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Boundary spanning: Its role in trust development between stakeholders in integrated water resource management

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Boundary spanning: Its role in trust development between stakeholders in integrated water resource management

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ABSTRACT

This study sheds light on the importance of boundary spanners in developing the conditions that foster trust between stakeholders in integrated water resource management (IWRM). Boundary spanners routinely reach across organizational borders to build interconnections and interdependencies in order to manage complex problems, inform policy, and encourage knowledge sharing. The importance of the boundary spanning role has been shown in organizational business practices, urban planning, and higher education yet little research exists on its impact in IWRM. The mixed methods approach used in this study involved surveying and interviewing individuals with previous experience with IWRM in Nebraska. The results of the survey indicated that boundary spanning behavior predicted a large percentage of the variance in conditions that build trust between stakeholders. Further exploration revealed that boundary spanning, cooperation, power imbalance, and scale mismatch were predictors of trust building conditions. In addition, authentic leadership, autonomy, and trustworthiness were predictors of boundary spanners' ability to establish trust building conditions between stakeholders, with trustworthiness being the strongest predictor. The qualitative phase included interviews with thirteen individuals who participated in the online survey and scored high in boundary spanning behaviors. The interview analysis resulted in seven themes, which strongly support the promising role that boundary spanners play in fostering conditions that build trust between stakeholders within IWRM. This paper reflects on the importance of a boundary spanner within integrated water management, demonstrates the effectiveness of boundary spanning on the development of trust building conditions, and encourages more research on how to better identify and train boundary spanners to assist in the co-production of knowledge.

1. Introduction

Water resource management is transforming from a top-down, mono-disciplinary, and single sector approach into a multi-dimensional model opening the way for more stakeholder participation in planning and decision-making (Pahl-Wostl et al., 2011; Basco-Carrera et al., 2017). Integrated water resource management (IWRM) is a recent process that stresses the equitable, reliable, and sustainable approach to water management with the end goal of maintaining a resilient system. This inclusive approach encourages collaboration from a variety of stakeholders at multiple scales and works to reduce conflict, strengthen knowledge sharing, improve trust, and build cooperation.

Only through stakeholder trust and collaboration in the IWRM process and those involved can we establish long-term water resource policies that are resilient to environmental changes and human wants and needs (Gray et al., 2012; Nastran and Pirnat, 2012; Trimble and Berkes, 2013; Nastran, 2015). Involving stakeholders in the participatory process from the onset

establishes a platform from which to work and sets the tone for trust development and future positive engagement to address sustainability issues. This paper considers the potential impact of boundary spanners in developing the conditions that foster trust between stakeholders in IWRM. Boundary spanners are individuals within an organization who can reach across organizational borders to build relationships, interconnections, and interdependencies in order to manage complex problems (Williams, 2002). The role of a boundary spanner is to connect different actors and their interests in order to foster trust, thus improving the relationship between stakeholders allowing for better coordination between decision-making and implementation of policy (Bednarek et al., 2018; van Meerkerk and Edelenbos, 2018; Posner and Cvitanovic, 2019; van den Brink et al., 2019). The ability to work across disciplines and span other boundaries (e.g., cultural and geographical) offers advantages to both the boundary spanner and those with whom they work (Goodrich et al., 2020).

The literature on boundary spanning has evolved over the years and is only now being discussed as an essential part of natural resource

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management and policy development (Bednarek et al., 2018; Posner and Cvitanovic, 2019). Moreover, little is known about the characteristics of boundary spanners in IWRM, and how context influences their ability to function successfully. The purpose of this study was to examine the influence of boundary spanners on cultivating trust conditions between stakeholders to improve the stakeholder engagement process within IWRM. We posed the following research questions: 1) Do boundary spanners cultivate trust conditions between stakeholders within the IWRM process? 2) How do boundary spanners cultivate trust conditions between stakeholders within the IWRM process? Understanding how and why boundary spanners affect stakeholder participation is necessary in today's complex and multi-scalar water governance systems. Facilitators and project managers who can identify potential boundary spanners or encourage boundary spanning activity are more likely to see significant knowledge sharing, trust building, and stronger stakeholder relationships that can better withstand future challenges resulting in more effective collaborative efforts.

2. Literature review

2.1. Trust building

Mayer et al. (1995) define interpersonal trust as "a willingness to be vulnerable to the discretionary actions of another party" (p. 712), and it is recognized as a key component of success in any type of public engagement process or effective social system. Wondolleck and Yaffee (2000) describe interpersonal trust as the extent to which one believes others will follow through on their commitments, take others' welfare into account, and offer and return favors, which is essential for forming agreements across stakeholders whose interests may be in direct conflict. Klijn et al. (2010) found trust to stimulate learning by increasing knowledge sharing, improve the chance that stakeholders will invest their resources in cooperation, and promote innovation by lowering the uncertainty about opportunistic behavior within governance networks. However, when there exists prior conflict or antagonism among stakeholders, trust building becomes the most prominent aspect of the early participatory process (Ansell and Gash, 2008). Edelenbos and Klijn (2007) found that although trust is difficult to achieve, the benefits far outweigh the challenges. Trust is valued because it facilitates, solidifies, and enhances cooperation between stakeholders, and in the end, actors representing different values and perspectives are more willing to embrace collaboration and share knowledge, which provides stability when facing challenges.

A recent systematic review of the literature on collaboration in environmental management and governance by Feist et al. (2020) found trust building to be the most prominent individual quality that contributes to the collaborative process. Previous studies have shown that trust between stakeholders is "a prelude to building working relationships" (Berkes, 2009, p. 1694) leading to successful integrated natural resource governance (Davenport et al., 2007; Gilmour et al., 2011; Stern and Coleman, 2015; Turner et al., 2016; Young et al., 2016), whereas a lack of trust is "often the most fundamental barrier to the negotiation and construction of NRM [Natural Resource Management] plans" (Lachapelle and McCool, 2012, p. 322). The establishment of trust between participants has been shown to encourage knowledge sharing, movement toward a common goal, and better policy implementation (Ansell and Gash, 2008; Klijn et al., 2010; Newig et al., 2016; Fliervoet et al., 2017), and can be essential to collaborative governance (Bodin et al., 2006; Fliervoet et al., 2016). Moreover, prior studies have demonstrated that trust in environmental planning and management is key to establishing solid working relationships between stakeholders to achieve long-term environmental policies and solutions (Edelenbos and Klijn, 2007; Ansell and Gash, 2008; Gilmour et al., 2011).

