

Articles

The Multidimensionality of Trust: Applications in Collaborative Natural Resource Management

MARC J. STERN

Department of Forest Resources and Environmental Conservation,
Virginia Tech, Blacksburg, Virginia, USA, and Center for Leadership in
Global Sustainability, Arlington, Virginia, USA

KIMBERLY J. COLEMAN

Department of Forest Resources and Environmental Conservation,
Virginia Tech, Blacksburg, Virginia, USA

Despite the long-recognized importance of trust in the natural resources management literature, few have drawn upon the breadth of other disciplines' investigations of trust to inform their work. This article represents an effort to break down the concept of trust into its component parts in an attempt to reorganize trust theory in a robust and practical way for collaborative natural resource management. We describe four forms of trust relevant to collaborative (and other forms of) natural resource management: dispositional trust, rational trust, affinitive trust, and procedural trust. By delineating different forms of trust, their antecedents, and their potential consequences for collaborative natural resource management, we aim to provide a useful and consistent lexicon and framework for use by researchers and practitioners in the human dimensions of natural resource management.

Keywords collaborative natural resource management, organizations, planning, theory, trust

Trust has repeatedly been identified as an important element of multiple forms of natural resource management processes and outcomes (Beierle and Konisky 2000; Davenport et al. 2007; Siegrist et al. 2000; Smith et al. 2013). For example, in a study of national parks in the United States and Ecuador, trust in protected areas authorities proved to

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Address correspondence to Marc J. Stern, Department of Forest Resources and Environmental Conservation, Virginia Tech, 304 Cheatham Hall (0324), Blacksburg, VA 24061, USA. E-mail: mjsstern@vt.edu

be a key predictor of compliance with park regulations, with distrust predicting noncompliance (Stern 2008a). Trust held by community members for natural resource agencies has also been shown to increase public approval of management decisions and minimize resistance to planning efforts (Cvetkovich and Winter 2003; Lachapelle and McCool 2012; Vaske et al. 2007). Studies from multiple disciplines have identified trust as an important driver of collaboration, conflict resolution, and enhanced group performance in various contexts (Fulmer and Gelfand 2012; Ostrom 2003).

The concept of trust, however, has been operationalized in multiple, sometimes conflicting, ways throughout the natural resources literature. As Davenport and others (2007, 364) note, “No single perspective captures the complexities and subjectivity of trust in the context of natural resource management.” For example, Stern (2008b) distinguishes between social trust and rational trust, defining social trust as that based upon perceptions of shared values, identities, and experiences with a potential trustee, and rational trust as that based on evaluations of expected outcomes of a relationship. Meanwhile, others define social trust as a more general willingness to rely on those who have the responsibility for making decisions (Cvetkovich and Winter 2003; Siegrist et al. 2000; Vaske et al. 2007), regardless of how it comes about. Still others refer to trust as a singular concept without clear definition or explanation of its multiple potential dimensions (e.g., Beierle and Konisky 2000). Some statistical analyses by Vaske and others (2007) suggest that multiple dimensions of trust may be difficult to separate from one another and support a unidimensional interpretation, at least in the case of public trust for a government agency. The work of Lijebblad and others (2009) provides some additional support for this notion, although the authors clearly note a practical need for identifying separate dimensions of trust to effectively guide management approaches.¹

Thus, while the importance of trust as an essential ingredient for effective natural resource management, and especially for collaborative efforts, has been recognized for more than two decades in the natural resources field (Ostrom 1990; Pretty and Ward 2001), trust theory remains underexplored within this context when compared to other fields, including management (e.g., Fulmer and Gelfand 2012; Lewicki et al. 2006; Mayer et al. 1995; Möllering 2006; Schoorman et al. 2007), economics (e.g., Ostrom 1990); political science (e.g., Hardin 2002), sociology (e.g., Barber 1983; Coleman 1990; Cook 2001), and psychology (e.g., Braithwaite 1998; Tyler 1990). One exception is the work of Smith and others (2013), who divide the trust concept into dimensions of dispositional trust, trust in the federal government, shared values, and moral and technical competencies. Our conceptualization differs somewhat from (though does not necessarily conflict with) that of Smith and his colleagues to provide a more generalized framework for understanding trust in collaborative natural resource management contexts.

