons. Maine Audubon Society (2008), for example, participated to 'help put a little-known but all-important wildlife resource on the map,' and to protect essential breeding, feeding, and resting areas for a large number of species in the Maine, such as blue-spotted salamander, Blanding's turtle, and eastern ribbon snake (*Thamnophis s. sauritus*). Consultants participated to find answers to questions they were confronted with in the field.

Third, collaboration allows for the representation of individuals and groups affected by the decision-making process. One of the tenants of collaboration is that individuals come to the table with varying levels of knowledge, skills, levels of power, and resources. While at times a power differential was present between members, all received equal representation at the table. However, while individuals with diverse backgrounds were represented at the table, the VPWG was, in fact, homogeneous in terms of interest. All participants expressed an interest in finding a way forward to protecting vernal pools, albeit at a different pace. In terms of inclusiveness and representation, certain interests were underrepresented by the VPWG. Most obviously, landowners, realtors, and developers were not directly involved. Their absence may be a legitimate concern because the revised SVP rules could potentially alter development plans on private lands. Private interests fear that the new rules will 'increase the time, expense, and uncertainty of all types of development projects that impact significant vernal pool habitat – from residential subdivisions to shopping centers to landfill expansions,' place the burden of identification and delineation of SVP habitat on the developer (a task previously assigned to MDIFW), and delay many projects until spring when developers could conclusively determine what permits would be required (Pierce Atwood LLP 2006).

However, the absence of landowners 'at the table' may have been appropriate in this case. While the absence of the regulated community was notable, the VPWG process was not designed to include public involvement. Rather, it was largely at the level of deliberation where professional and technical representatives used the best available science to define vernal pools and identify 'significance' criteria that would pass political and public scrutiny. In many ways, the VPWG needed to determine what would pass the 'straight face test' before getting input from the public. The regulatory mandate rested with the state, and it was not viewed as an appropriate venue to have individual landowners at the table, yet any decisions made would have to be palatable to state legislatures and their constituents.

Eventually, the process did proceed through a formal public review process (e.g., agency rule-making), allowing for citizen input. Thus, the VPWG provides an excellent example of the way in which multi-stakeholder collaboration can complement traditional administrative procedures. In this case, collaboration served as a mechanism to ensure 'buy in' by VPWG members and stakeholders with diverse interests and backgrounds. Because the VPWG was able to come to consensus on the definition of vernal pools as well as the criteria to determine a SVP, they represented a united front as the proposed rule went before the Maine state legislature.

Fourth, intangible outcome such as building relationships, establishing trust, and sharing information are some of the most beneficial aspects of collaborative planning. Participants of the VPWG attribute successful outcomes to strong, personal relationships that developed during the process. Certainly, consensus on the language of the new vernal pool legislation and 'spin off partnerships' such as the vernal pool mapping and assessment project would not have been possible without the stock of social, political, and intellectual capital developed during deliberation. As a result of improved communication among stakeholders, vernal pools are now on the radar of regulatory agencies and the general public, more stringent regulations are in place, and towns are taking steps to identify and map their pools to allow for streamlined and proactive management. In addressing potential opportunities and barriers to collaborative planning, however, future empirical analysis must determine whether similar relationships develop between decision-makers and the public or whether decision-makers missed an opportunity to engage meaningfully with landowners and community members. Understanding how to secure landowner cooperation is particularly important because natural resource conservation increasingly depends on securing the cooperation of private-property owners in local communities (Peterson and Horton 1995; Peterson et al. 2002). By paying closer attention to the dynamics of stakeholder involvement and to issues of communication (e.g., Depoe et al. 2004), future research can assess how strategies used to engage landowners such as public workshops on the new Significant Wildlife Habitat rules, fact sheets from DEP, MDIFW, and Maine Audubon Society, and web-based resource materials (e.g., www. umaine. edu/vernalpools) affect information transfer, trust, and relationship building.

Fifth, diverse perspectives encourage a more broad-based understanding of the issues at stake, allowing for the design of more innovative solutions. The VPWG supports this conclusion. By supporting and disseminating ecological research and

Best Management Practices, the 10-year process encouraged social learning. Both the process and outputs of the collaborative effort improved stakeholders' understanding of vernal pool ecology and the challenges associated with conservation on private lands. The collaborative process created a feedback loop whereby knowledge gained through education and outreach programs influenced the ultimate vernal pool conservation strategy crafted by the VPWG. With regards to the design of innovative solutions, as of this writing a growing number of towns are involved with the vernal pool mapping and assessment project and citizen science program. Their involvement and commitment suggests that these communities are beginning to embrace alternative actions to protect natural resources, and particularly vernal pools on private property. Moreover, as more towns become engaged with the project, the original MDIFW goal of mapping and assessing pools can eventually be met through town initiatives founded upon town consensus. Conservation of pool-breeding amphibian habitat, like many conservation goals, is often most effective at the local level where neighbors, planners, and other concerned citizens play an active stewardship role (Klemens 2000; Preisser et al. 2000), and our example illustrated how local community engagement in collaborative processes can generate innovative solutions tailored to local conditions (Landy et al. 1999).

Sixth, it is clear that collaboration slows decision-making. Collaborative planning is oftentimes slow, difficult work, and the nearly 10-year process of the VPWG is no exception. For some participants, the collaborative process was painstakingly slow and frustrating with uncertain benefits. There are, however, plausible explanations to support the length of time required for a group such as VPWG to reach consensus: (1) the length of time required to design and implement natural resource management strategies is influenced by both the level of knowledge of the resource and by how controversial the regulation may be; (2) the possibility of more regulation on a seemingly ubiquitous and misunderstood resource was controversial; and (3) the many voices 'at the table' slowed decision-making, and interpersonal dynamics caused temporary stalemates.

Finally, one of the arguments against collaboration is that it results in the 'lowest common denominator solution' or the alternative supported by the most participants. The definition of vernal pools and the criteria for determining significance, although driven by science, were indeed a political compromise and did not completely reflect the best-available science. At the same time, however, VPWG members acknowledge that if the rule had been based on criteria better supported by science (e.g., minimum number of egg masses and width of buffer zones), more pools would have been captured, and the rules may not have passed muster with the state legislature and, as a consequence, vernal pools would have ended up with less regulation.

Collaborative planning is a slow, laborious process. It is often difficult, complicated, and challenging, and in general success requires time, patience, and perseverance (Diamant et al. 2003). Yet collaborative processes have the potential to achieve conservation goals associated with vernal pools and other ubiquitous natural resources at any number of spatial scales, from local to ecoregional. Thus, the challenges are well worth confronting.

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Author Queries

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Queries	Details Required	Author's Response
AU1	Please provide Author mail-ID	
AU2	The citation 'MSPO 2001' (original) has been changed to 'Maine State Planning Office, 2001'. Please check if appropriate.	
AU3	Please provide citation for Calhoun (2003).	
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