The literature on trust clearly emphasizes that vulnerability, risk, and expectations are characteristics specific to trust development (Edelenbos and Klijn, 2007); stakeholders must be willing to take some risk for collaboration to occur. Risk-taking is key to developing relationships that are open to knowledge sharing, reciprocity, and trust building (Ansell and

Gash, 2008). As Pretty (2003, p. 1913) explains, "relations of trust lubricate cooperation, and so reduce transaction costs between people."

Interpersonal trust building between stakeholders in an integrated water management situation often involves a variety of individuals whose backgrounds, experiences, and perceptions about water management are uniquely their own. Research on trust building recognizes that multiple actors within the participatory process may be capable of taking on the role of relationship development; and because trust typically develops in informal network settings, boundary spanners can be important in establishing and stimulating these informal spaces (Davenport et al., 2007; Zhao and Anand, 2013; Edelenbos and Meerkerk, 2015; Stern and Coleman, 2015; Schotter et al., 2017). For trust to flourish, stakeholders must view the boundary spanner as someone with perceived independence, cultural perceptiveness, knowledge, and expertise in the areas of relevance, professionalism, competence, and credibility as well as reputation (Gilmour et al., 2011; Metcalf et al., 2015; Posner and Cvitanovic, 2019; Goodrich et al., 2020).

Trust between stakeholders in IWRM is imperative due to the uncertainty of resources, conflicting stakeholder interests and values, asymmetric power and risk, and the vagaries of human behavior (Balint et al., 2011; Margerum, 2011); it is the inability of natural resource managers to control these factors that makes it difficult to create a participatory process that is transparent, cooperative, and neutral. That said, several scholars have identified multiple dimensions of trust for use in the natural resources context (Leahy and Anderson, 2008; Stern, 2008; Smith et al., 2013; Stern and Coleman, 2015) with many of those forms of trust emerging at different points during the participatory process. Stern and Coleman (2015), for example, identify four types of trust based on different antecedents: dispositional, rational, affinitive, and procedural trust. Others caution that measurement issues associated with multi-dimensional conceptualizations of trust might support a unidimensional approach, particularly in the realm of public trust or governance networks (Vaske et al., 2007; Lijeblad et al., 2009). Beierle and Konisky (2000) argue that trust can be viewed as a singular concept without the complexities of multiple potential dimensions. Further research into multi-dimensional conceptualizations of trust and their effect on trust between stakeholders is needed. For the purposes of this study we consider interpersonal trust unidimensional.

Because good water governance and effective stakeholder engagement are tightly linked, it is critical that conditions conducive to trust building be explored. By recognizing those challenges inherent to trust building and being in a favorable position to act, boundary spanners have the opportunity to mediate the adverse impacts of scale mismatch, power imbalance, negative perception, and diversity.

2.2. Boundary spanners

Extant literature portrays the boundary spanner as one who serves as a connector between two or more stakeholders (Williams, 2002; Posner and Cvitanovic, 2019; Goodrich et al., 2020) and operates on the periphery of an organization positioning her/himself as both an internal and external communicator (Zhao and Anand, 2013). By acting as an interorganizational ambassador, boundary spanners have the opportunity to influence perceptions and improve knowledge while creating multiple pathways for stakeholders to learn about each other's values, experiences, and skills (van Meerkerk and Edelenbos, 2014; Alexander et al., 2016; Coleman and Stern, 2018a, 2018b). Furthermore, boundary spanners look for opportunities to link science with policy enhancing sustainability solutions (Bednarek et al., 2018; Goodrich et al., 2020). Bodin et al. (2006) referred to persons who provide bridging links between groups and communities, some otherwise not in direct contact with each other, as brokers and in this role are important to adaptive natural resource management by knowing who, when, and how to connect to others who have critical information.

A primary focus of a boundary spanner is building sustainable relationships. Because IWRM involves individuals from a variety of professional and organizational backgrounds, these collaborative encounters require

boundary spanners to not only recognize, but also manage these differences (Williams, 2002; Bednarek et al., 2018; Goodrich et al., 2020). The idea of using a boundary spanner to help bridge the gap between diverse stakeholder needs, policy demands, and complex scientific data has been referred to as "horizontal interactions" (Grygoruk and Rannow, 2017). Ensuring that stakeholders not only understand technical information but are also able to utilize it in the decision-making practice is vital. Highly scientific data that is distorted or overly complex can lead to disputes over expert knowledge and feelings of marginalization by participants, which may incapacitate the collaborative process (Muñoz-Erickson et al., 2010). Establishing sustainable and working relationships in complex networks takes on a variety of forms yet the primary goal is the same: cross borders, establish effective connections, facilitate good information exchange, and seek out shared meanings between stakeholders.

3. Contextual factors

3.1. Power imbalances

Boundary spanners encounter contextual factors which may negatively influence their effectiveness in IWRM. An imbalance of power may be such a contextual factor. Understanding power is central to collaborative water management (e.g., Brisbois and de Loë, 2016), and participation between the various actors is dependent on resolving these power relationships (Armitage et al., 2009). It is critical for boundary spanners to identify who has the power, who seems to be powerless, and notice how different stakeholders deal with this power (Thaler and Levin-Keitel, 2016). Alexander et al. (2016) found that people in governance networks involved with community-based conservation initiatives had to be cognizant of powerful or more influential stakeholders who attempted to control the types and sources of knowledge.

3.2. Scale mismatch

Scale is another factor that shapes the function and distribution of trust as well as its degree of implementation within the IWRM process. Developing trust across different geographic scales and levels of governance can be a challenge to boundary spanners. Identifying patterns and dimensions of a stakeholder group early is critical, especially when varying scales of governance are at play (Cheng and Daniels, 2005). Failure to recognize the existence of cross-scale and multi-level interactions may impinge on the capacity to develop trust between stakeholders (Cash et al., 2003; Cash et al., 2006). Previous research has found that large-scale projects often lead to less stakeholder participation, mistrust, and a top-down approach (Maynard, 2013), and that trust varies with scale - higher levels of trust in state (and local) agencies as opposed to federal agencies (Gray et al., 2012). Cash et al. (2006) suggest that knowledge is perceived differently at various levels or scales, which is a result of individual perceptions as to what is credible, valuable, and legitimate information, and whether or not it is important. This "plurality challenge" (Cash et al., 2006, p. 6) can be addressed by a boundary spanner since this individual can act as an intermediary between the different levels or scales, perceptions, and interests by assisting in the co-production of knowledge and cross-sectoral cooperation (Nel et al., 2015).