We draw upon multiple social science and business disciplines to break down the concept of trust into its component parts in an attempt to organize trust theory in a robust and practical way for collaborative natural resource management. By identifying different forms of trust, their antecedents, and their potential consequences for collaborative natural resource management, we hope to provide a useful and consistent lexicon and framework for use by researchers and practitioners in the human dimensions of natural resource management.

Defining Trust and the Components of Trust Theory

Trust can be conceptualized in multiple ways, but most definitions coalesce around the idea that trust is a psychological state in which one actor (the trustor) accepts some

form of vulnerability based upon positive expectations of the intentions or behavior of another (the trustee), despite inherent uncertainties in that expectation (Möllering 2006; Rousseau et al. 1998). Hardin (2002) describes trust as a tripartite relationship in which *entity a* trusts *entity b* to do *action c*. In other words, trust is context-specific and concerns a trustor (entity a), a trustee (entity b), and a potential action (action c). The trustor usually takes the form of an individual or group. In this article we focus upon individuals, though we consider the influences of the groups they represent. The trustee can take the form of an individual, a process, an object, an organization, or an institution.

Within the context of natural resource management, potential trustees can take on many identities. They can be organizations, such as a managing authority; individuals, such as a park superintendent, a planning official, or a representative of an environmental nonprofit organization; processes, such as a public involvement process associated with the National Environmental Policy Act (NEPA); or a set of rules, such as those developed to govern a collaborative planning group. In some cases, trust can be placed in an object, such as a report or map, which may serve as a catalyst to collaboration or other forms of trust (White et al. 2010). In each case, the trustor places faith in something to serve some predictable service or function.

Key components of trust theory therefore include characteristics of the trustor, the trustee, the interactions and relationships between them, the particular set of actions in question, and the context in which trust (or distrust) is developed. Characteristics of the trustor help to define their predispositions to be generally trusting or distrusting (Mayer et al. 1995, Schoorman et al. 2007). While some authors argue that these predispositions are relatively stable (Mayer et al. 1995), others highlight that dispositional trust may be largely context dependent (Fulmer and Gelfand 2012; Huff and Kelley 2003). Moreover, trustors will have different degrees of vulnerability and power in different situations, delineating different forms and degrees of risk in decision making. The salience of a particular issue for any trustor will also vary, either raising or lowering the bar for the development of trust depending on the importance of the potential outcome.

Different trustors may also have different degrees of tolerance for risk and uncertainty. As such, individuals may have different requirements for the amount of information needed to formulate trust or distrust. Similarly, different value sets held by different individuals influence the types of information most important to developing trust assessments. For example, trust can be based on strategic assessments of predictable outcomes and/or on sentimental relationships between individuals (Braithwaite 1998; Stern 2008b). Individuals may value each differently and thus have strong tendencies to build trust using different criteria. Personal histories play an important role in the development of not only the relative importance of different criteria, but also the general propensity to trust or distrust.

Characteristics of trustees are typically discussed in terms of three elements of trustworthiness, as perceived by trustors: ability, integrity, and benevolence (Mayer et al. 1995). Ability refers to the trustor's confidence in the trustee's capabilities to effectively carry out action c, resulting in the trustor's expected outcome. Integrity refers to the trustor's perception that the trustee consistently adheres to an acceptable set of principles. As such, integrity is based largely upon trustors' perceptions of trustees' value systems. These themes are similar to the Smith et al. (2013) concepts of technical and moral competency, drawn from Barber's (1983) earlier work. Benevolence refers to the trustor's perception that the trustee feels positively toward the trustor and will likely act upon that positive orientation. In other words, the

trustor believes that the trustee wants to “do good to the trustor” (Mayer et al. 1995, 718). An additional element may include charisma, as trust may often develop from less cognitive and more affective, or emotional, sources. Charismatic leaders and teachers, for example, often generate higher levels of trust in their followers (or students) than do otherwise competent people lacking this quality (Dirks and Ferrin 2002; Finn et al. 2009; Gillespie and Mann 2004). Each of these characteristics (ability, integrity, benevolence, and charisma) may have differential importance to different people in different situations.

Contextual factors may also dictate to some degree the relative importance of different types of trust assessments. Different environments or organizational contexts may influence dispositions, setting different baselines of trust. In other words, in different situations, one might start from a position of trust or distrust prior to engaging with another entity. For example, employees in a work environment that is generally empowering and encourages creative thought and risk taking may be more predisposed to trust others within that environment (Fulmer and Gelfand 2012).