3.3. Conflict

Conflict may influence a boundary spanner's ability to develop trust in a variety of ways. Stakeholders who have experienced a history of conflict with another actor in the IWRM process are more likely to express low levels of trust presenting a challenge to boundary spanners. Tense and conflicted history between participants is likely to result in lack of commitment and participation as well as feelings of suspicion and distrust (Ansell and Gash, 2008). Moreover, failure to acknowledge conflict may lead to increased frustration among stakeholders, resulting in even lower degrees of trust between participants (Young et al., 2016).

3.4. Cooperation

The value of cooperation to resource management is well documented (e.g., Ostrom, 1990, 2010). Bressers and Lulofs (2010) argue that boundary spanning strategies in water resource management can create opportunities for cooperation. Too much cooperation and trust between participants, however, can lead to not only groupthink, which can stifle independent and innovative thinking (Edelenbos and Klijn, 2007), but also demotivate participation and reduce the development of new ideas and active debate (Smith et al., 2013). There is also the opportunity for high-trust relationships to result in closed networks, thus hampering cross-boundary interactions (Edelenbos and Meerkerk, 2015).

4. Antecedents to boundary spanning

Little research exists on the facilitating conditions or antecedents which impact boundary spanning behavior, and because boundary spanners deal with both interpersonal relationships and the external environment, understanding oneself is vital to successfully managing diverse stakeholders and various scales of governance (Cash et al., 2006; Schotter et al., 2017; van Meerkerk and Edelenbos, 2018). The following section demonstrates how three personal attributes (autonomy, authentic leadership, and trustworthiness) may influence a boundary spanner's ability to establish the conditions conducive to building trust between stakeholders in IWRM.

4.1. Autonomy

A boundary spanner's ability is greatly enhanced by strong ties to one's personal networks. Additionally, a boundary spanner who has strong connections and displays a sense of autonomy is more likely to have success when valuable information or integration of knowledge is necessary (Brion et al., 2012). Boundary spanners who demonstrate a degree of empowerment and personal legitimacy are not only more effective, but able to engage more constructively with stakeholders (Williams (2002) and replace their distrust with confidence and good faith (Perrone et al., 2003; van Meerkerk and Edelenbos, 2014; Thompson et al., 2016). That said, the ability of a boundary spanner to work independently within certain parameters is critical. Schotter et al. (2017) suggest that boundary spanners who are able to utilize their personal legitimacy during the participatory process are more likely to replace stakeholder distrust with confidence and good faith. However, boundary spanners must protect themselves from enmeshment with the recipient's desires as well as their home organization's overarching needs, thus striking a balance between remaining independent and a team player (Williams, 2002).

4.2. Authentic leadership

Previous studies have recognized the value of both leadership and trust in natural resource management, and research has demonstrated that it is not only what a person does, but how one conducts her/himself that influences stakeholder perceptions and cooperation (e.g., Bodin et al., 2006). An authentic leader establishes legitimacy through honest relationships with others and demonstrates high integrity. Furthermore, when leaders "…act upon their true values, beliefs, and strengths, while helping others to do the same…" follower behavior and performance may be positively impacted (Walumbwa et al., 2008, p. 91). It is critical that boundary spanners know where they stand on important issues and their values and beliefs associated with their views (Avolio and Gardner, 2005). This sense of self allows them to be consistent and express to others through words and action what they exemplify in terms of principles and ethics. Walumbwa et al. (2008, p. 94) define authentic leadership as "a pattern of leader behavior that draws upon and promotes both positive psychological capacities and a positive ethical climate, to foster greater self-awareness, an internalized moral perspective, balanced processing of information, and relational transparency on the part of leaders working with followers, fostering positive self-development." Authentic leadership has been found to be associated

with a number of positive outcomes including increasing organizational commitment, trust in leadership, work engagement, and job performance (Gardner et al., 2011). We acknowledge the literature and suggest that boundary spanners who are cognizant of their leadership capabilities may experience improved relationships with stakeholders, which in turn lead to more trusting relationships.

4.3. Trustworthiness

"Trustworthiness is a quality of the trustee (i.e., person being trusted), while trusting is something that the trustor (i.e., person doing the trusting) does" (Sharp et al., 2013, p. 1248). Recognizing that trust and trustworthiness are related, yet distinct constructs is vital to understanding the importance of trustworthiness in the participatory process. Building on previous research, both Mayer et al. (1995) and Hamm et al. (2016) mention particular characteristics of trustworthiness that suggest better success in trust development.

According to Mayer et al. (1995), three characteristics of a trustee appear to explain a major portion of one's level of trustworthiness: ability, benevolence, and integrity. Each one of these attributes contribute to the perception of trustworthiness; however, Mayer et al. (1995) recommend that trustworthiness should be looked at as a continuum with different attributes sometimes acting together and sometimes independently. Hamm et al. (2016) go a step further and propose five characteristics of trustworthiness: competence, care, confidence, procedural fairness, and shared values. Consequently, the ability of a boundary spanner to project a sense of fairness, neutrality, and leadership helps promote knowledge creation and exchange (Bednarek et al., 2018).

Trustworthiness, defined as those "perceptions of the qualities of a potential trustee that make them trustworthy" (Coleman and Stern, 2018a), can be as equally important in the development of trust between stakeholders. Despite the benefits of trustworthiness in the pursuit of trust development, little research exists on its impact or use as a precursor to trust building within IWRM. This study examines how one perceives their own level of trustworthiness in relationship to their boundary spanning ability.

5. Hypothesized model

As reviewed in the preceding sections, research into trust suggests that boundary spanners may play an important role in building trust conditions between stakeholders in IWRM. We hypothesize that boundary spanning behavior will be a significant predictor of conditions that foster trust building between stakeholders in IWRM (H_1). Further, we examine whether context, specifically power imbalance (H_2), scale mismatch (H_3), conflict (H_4), and cooperation (H_5) moderate a boundary spanner's ability to develop conditions that foster trust between stakeholders within IWRM. We also hypothesize that boundary spanner's perceptions of their autonomy (H_6), authentic leadership ability (H_7), and trustworthiness (H_8) will influence their boundary spanning behaviors during IWRM. The hypothesized conceptual model is shown in Fig. 1.

6. Materials and methods

A mixed methods explanatory sequential design (Creswell and Plano Clark, 2018) was used to examine the influence of boundary spanners on cultivating the conditions that foster trust between stakeholders to improve the stakeholder engagement process within an IWRM process. By using multiple methods to examine how individuals view a boundary spanner's influence on the conditions that build trust between stakeholders, we not only improve the accuracy of our results, but provide a more in-depth perspective of this dynamic.

For the quantitative phase of this study, 290 recruitment emails were sent to individuals who had previously participated in at least one integrated water management process in Nebraska. Participants represented a wide spectrum of those who played particularly important roles in integrated water management in Nebraska - Natural Resources Districts' general managers and board members, Nebraska Department of Environment and Energy and Department of Natural Resources project leaders, local farmers, irrigation district representatives, environmentalists, and others. This allowed us to understand boundary spanning behavior from the perspective of a diverse set of stakeholders.

6.1. Quantitative analysis

One hundred sixty-five ($n = 165$) out of 290 participants (56.9%) responded to the online survey. The mean age of participants was 51.5 with a range from 26 to 84 years. The majority of participants (89%) had at least a college education. Thirty-four participants were female (20.6%) and 131 were male (79.4%). Females scored higher in boundary spanning behavior and trust building. However, the difference was only significant for boundary spanning. An independent sample t-test revealed females (M = 5.09, SD = 0.46) scored significantly higher than males (M = 4.79, SD = 0.65; $t = 2.51$, $p = .01$) in boundary spanning behavior.

We used a statistical package for the social sciences (SPSS) to conduct the initial data analysis and test the hypothesized conceptual model (Fig. 1). All hypotheses testing utilized linear regression statistical analyses. In the linear regression, boundary spanning was used as a predictor of trust building conditions. Power imbalance, scale mismatch, conflict, and cooperation were moderators in linear regressions of the relationship between boundary spanning and trust building conditions. Furthermore, autonomy, authentic leadership, and trustworthiness were used as predictors of
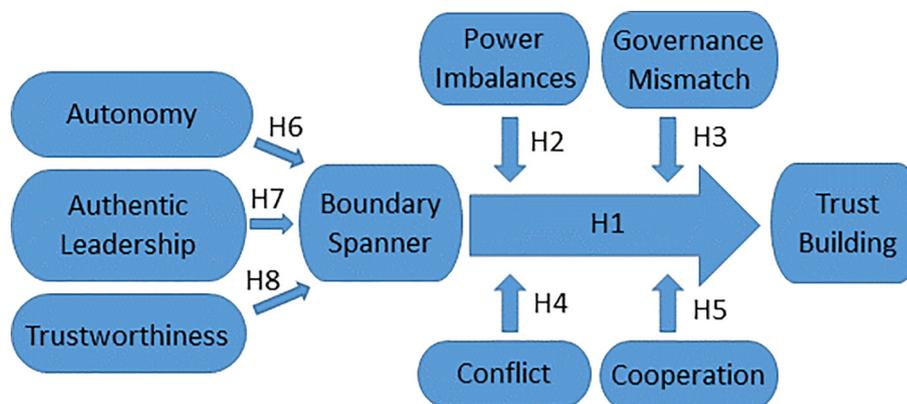

Fig. 1. Hypothesized model predicting boundary spanning behaviors and those conditions that foster trust building between stakeholders in integrated water resources management.

boundary spanning in linear regressions. Thus, boundary spanning was both a predictor variable and a dependent variable.

The questionnaire contained 38 questions and items covering nine different scales. All of these items were derived from previously validated instruments. Measures were selected based on past validity, reliability, and appropriateness of fit for variables in this study. Participants were asked to decide between the continuums of "Strongly Disagree" to "Strongly Agree" on a six-point Likert scale. Klijn et al.'s (2010) interpersonal trust scale was used to examine how participants foster the conditions to build trust between stakeholders. An example item is "I generally live up to the agreements I make when developing trust between others."

Items employed to measure boundary spanning behavior originate from a 2014 study by van Meerkerk and Edelenbos. An example item is "I am effective at reaching across organizational borders to build mutually beneficial relationships with those involved in water management."

Scale mismatch was adopted from items developed by Cash et al. (2006) and Daniell and Barreteau (2014) and was measured by agreement with the following items: "As the administrative scale of governance changes (i.e., local to state to federal), my ability to positively influence trust between stakeholders decreases." and "As the spatial scale of water management changes (i.e., sub-watershed to the entire watershed), it is harder for me to build trust between stakeholders."

The Survey of Influence Effectiveness (Bacon, 1994) was used to measure power imbalance. An example item is "If I have more access to information that other stakeholders need and value, it is harder for me to develop trust between stakeholders." Conflict was measured using the causes of conflict framework developed by Moore (2003) to measure the impact of interpersonal conflict on trust building. An example item is "If I have different interests from other stakeholders, it is harder for me to develop trust between stakeholders." The items used for cooperation were developed by Žižlavský and Estélyi (2013) and based on the conditions needed when entering into close cooperation with an inter-firm partner. An example item is "If the need for cooperation is high, it is easier for me to develop trust between stakeholders."

Autonomy was measured using the autonomy subscale of the Ryff Psychological Well-Being (PWB) scale (Abbott et al., 2006). An example item is "I am not afraid to voice my opinion even when I think it is in opposition to the opinions of most people." The Authentic Leadership Inventory (ALI) developed by Neider and Schriesheim (2011) was used to measure how a person evaluates oneself as a leader when participating in an IWRM process. An example item is "I show consistency between my beliefs and actions." Mayer et al.'s (1995) scale was used to measure one's perception of their trustworthiness. An example item is "I try hard to be fair when interacting with others."

6.2. Qualitative analysis

For the qualitative phase, thirteen individuals were selected based on the criteria of scoring more than one standard deviation above the mean on the boundary spanning behavior and trust building scales. Eight of the participants were male and five were female. The interviews were conducted in person ($n = 11$), over the phone ($n = 1$) and via Zoom video ($n = 1$) and lasted from 45 to 90 min.

Qualitative data was collected using a semi-structured interview protocol. Each interview was guided by the research questions, but remained unstructured enough to allow for flexibility in questioning (Creswell, 2013; Merriam and Tisdell, 2016). The open-ended questions encouraged participants to expand upon their boundary spanning behavior and provided the interviewer an opportunity to probe for more information when necessary in order to discover new perspectives and themes. Interviews were conducted until saturation was achieved; that point in which further coding was no longer feasible and lack of new content expressed was reached.

The qualitative phase of this research study was based on the foundations of grounded theory (Glaser and Strauss, 1967). The intent, however, was not to develop a new model, but to elaborate upon current boundary spanning theory, which supports the role of boundary spanners in such

sectors as organizational business, urban planning, and higher education, but neglects to clarify their influence in integrated water management. Recent studies have successfully utilized a modified grounded theory methodology without proposing a new model (Cutliffe, 2006; Tavory and Timmermans, 2009; Selvaraj and Fields, 2010).