Other particularly important context variables may be referred to as “control systems” (Mayer et al. 1995). Control systems generally reduce the importance of interpersonal trust in predicting behavior by setting official rules, contracts, or other monitoring mechanisms to coerce or otherwise influence particular behaviors. These mechanisms reduce risk in transactions and relationships, as long as all parties abide by the rules. While control systems may influence more trustworthy behaviors, those behaviors may be interpreted as responses to the controls rather than as signs of trustworthiness (Mayer et al. 1995). As such, control systems can have either positive or negative impacts upon the development of interpersonal trust (Schoorman et al. 2007).

In any context, trust assessments can be based on cognitive, affective, or subconscious psychological processes (Luhmann 1979). Cognitive processes involve explicit calculations and evaluations made about the potential benefits and risks of trusting. As such, they generally require some degree of specific information about the likely outcomes of action *c*. Affective processes involve more emotional judgments about the qualities of the trustee. In other cases, trust may be based on dispositions, heuristics, or taken-for-grantedness (Möllering 2006). For example, one might automatically, or subconsciously, trust a scientific expert to know what she is talking about without having to carefully consider the details of her argument, or an official map to be accurate without having to verify it on the ground.

The same classes of psychological processes can also form the bases of distrust, which is conceptually distinct from a mere lack of trust. While a lack of trust indicates the absence of a specific judgment about trust, distrust refers to a state in which the trustor (entity *a*) believes that the trustee (entity *b*) will perform an action that will actually be harmful to the trustor. Distrust implies an active misgiving of *entity b* on the part of *entity a*. We describe in the following section how the antecedents of distrust may fall within the same theoretical categories as the antecedents of trust. In any case, trust may exist on a continuum, ranging from complete distrust through a lack of trust toward complete trust.

In summary, trust and distrust are specific psychological states in which a trustor accepts or refuses to accept vulnerability to another’s actions (Hardin 2002; Larson 2004; Möllering 2006). These decisions, in theory, should result in particular behaviors taken by *entity a* (the trustor). We refer to these behaviors as “response *d*” to indicate what the trustor does as a result of their trust or distrust for *entity b* (see Figure 1). In the context of collaborative natural resource management, those

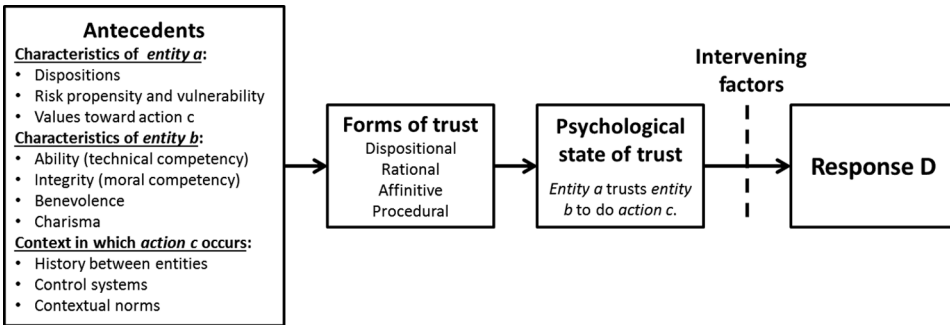


Figure 1. Basic framework illustrating key components of trust theory.

actions may include compliance with rules, honest participation in a collaborative process, acceptance of information, partnering or sharing of information, withdrawing from collaboration, or actively defending or opposing a collaborative group or other institution (Beierle and Konisky 2000; Margerum 2011; Stern 2008a, 2008b).

Figure 1 summarizes our basic conceptualization of trust and serves as a guide to our discussion. Our goal in this article is to identify useful categorizations of trust and distrust based primarily upon their antecedents and to discuss their implications for collaborative natural resource management. We focus upon antecedents to distinguish different forms of trust because they can operate at multiple scales and provide tangible levers for potentially manipulating trust outcomes. The next section focuses on defining these different forms of trust and describing their potential importance to collaborative natural resource management efforts. We conclude by discussing the challenges associated with predicting potential actions taken by trustors (or distrustors). We label these as intervening factors, which may inhibit the transformation of any form of trust or distrust from a psychological state into a manifested action.