All interviews were recorded and transcribed. During interviews, we observed and recorded participant reactions to interview questions. Interview transcripts were analyzed following an inductive coding approach allowing insights into the influence of boundary spanning behavior that fosters conditions to build trust between stakeholders in IWRM. This process involved organizing and reducing the data by a system of coding into meaningful chunks or categories (Merriam and Tisdell, 2016). Through multiple rounds of coding, concepts were developed through constant comparison, and then organizing statements or singular comments into groups of similar thoughts or ideas; followed by the development of individual themes. The most relevant concepts were integrated to develop a detailed synopsis of what was obtained in the interviews. Validity was confirmed through member checking after transcription and expert review of the coding process (Creswell, 2013).

7. Results

7.1. Quantitative results

Descriptive statistics and Pearson correlations provided the initial basis of analysis for the variables. Results are presented in Table 1. The measurement scales had satisfactory internal reliability with Cronbach's Alpha >0.70 (Nunnally and Bernstein, 1994). Cronbach's alpha is shown on the diagonal in Table 1. Reliability of scale mismatch was 0.65 using the Spearman-Brown statistic because it was composed of two items.

The results of a linear regression analysis indicated that boundary spanning significantly predicted trust building conditions ($b = 0.63$, $t(163) = 10.32$, $p < .001$) and explained 39.5% of the variance in trust building conditions ($F(1,163) = 106.59$, $p < .001$). Thus, hypothesis 1 was accepted. Power imbalance did not moderate the relationship between boundary spanning and trust building conditions ($b = 0.06$, $t(163) = 0.99$, $p > .05$). Thus, hypothesis 2 was rejected. Scale mismatch did not moderate the relationship between boundary spanning and trust building conditions ($b = -0.05$, $t(163) = -0.85$, $p > .05$). Thus, hypothesis 3 was rejected. Conflict did moderate the relationship between boundary spanning and trust building conditions ($b = -1.11$, $t(163) = -2.16$, $p < .05$). Thus, hypothesis 4 was accepted. Cooperation did not moderate the relationship between boundary spanning and trust building conditions ($b = -0.47$, $t(163) = -1.39$, $p > .05$). Thus, hypothesis 5 was rejected.

The results of linear regression analyses indicated that autonomy significantly predicted boundary spanning ($b = 0.49$, $t(163) = 7.13$, $p < .001$) and explained 23.8% of the variance in boundary spanning ($F(1,163) = 50.83$, $p < .001$). Thus, hypothesis 6 was accepted. Authentic leadership significantly predicted boundary spanning ($b = 0.67$, $t(163) = 11.37$, $p < .001$) and explained 44.2% of the variance in boundary spanning ($F(1,163) = 129.2$, $p < .001$). Thus, hypothesis 7 was accepted. Trustworthiness significantly predicted boundary spanning ($b = 0.72$, $t(163) = 13.24$, $p < .001$) and explained 51.8% of the variance in boundary spanning ($F(1,163) = 175.2$, $p < .001$). Thus, hypothesis 8 was accepted.

Based on the results of the linear regression analyses and little support for the moderating variables, a path analysis was conducted using Mplus 8.4 to explore the relationship between the variables. Model fit was assessed by the comparative fit index (CFI), the Tucker-Lewis index (TLI), the Standardized Root Mean Square Residual (SRMR), and the root mean squared error of approximation (RMSEA). Acceptable model fit is indicated by CFI and TLI values greater than 0.90 and 0.95, respectively, and SRMR values less than 0.08, and by RMSEA values smaller than 0.08 (Hu and Bentler, 1999; Kline, 2011). The overall model fit indices indicated a reasonably good fit to the data: CFI = 0.92; TLI = 0.83; SRMR = 0.05; RMSEA = 0.13.

Table 1
Descriptive statistics and correlation matrix for variables ($N = 165$).

	Variables	Mean	S.D.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1.	Trust building	4.75	0.57	(0.72)									
2.	Boundary spanning	4.86	0.62	0.63**	(0.70)								
3.	Scale of Govern.	3.79	1.02	0.07	−0.04	(0.65)							
4.	Power imbalance	2.78	0.84	−0.28**	−0.16*	0.42**	(0.77)						
5.	Conflict	3.36	0.88	−0.19*	−0.21**	0.42**	0.51**	(0.77)					
6.	Cooperation	4.57	0.73	0.41**	0.39**	0.09	0.01	0.14	(0.74)				
7.	Autonomy	4.76	0.68	0.36**	0.49**	0.08	−0.12	−0.17*	−0.21**	(0.73)			
8.	Authentic leadership	4.97	0.62	0.64**	0.67**	−0.05	−0.22**	−0.15	0.35**	0.51**	(0.72		
9.	Trustworthiness	5.06	0.57	0.66**	0.72**	0.03	−0.18*	−0.07	0.37**	0.47**	0.73**	(0.86)	
10.	Age	51.50	12.88	0.11	0.20*	0.14	0.14	−0.01	0.19*	0.25**	0.11	0.10	
11.	Gender	0.79	0.41	−0.20*	−0.19*	0.03	0.20*	0.14	−0.02	0.05	−0.14	−0.09	0.20*