Applying Trust Theory to Collaborative Natural Resource Management: The Antecedents of Trust

Effective ecosystem management often requires collaborations between multiple stakeholders across social, political, jurisdictional, and natural boundaries and spectra. Collaboration is credited with producing a variety of ecological and social benefits, including conflict resolution, better decision making, and improved chances that natural resource decisions will be implemented (Innes 1996; Wondolleck and Yaffee 2000). Trust serves as a vital lubricant to collaborative processes, supporting more effective group process and performance (Dirks 1999) and effective communications and negotiation (Fisher et al. 1991; Margerum 2011). Meanwhile, distrust can limit dialogue and meaningful negotiation (Pruitt and Carnevale 1993). Trust development in collaborative processes can be quite challenging, as interests, values, and problem definitions often conflict, power distributions are not often equitable, and different forms of risk and vulnerability are not shared equally (Balint et al. 2011; Margerum 2011). As such, the question of how different forms of trust (or distrust) may develop in these situations and their impacts upon process outcomes is an important one for advancing natural resource management.

Table 1. Definitions and antecedents of the four types of trust

Type	Definition/basis	Antecedents
Dispositional	The general tendency or predisposition of an individual to trust or distrust another entity in a particular context.	Can be based on innate tendencies, personal history, received cultural norms, and/or contextual cues from one's current environment.
Rational	Trust in an entity based primarily on a calculation of the perceived utility of the expected outcome of placing one's trust in another entity.	Evaluations of information about the prior performance of <i>entity b</i> and the subsequent predictability and assessment of likely outcomes.
Affinitive	Trust in an entity based primarily on the emotions and associated judgments resulting from either cognitive or subconscious assessments of the qualities of the potential trustee.	Cognitive or emotional assessment of the integrity and/or benevolence of the trustee, resulting from any of the following: <ul style="list-style-type: none"> • Assumptions of shared values or concerns. • Feelings of social connectedness. • Shared positive experiences. • Subconscious or emotional response to <i>charisma</i> or perceived shared identity.
Procedural	Trust in procedures or other systems that decrease vulnerability of the potential trustor, enabling action in the absence of other forms of trust.	Perceptions of legitimate, transparent, and/or binding procedures that enable confident predictions of the behaviors of others.

We identify four types of trust relevant to collaborative natural resource management: dispositional trust, rational trust, affinitive trust, and procedural trust (Table 1). We describe how each form of trust can be defined, examples of how it can come about, and implications for collaborative natural resource management.

Dispositional Trust

What we refer to as dispositional trust encapsulates multiple terms in the literature, including dispositional trust, general trust, received trust, routine trust, and propensity (Mayer et al. 1995; Möllering 2006; Siegrist et al. 2005; Smith et al. 2013). Dispositional trust can describe a general, context-independent predisposition to trust others (Mayer et al. 1995; Siegrist et al. 2005). Alternatively, it can be context or trustee specific, as in the tendency to trust someone with a particular title or other form of authority in a certain situation for no other reason than that person's position. Individuals may also have dispositional tendencies to trust in objects or institutions

that are perceived as having authority or legitimacy, for example, maps or government agencies. This form of trust is similar to Suchman's (1995) cognitive legitimacy or what Möllering (2006) terms "routine," reflecting a "taken-for-grantedness" of existing authority or expertise. Distrust might also be similarly taken for granted. For example, many researchers have noted a growing propensity for some U.S. citizens to distrust the government (Freudenberg 1993; Jennings 1998; Montinola 2004) or scientists (Gauchat 2012). Context may further influence dispositional trust by setting a general norm for individuals within an organizational or cultural context. For example, in an open and supportive organizational environment, individuals may be more prone to trust than in a competitive or more secretive environment (Fulmer and Gelfand 2012).

The relevance of dispositional trust to collaborative natural resource management is that it sets a baseline prior to forming any other type of cognitive or affective trust assessment. This baseline may be informed by the innate tendencies or prior experiences of participants or by the general tone set in an initiative's early going. Dispositional trust may be particularly important in large-scale efforts, because the number of actors can be too many for individuals to gather enough information about, or build relationships with, potential trustees (Sonderskov 2011). Planning and management efforts with high dispositional trust may typically reap the benefits of more open communications. Those with greater dispositional distrust are likely to face greater communications challenges throughout a process.

Smith and others (2013) note that individuals with highest degrees of dispositional trust may be the least likely to participate directly in natural resource management processes, as they may generally trust authorities to do the right thing and therefore see little need to get involved. As such, particularly high levels dispositional trust may not be the norm in many cases, setting a more difficult baseline from which to develop other forms of trust.

Rational Trust

Rational trust is based primarily upon expectations of reciprocity or perceived utility in strategic interaction (Coleman 1990; Hardin 2002; Möllering 2006). This economic perspective on trust is commonly based on predictability and past performance with relation to the costs and benefits of the action under consideration (Jennings 1998; Stern 2008b). Its development requires enough information for the trustor to make a calculative assessment of expected outcomes of the action. As such, rational trust is primarily cognitively based. Perceptions of the ability of the trustee are particularly important in rational assessments. Integrity may also come into play in terms of consistent past performance. Rational trust is built when *entity a* has enough information to evaluate the likely outcomes of trusting *entity b* to be personally beneficial. Similarly, rational distrust occurs when *entity a* has information about the likelihood of negative outcomes of trusting *entity b* (Larson 2004).

The presence of rational trust allows for the exchange of information and other social goods (e.g., favors, concessions) when individuals believe they will receive a benefit (Möllering 2006). Braithwaite (1998) explains that this form of trust is based on exchange norms. Norms describe socially defined standards of behavior. Individuals' general values tend to predispose them to certain sets of norms more so than others. Consequently, individuals' values influence how they assess trustworthiness. Exchange norms are linked to security values, which reflect the importance of protecting oneself

and one's community, commonly in terms of economic prosperity or safety (Braithwaite 1998). For individuals who have strong security values, the ability to predict a beneficial outcome makes rational trust and, subsequently, exchanges possible (Kramer and Tyler 1996). As such, individuals with security value orientations may rely more heavily on rational trust in their decision making than on other forms of trust.

Within collaborative natural resource management, rational trust stems from calculative expectations of personal benefits. As such, communications and actions that demonstrate how the benefits of participation outweigh the costs for participants may drive its development. The presence of rational trust may allow individuals with strong security values to participate in the exchange of ideas and cooperate with other actors. However, rational distrust may develop if expectations are not met or if the trustor acquires knowledge that shows the trustee to be incompetent, unpredictable, inconsistent, or reckless (Larson 2004).

Affinitive Trust

Affinitive trust assessments focus more strongly on the trustor's perceptions of the benevolence, integrity, and other social characteristics of the trustee and their interactions. Affinitive trust may come about through feelings of social connectedness, positive shared experiences, perceptions of shared identities, or assumptions of the similarity of salient values (Braithwaite 1998; Cvetkovich and Winter 2003; Stern 2008b).

The primary distinction between affinitive trust and rational trust is the focus on the qualities of the person, rather than a direct calculation of an expected outcome of the action in question. This is similar to what Blackburn (1998) described as trusting an entity to "act from a concern" that is shared by the trustor without clear consideration of the action itself. Affinitive trust can develop cognitively through an explicit evaluation of a potential trustee's character, affectively through the development of meaningful relationships, or subconsciously through an automatic response to the personality type or charisma of the potential trustee. In any case, an affinity is developed for the trustee. Affinitive trust is linked to what Braithwaite (1998) describes as communal norms and harmony values, which represent goals of peaceful coexistence and mutual respect. Individuals who place a high premium on harmony values may place higher value on affinitive forms of trust than individuals who base decisions more strongly on exchange norms and security values.

Affinitive forms of trust and distrust have been shown to be particularly powerful in natural resource management settings. Affinitive distrust is based on perceptions of incompatible values and experiences or other forms of general acrimony between two entities. Stern's research (2008a, 2008b, 2010) on the relationships between protected areas and the people that live around them suggests that this type of distrust may be the strongest driver of people's reactions to some forms of natural resource management initiatives, overpowering rational concerns. Research by Cvetkovich and Winter (2003) and Vaske et al. (2007) indicates that perceptions of similar salient values regarding issues such as threatened and endangered species or wildfire management can lead to greater trust in natural resource agency decision making and public approval of agency practices.

Reference group theory helps to explain the mechanisms through which affinitive trust may serve to bolster collaboration and why this form of trust has been identified as particularly important. People use reference groups (or individuals) to help develop their own values, attitudes, and appraisals regarding various situations (Merton 1968).