Note. Reliability coefficient estimates (α) are in Parenthesis along diagonals. *$p < .05$; **$p < .01$. (Two-tailed tests). $N = 149$ for Age. $N = 162$ for Gender.
A Pearson correlation was not appropriate for testing the relationship between the continuous variables (e.g. Trust Building) and the categorical variable Education level.
Results of a one-way ANOVA with a Tukey post hoc test found no significant relationship between continuous variables and education level.
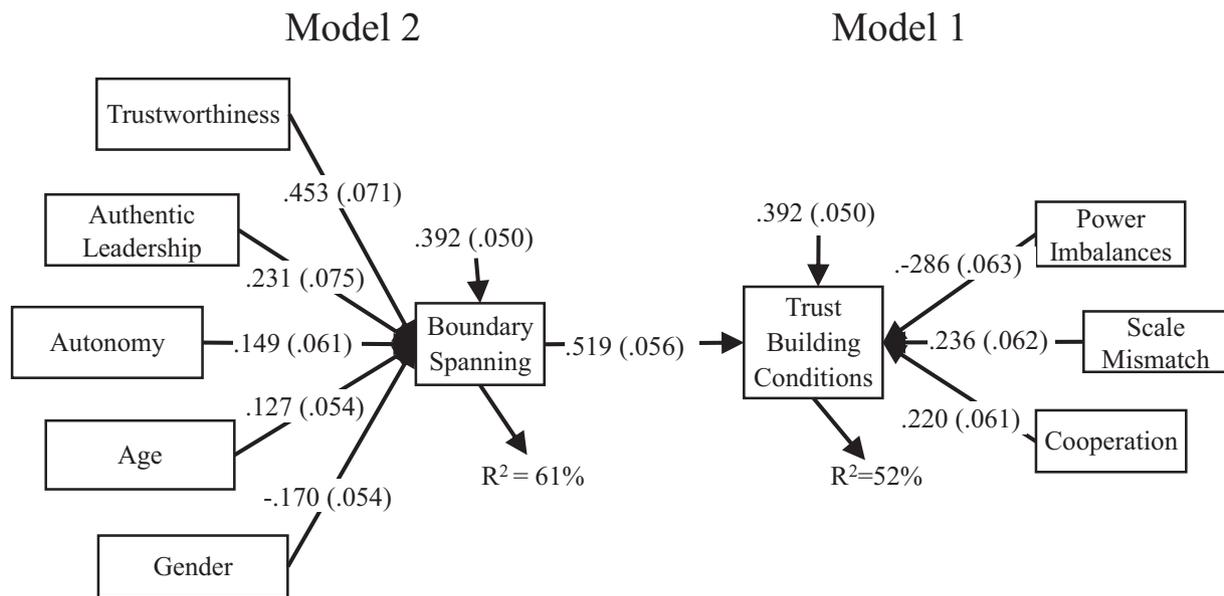

Fig. 2. Result of Path Analysis of variables explaining trust building conditions (Model 1) and boundary spanning (Model 2). ($p < .05$).

For the case in which trust building conditions was the dependent variable (Model 1), this model accounted for 52% of the variance in trust building conditions (see Fig. 2). Based on Cohen's (1988) guidelines, we can say that boundary spanning had a strong effect on trust building conditions ($\beta = 0.519$, SE 0.056, $p < .0001$). Scale mismatch ($\beta = 0.236$, SE 0.062, $p < .0001$), power imbalance ($\beta = -0.286$, SE 0.063, $p < .0001$), and cooperation ($\beta = 0.220$, SE 0.061, $p < .0001$) had a moderate effect on trust building conditions. Conflict, age, gender, and education had no significant effect on trust building conditions and were excluded from model 1.

For the case in which boundary spanning was the dependent variable (Model 2), this model accounted for 61% of the variance in trust building conditions (see Fig. 2). Trustworthiness had a strong effect on boundary spanning ($\beta = 0.453$, SE 0.071, $p < .0001$). Authentic leadership ($\beta = 0.231$, SE 0.075, $p < .01$), autonomy ($\beta = 0.149$, SE 0.061, $p < .05$), and gender ($\beta = -0.170$, SE 0.054, $p < .01$) had a moderate effect on boundary spanning. Age had a small effect on boundary spanning ($\beta = 0.127$, SE 0.054, $p < .05$). Education had no significant effect on boundary spanning and was excluded from model 2.

7.2. Qualitative results

The qualitative phase of this mixed methods study explored the essence of boundary spanning influence on the conditions that build trust between stakeholders. Rigorous coding of the thirteen transcribed interviews resulted in seven carefully derived themes and demonstrated the complexity of the engagement process. Moreover, each theme is important to understanding the role of boundary spanners in developing conditions that build trust between stakeholders and were represented frequently by participants during the interview process.

7.2.1. To lead or not to lead? That is the question

Study participants were aware of the need for leadership during the engagement process; however, knowing when to lead and to what degree varied according to the stakeholder group and type and size of project. Several subthemes emerged during the coding process, ranging from the idea of taking charge to leading by example. Identifying a central person to keep the process moving forward was also suggested as one approach to better stakeholder communication and relationship building. Such a person (i.e., boundary spanner) would have the opportunity to not only be a resource, but promote an environment conducive to open and constructive discussion free from repercussions. One interview participant shared a conversation with a stakeholder as an example: "You know, I really agree with things you're sayin'. I really am on your side, but I can't say that in this group because if I do, the guy that I sell my hay to won't buy it."

Participants also noted that an individual should demonstrate some degree of autonomy from her or his organization. Moreover, having some

independence from one's organization and being able to contain conflict increases an individual's capacity to build relationships and influence trust between stakeholders. One participant expressed this observation in particular: "When you know you're the voice, you have to be seen as not being in the pocket of anyone. And it also gives you the courage to speak up." Ultimately, the ability to come across as neutral benefits both the stakeholder group and the boundary spanner.

7.2.2. Finding structure out of chaos

The complexities inherent in integrated water management can lead to stakeholders feeling disengaged from the process. Interviewees acknowledged that providing some sort of procedural framework for engaging stakeholders enables them to more likely trust in the collaborative process and each other. Additionally, involving stakeholders in the development of a structured engagement process in which they set the ground rules has the potential to level the playing field especially when more powerful agencies are involved in the process. Setting ground rules early on provided participants with the opportunity to manage conflict in order to build stronger relationships that can lead to long-lasting trust. It also prohibited disgruntled stakeholders from dividing or alienating others, thus holding up the collaborative process and stalling forward momentum. This expectation was expressed well by a participant:

People had the foresight to deeply involve the stakeholders in how that was done and created. And that was, that really started off with the drafting of a charter document that hopefully represented a structure and a framework, and again, the values and the interests of the people that were gonna participate.

Namely, allowing stakeholders to participate in the development of ground rules provides an element of control that is often overlooked in the participatory process.

7.2.3. Are you talkin' to me?!

Interviewees consistently maintained that communicating a well-defined and factual message was essential to not only trust development between stakeholders, but to an overall successful collaborative process. Many of the participants stressed the importance of transparency and simplicity in one's communication to others. Attempting to engage stakeholders using technical or vague commentary is not only ineffectual but may encourage feelings of marginalization and discourage a two-way exchange of information. One individual summarized this theme particularly well: "You don't want it to be science-y and to the point where it's only acceptable by, let's say, a hydrogeologist or someone."

However, once stakeholders were receptive to an exchange of information, participants were able to assist others in identifying the real issue at hand; often a message is so convoluted that it must be broken down into smaller parts. It is only then, that stakeholders can begin to understand the wants and needs of others – a precursor to trust building.