In other words, our values are developed through comparison to other people whom we feel are important for one reason or another. In collaborative environments, face-to-face interactions allow for the building of relationships between different stakeholders. As relationships and affinities develop, entities may begin to enter each other's relevant reference groups, creating shifts toward shared values or intentions. These shared values may contribute to shared problem definition, to mutual understandings of the interests of different stakeholders, to concern for other actors, and to the development of shared criteria for evaluating alternative courses of action. Each of these has been identified as a key ingredient to successful conflict resolution, particularly for wicked natural resource problems (Balint et al. 2011; Fisher et al. 1991; Weber and Khademian 2008).

Procedural Trust

Procedural trust is based on the interactions between positive control systems (Mayer et al. 1995; Schoorman et al. 2007) and other forms of trust. As such, it might more broadly be referred to as "systems-based trust." As noted earlier, control systems may have positive or negative impacts upon trust development. On one hand, they reduce risk by creating a basic safety net if the potential trustee is assumed to comply with the rules. On the other hand, otherwise trustworthy actions could be attributed to the control system, rather than the trustworthiness of the trustee. In either case, the presence of the control system reduces the need for other forms of trust. The case of a negative control system would be one that removes this need entirely, such that when the control system is removed, baseline trust may actually be lower than if the control system didn't exist in the first place. This may be the case in some coercive or competitive systems. This is somewhat different from procedural distrust, which may occur when a process or procedure is perceived to be unfair and/or illegitimate.

We posit that procedural trust develops when procedures (the control system in the case of collaborative natural resource management) are viewed as legitimate by all actors. In other words, all participants (entities a) trust the procedures (entity b) to be fair (Tyler 1990). In this case, the control system can be relied upon primarily to reduce risk and develop common purpose and identity, rather than to coerce specific behavior. The literature suggests that such legitimacy may emerge from multiple sources, including joint procedural development, transparency in decision making, power sharing, and the equitable distribution of benefits and risks (Gezelius 2002; Levi and Stoker 2000; Stern 2008b, 2010; Suchman 1995; Sunshine and Tyler 2003). Where procedures are jointly agreed upon as fair, participants can place greater faith in the compliance of others.

Responses

Prior research has identified multiple behaviors resulting from trust and distrust. These include compliance or noncompliance with regulations, protest, improved or damaged performance, attrition (dropping out), participation, sharing, filing lawsuits, and others (Dirks 1999; Ostrom 2003; Schoorman et al. 2007; Stern 2008a, 2008b). Depending upon the intensity, the form, the context, and the entity in which trust is placed, additional responses could include apathy or avoidance (Noteboom 2002; Ohno et al. 2010; Smith et al. 2013). For example, if an individual has total trust in an organization and its employees (e.g., the U.S. Forest Service and the local District Ranger), he or she may be less motivated to participate, unless he

or she would receive personal satisfaction from the engagement or had a general desire/curiosity to learn something from it. Smith and others (2013), for example, found that individuals with high levels of dispositional trust, perceptions of shared salient values, and trust in the moral competency of the managing agency were least likely to be involved in resource-related management actions.

If an individual trusts the organization but not the managers of the process, he or she may be more motivated to participate for the opportunity to safeguard his or her desired outcomes, ensuring that the managers don't overstep their authority. If an individual trusts the process manager but not the organization, the nature of participation again might manifest differently, resulting in avoidance of the process for fear of a lack of ability to influence the outcome, participation in protest, participation in some aspects of a process but not others, or other actions. If explicit distrust exists, the degree of salience might dictate different responses, including avoidance, participation in protest, or obstruction. The possible configurations are innumerable and depend not only upon trust assessments at different levels, but also upon salience and the degree of vulnerability and power felt by the trustor.

In addition to mismatches in trust assessments at different scales (interpersonal vs. organizational), different forms of trust may result in entirely different sets of responses. For example, affinitive trust might result in one set of responses, while rational trust might result in another. Stern (2010), for example, found that while rational trust assessments of local residents were strong predictors of overall attitudes toward neighboring national parks, affinitive trust assessments of park management entities were more powerfully predictive of active park support and opposition in the form of behaviors. Interactions between different forms of trust are not well known or studied, though some theorists believe there may be some predictable sequences. For example, Mayer et al. (1995) suggest that assessments of integrity may develop more quickly than assessments of benevolence. Others note that strong forms of trust can only develop over time if presumed similarities in values are repeatedly validated by actions (Kumar and Paddison 2000).