7.2.4. Connecting the dots

In order for a message to be meaningful, stakeholders must not only understand what is being communicated, but be willing to acknowledge and act upon it. When study participants were questioned about the importance of establishing connections between stakeholders, their responses often centered on the importance of one-on-one conversations. Sharing one's message in a more directed and individualized way enables project managers the chance to clarify a message, contain potential conflict, or provide stakeholders a safe environment to share their perspective. Interviewees noticed that stakeholders who connected with others on a more personal level were more willing to take ownership of the issue and work toward common goals. This expectation was expressed well by a participant: "I don't have to tell 'em we're gonna go take that hill. They already said they wanted to take the hill. I'm just givin' 'em the suite of options they get to choose from to go take that hill." In the end, stakeholders with the right attitude and motivation can achieve innovative and durable outcomes.

7.2.5. Speak now or forever hold your peace

Trust can only thrive when individuals are included early on in the engagement process and given the opportunity to share their knowledge, values, and beliefs. Failure to engage stakeholders and recognize cultural differences sets the stage for mistrust and power struggles. In order to circumvent such situations, participants stressed the necessity of providing multiple settings and opportunities for stakeholders to meet, whether that be formally or informally. Participants noted these types of interactions, which often occur before or after sessions, can be viewed as a precursor to trust building. Using smaller groups not only provides a safe space for stakeholders to let their guard down, but increases opportunity for the exchange of local and traditional knowledge. Participants stressed that incorporating local and traditional knowledge into the planning process gives stakeholders a sense of ownership and strengthens the policy outcome. As one participant stated, "I believe in science; I do. But I think it has its own bias sometimes... If you are not on the ground, in the trenches so to speak, there's things you're gonna miss." The interviewee went on to describe how her relationship with other stakeholders improved once they learned about her past experiences. The recognition that she worked her way up in her field changed how other stakeholders accepted and respected her knowledge.

7.2.6. There is no 'truth', only perceptions

Stakeholder diversity within the collaborative process was viewed by interview participants as necessary and vital to sustainable and successful water resource management policy. Yet diversity can bring misunderstandings and conflict because of the variety of perceptions at play. With the help of a boundary spanner these challenges create opportunities for stakeholders to ask questions of each other, to share knowledge with others, and to explain their perspectives. With that being said, one negative experience with a particular individual or institution has the potential to adversely impact the entire collaborative process. This observation was expressed by one respondent:

It's not always possible but it's good to understand if there have been issues in the past, and to know what those issues were and how it transpired, and then you can use those, that knowledge to potentially work through it faster.

In other words, acknowledging and addressing pre-conceived notions or prior conflict between stakeholders allows the collaborative process to keep moving forward.

7.2.7. Conflict management 101

Interview participants as a whole acknowledged that conflict is inevitable during the engagement process, but proper attention to and management of conflict can result in positive outcomes. Boundary spanners who have the ability to address the emotion, negativity, and scale mismatch within the collaborative process can use this opportunity as a catalyst to spur on new ideas and pathways. Some participants went so far as to welcome conflict – "Embrace controversy. Embrace opposition." – and viewed it as an opportunity for growth.

While the group as a whole realized the benefits to conflict, they also understood that not all conflict can be managed or addressed successfully. Those collaborations involving multiple geographical and jurisdictional scales can result in stakeholders feeling marginalized or distrustful of the process. Boundary spanners must recognize that certain issues cannot be resolved and encourage stakeholders to move on so that current relationships remain strong. Interview participants realized that collaboration between diverse stakeholders is a balancing act between unique perspectives, different agency missions, and the water resource being managed. This notion was stated succinctly by one participant: "I think the mistake there is thinking that you're gonna fit the public in a process instead of making the process fit the public." The interviewee went on to share that by pulling in disparate stakeholders and points of view, you run the risk of conflict and tension. However, by acknowledging the contributions of other stakeholders you are often rewarded with a more motivated and cohesive group of individuals.

8. Discussion

The quantitative phase of the study tested hypotheses that were developed based on a review of literature on extant theories of trust building and boundary spanning. Results of the path analysis found that boundary spanning explained 52% of the overall variance in trust building conditions in Model 1. Power imbalance, scale mismatch, and cooperation had a moderate effect. These results suggest that the role of a boundary spanner is critical to developing trust building conditions between stakeholders. Furthermore, a boundary spanner should account for the direct effect of power imbalance, scale mismatch, and cooperation when fostering conditions that build trust between stakeholders. Additionally, results of Model 2 indicated that trustworthiness had a large effect on boundary spanning while authentic leadership, autonomy, age, and gender had a moderate effect.

These outcomes demonstrate the importance of having boundary spanners involved within the IWRM process, especially in those instances when the issue at hand is complex, contentious, and involves a variety of geographic, organizational, and jurisdictional boundaries. Although conflict was found to be insignificant and removed from Model 1, study participants confirmed that when conflict exists between stakeholders their boundary spanning behavior is less effective in fostering conditions that build trust. Furthermore, conflict is more likely experienced when stakeholders of diverse knowledge, backgrounds, and values as well as disparate agency missions are involved in the IWRM process. Boundary spanners must recognize and address conflict between stakeholders to be most effective in fostering conditions that build trust between stakeholders. They have the chance to embrace conflict and use it as a catalyst for better communication, thus opening the door to trust building. The role of the boundary spanner may be most valuable in certain IWRM circumstances - highly contentious, long-term projects with a history of conflict between diverse stakeholders.

In addition, our study determined power imbalance, scale mismatch, and a cooperative environment to be moderate predictors in the development of trust building conditions. Boundary spanners and others involved in IWRM must recognize power imbalance and scale mismatch and take appropriate measures, which may include the development of procedural frameworks or the creation of space to help identify individual values and needs in order to overcome these negative influences on trust building (Pirson and Malhotra, 2011). In contrast, a cooperative environment is supportive of trust building conditions between stakeholders; thus boundary spanners and others involved in IWRM must do all they can to develop such an environment. This type of "boundary management" (Cash et al., 2003) is achieved through two-way communication, mutual understanding, and active engagement.

While autonomy and authentic leadership were moderate predictors of boundary spanning behavior, being perceived as trustworthy was an important predictor of boundary spanning behavior. There must exist a certain level of acceptance and equity when engaging with stakeholders. This brings to light the importance in identifying those boundary spanners who have the necessary skills and traits to engage a diverse set of stakeholders in an IWRM process. The data also indicate that some factors are more influential than others are, showing that stakeholders may be more responsive to certain boundary spanning behaviors and attributes. Given the important role of a boundary spanner in an IWRM process, further research into the development of boundary spanner skills and behaviors is warranted. A definite lack of training and institutional support currently exists to better prepare individuals for the boundary spanning role (Safford et al., 2017; Goodrich et al., 2020).