Behavioral responses to trust assessments may also vary as relationships develop over time. In one scenario, the establishment of consistent performance and repeated affirmation of rational trust can lead to the development of affinitive trust and deeper relationships. In another, some degree of affinitive trust may be a prerequisite for initial risk taking in the absence of information that would allow for predictable outcomes. Without this initial risk taking stemming from affinitive trust, no basis may exist for rational trust. As relationships grow, rational trust assessments may become easier as more information becomes available to the trustee.

To date, little research has taken place to differentiate the behavioral responses to different forms of trust assessments. As such, we don't know which forms of trust most commonly lead to which outcomes in different contexts. Interactions between different forms of trust and distrust are similarly understudied. Existing theory generally suggests, however, that each form may be important to successful collaborative natural resource management.

Intervening Variables

High degrees of any form of trust or distrust may not necessarily lead to any specific behavior. Trust rather describes a psychological state that indicates a general willingness to accept some degree of risk, while distrust indicates the opposite.

Acting upon that willingness is not an automatic response of the psychological state. Multiple variables may intervene to prevent *entity a* from enacting any responses.

In complex collaborative networks, trust relationships between entities do not exist independently from other relationships. Each actor may feel competing upward, inward, and outward accountabilities that challenge not only their abilities to balance trust-building actions, but also their decisions to act upon trust assessments. For example, a process leader who works for a government agency may feel accountable to her agency, her supervisor, her team, her project's goals, procedural compliance, and multiple other stakeholders, not to mention her own personal beliefs and norms regarding appropriate actions on the landscape and appropriate roles of the agency, the public, and science (Stern et al. 2010b). Any stakeholder external to the agency may experience similar tensions. For example, a representative of a nongovernmental conservation organization may develop strong interpersonal trust with an industry representative. However, she may not feel able to act upon that trust based on her accountability to the nonparticipating constituents she represents. In these cases, competing reference groups form a conundrum for the individual (Schindler et al. 2002). Representation also poses challenges with regard to mismatches of scale. If I trust the individual, but not the individual's organization, or vice versa, which takes precedence in my decisions about actions I will take?

Individuals can also find themselves in states of cognitive dissonance following the development of trust in a collaborative context. Cognitive dissonance describes the internal state in which either two held beliefs conflict with each other, or a belief conflicts with an intended action (Festinger 1957). A participant might develop strong social trust for another participant, but disagree on moral grounds about performing a certain action. As such, trust does not necessarily predicate agreed upon action. Rather, it may allow for reasoned discourse and mutual respect in negotiation around that action and its alternatives.

Many collaborative efforts involve government authorities or other large organizations. This poses challenges of power differentials. For example, in the United States, natural resource management agencies cannot legally delegate decision making to other entities. Even in the case of a Federal Advisory Committee, decision-making authority lies within the agency (Butler 2013). External stakeholder power, in contrast, lies in the ability to effectively communicate within the process, to appeal, to litigate, or to apply normative or political pressure (Stern et al. 2010b; Predmore et al. 2011). Accordingly, each entity has different types of vulnerability, depending on the particular stake that entity has in the collaboration. In international protected areas and integrated conservation and development projects, the forms of power granted to local people in decision making can vary tremendously (Baral and Stern 2011; Brechin et al. 2002). Vulnerable parties in some cases may have little choice but to act as if they trusted more powerful entities. In other cases, they may have far higher thresholds for developing trust if they feel they have more to lose.

Vulnerability also exists within the entities vested with the greatest power. Prior research shows that risk aversion can play a central role in agency decision-making in the U.S. Forest Service, for example, often limiting the capacity to focus on trust-building activities (Martin 2012; Mortimer et al. 2011; Siegrist et al. 2005; Stern and Mortimer 2009). Similar findings have surfaced in international conservation organizations (Stern 2010). These risks emerge from external and internal relationship challenges, the availability of resources for completing tasks, the skills and abilities of individuals and groups involved, and the relationships between each (Stern et al. 2013).

Collaborative processes entail varying degrees of power sharing and meaningful exchanges of information, not only between participating agencies and organizations, but also within them (Innes and Booher 2010; Powell 2010; Stern and Predmore 2012). Internal disagreements or conflicts within organizations pose additional challenges for acting on external trust assessments. Stern (2010) showed how internal strife can bleed out into the larger body of interested entities through inconsistent or misleading communication. Increased uncertainty caused by such communications hinders confidence in trust assessments, which can lead to antagonistic behavior (Möllering 2006; Stern 2010). Moreover, feared internal repercussions for external actions can inhibit behavior based on external trust (Stern et al. 2010b).

Formal control systems also play a powerful role in constraining the enactment of behavioral intentions based on trust. Bureaucratic procedures or other forms of rules and regulations (or even misperceptions of them) can preclude certain collaborative actions (Stern et al. 2010a). They can also coerce other behaviors that may compete with intentions based on trust. Institutional mechanisms and political intervention can similarly result in collaborative behavior without requiring trust between collaborators (Raymond 2006). This may again place collaborative efforts in jeopardy if these control systems change in the absence of trust between participants.

In other cases, the generation of trust might lead to a positive intention, but that intention might not be enacted based on personal doubts about one's own ability to carry out the action (Ajzen 1991). For example, a process leader might have been convinced by someone she trusts to hold a collaborative public meeting, but she might be afraid to do so because she is uncertain how to structure it effectively or how to deal with conflict that might emerge (e.g., see Hoover and Stern 2014). She might also be afraid of the impact botching the meeting might have on her trust relationship with the person or organization that convinced her of its importance.

In summary, while trusting relationships may often lead to behavioral intentions, multiple confounding factors may intervene before that intention is translated into action. Moreover, hypothesizing about individuals' specific responses to developing trust or distrust for any entity requires a wide array of context-specific information.

Conclusions

In this article, we have drawn upon literature spanning multiple social science and business disciplines to label and describe four forms of trust we feel are highly relevant to collaborative natural resource management efforts: dispositional trust, rational trust, affinitive trust, and procedural trust. Each form is defined primarily by unique antecedents whose opposites may also serve to predict distrust. Little is known about the particular processes or structures that may catalyze or constrain the development of each form of trust. Similarly, little is known about which forms lead to which actions under which conditions or about how the different forms of trust interact. How might one form of trust lead to another? Are there patterns in these sequences in different situations? For example, does trust in a boundary object, such as a model or map, lay the groundwork for developing other forms of trust? Does affinitive trust typically precede or follow rational trust? When one form of trust is lost, how may it be regained, and in what form? If both affinitive and rational trust are built, are relationships more resilient than if only one exists? Furthermore, does the existence of multiple different forms of trust buffer a system against outside disturbance? This might be a particularly important question, as turnover of staff or

stakeholders can remove interpersonal rational or affinitive trust from a system. Does the existence of strong procedural trust provide enough functional redundancy to bolster the collaborative group's resilience? Similarly, if procedures or other relevant systems change, can the presence of other forms of interpersonal trust do the same?

Given the diverse value sets of participants, it would be unwise for process managers to assume that focusing exclusively on the development of any one form of trust will be beneficial to collaborative efforts. Given typically low levels of dispositional trust in complex and wicked natural resource management problems (Smith et al. 2013), process managers might consider the importance of providing opportunities for reducing uncertainty between stakeholders (including themselves), thus enabling more confident assessments of each form of trust to emerge. Perhaps the most actionable form of trust for process managers is procedural trust. While no single process is likely to be appropriate in every situation, certain elements may contribute to participants' trust in procedures. These might include joint development of procedures, transparency in decision-making processes, responsiveness, and the equitable distribution of benefits and risks where possible (Gezelius 2002; Levi and Stoker 2000; Stern 2008b, Stern 2010; Suchman 1995; Sunshine & Tyler 2003). Such elements can contribute to creating a safe environment for other forms of trust to emerge.

We propose that those researching the human dimensions of natural resource planning and management consider breaking down the concept of trust into these (or similar) forms for future study. Understanding the forms of trust and distrust present in such contexts can provide deeper understanding of the particular challenges and potential solutions facing natural resource managers around the world. We don't believe that there exists a magical set of tools for building trust in any situation. However, examining the structures and practices of natural resource management processes that enable or constrain the development of valuable trust relationships can result in meaningful knowledge that may enhance future collaborative efforts.

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Note

1. We have extensively consulted the natural resources literature referring to trust. Due to space limitations, we summarize our assessment of the conceptualization of trust in this article. As such, we do not include citations to every article we reviewed, but only those necessary to illustrate the key points. Those interested in a more complete list of articles on trust or articles that operationalize trust empirically in natural resource contexts are encouraged to contact the lead author.

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