8.1. Integration of quantitative and qualitative phases

Integrating the qualitative and quantitative approaches provides some useful and unique insights as well as discussion points for further study. The qualitative findings allow us to further explain and interpret how a boundary spanner can foster conditions that build trust between stakeholders. While power imbalance and scale mismatch had a moderate effect

on trust building conditions in the quantitative phase, participants interviewed did not consider power imbalance or scale mismatch serious concerns. The combined quantitative and qualitative data suggests the effect of power imbalance or scale mismatch may minimally affect the development of trust conditions; participants may accept these conditions as a reality of working in IWRM and not see them as limiting their ability to build trust between stakeholders. Those interviewed also did not view cooperation as a critical necessity, although they did suggest that the time spent building cooperation resulted in less education and time spent on conflict containment. Participants interviewed also relied on the creation of a framework or structure to minimize potential conflict.

The interviews with participants scoring high in boundary spanning and trust building behavior revealed that boundary spanners lead by example; they model how to represent their home organization while transcending organizational barriers in support of IWRM goals. They communicate well-defined and factual messages that demonstrate transparency, speak in language that stakeholders understand, and value one-on-one relationships beginning early in the IWRM process. Boundary spanners who demonstrate a minimal level of autonomy from their organizations, reveal commitment to the process and the stakeholders, and have a vision of how trust development may be integral to achieving IWRM goals. Such individuals may encourage the establishment of a structured engagement process in which stakeholders set the ground rules and allow stakeholders to feel ownership in the process. Moreover, boundary spanners who respect and appreciate the diversity of stakeholders' needs, knowledge, values, and beliefs as well as recognize disparate agency missions may contribute to better water management outcomes. Thus, both the quantitative and qualitative results provide evidence that trustworthiness, authentic leadership, and autonomy are critical characteristics of a boundary spanner.

We contend that boundary spanning behavior can play a vital role in IWRM by not only assisting in the development of trust, but promoting critical information flow between stakeholders and organizations. This includes increasing the efficiency by which scientific research is considered for decision-making. As boundary spanners create multiple pathways for information sharing, their efforts may increase the legitimacy of science or the degree to which science is accepted among a diverse set of stakeholders. Because IWRM frequently involves stakeholders who represent vastly different disciplines, it is critical that the collaborative process is transparent and perceived as legitimate. We believe that boundary spanning can help establish a culture that encourages trust and uses the best science available to inform both policy and practice.

These combined findings add to our understanding of trust building between stakeholders in IWRM. It is vital that natural resource managers recognize the significance of trust building during the engagement process and seek out an individual or individuals, who have the ability to build bridges and establish and strengthen stakeholder relationships.

9. Conclusion

Our results demonstrate how boundary spanners can aid in the creation of stronger and more resilient stakeholder relationships setting the foundation for better long-term and sustainable policy outcomes. Natural resource managers and, more importantly, facilitators involved in IWRM would greatly benefit from integrating boundary spanners into the collaborative process. Boundary spanners are as unique as the water resource being managed, and their individual traits and skills can positively influence the collaborative process by encouraging the development of trust between stakeholders. Results of this study confirm the need for boundary spanners who possess some autonomy from their home organization and value being viewed by stakeholders as trustworthy and objective. Facilitators, who are willing to set the stage for boundary spanning activities and allow time for boundary spanners to connect with participants, can create an environment ripe for improved stakeholder participation and, in turn, an improved likelihood of meeting IWRM goals. In addition, since boundary spanners are in direct contact with stakeholders during the IWRM process, their ability to not only notice, but minimize the negative influence of power imbalance

and scale mismatch and encourage cooperation cannot be underestimated. The creation of an environment that encourages honest and open communication can set the stage for stakeholders to not only share knowledge and inform policy, but be willing to recognize and acknowledge both cultural and personal differences.

Additionally, facilitators should feel comfortable calling upon more than one boundary spanner in certain situations; however, they must stay alert to those who identify too closely with stakeholders. Boundary spanners should strive to remain impartial yet simultaneously true to their home organizations and the IWRM process. The possibility of losing one's objectivity has the potential to negatively hurt the collaborative process.

It is crucial from the evidence that boundary spanning has a place in IWRM. Further research, however, is needed to better understand how to identify and incorporate boundary spanners into the engagement effort, whether in a formal or informal role. Supplementary work is also required to not only identify specific training needs and resources, but better methods of evaluating a boundary spanner's impact on the participatory process.

Interestingly, our study found females were significantly higher in boundary spanning behavior than their male counterparts. This finding suggests that more investigation is needed to explain what characteristics or attributes women possess that lend itself to enhanced boundary spanning behavior. It is unlikely that female participants were trained in the role of a boundary spanner or had more formal power than male colleagues. Therefore, it is reasonable to assume that their boundary spanning behaviors were driven by other factors such as educational level or certain personality traits. Marschan-Piekkari et al. (1999) and Vaara et al. (2005) suggest that individuals who are more linguistically skilled are often perceived as professionally more competent and having better access to information and resources. The identification of a gender discrepancy would certainly add value to the literature regarding the education, training, and identification of a boundary spanner.

Our study considered trust to be unidimensional, and unidimensional approaches have been used in other studies concerned with the role of social trust in governance networks (Winter et al., 1999; Siegrist et al., 2000; Vaske et al., 2007; Klijn et al., 2010). However, we acknowledge that looking at trust as a multi-dimensional construct in IWRM is worthy of future research. Because there exist multiple types of trust (for example, affinitive, dispositional, procedural, and rational), each type may be more strategically important at different stages within the participation process (Davenport et al., 2007; Coleman and Stern, 2018a; de Vries et al., 2019). For example, de Vries et al. (2019) investigated the multi-dimensionality of trust necessary for a collective approach to biodiversity conservation adoption in agriculture. The interpersonal and institutional trust held by farmers fluctuated depending on the design and management of a resource or policy. Their research suggests that influences such as "new experiences, altered expectations, and contextual changes" (p. 5) can make interpersonal trust highly dynamic, which in turn may impact a stakeholder's level of institutional trust. A study on forest management reaffirms the multi-dimensional character of trust within NRM and highlights the challenges associated with building institutional, interpersonal, and procedural trust (Davenport et al., 2007).

Acknowledging the complex nature of trust is vital to better understanding how to manage its 'many faces' within the collaborative process. Additionally, once trust is achieved it must be actively maintained, especially as the needs and expectations of stakeholders shift. Boundary spanners can play an important role as they have the opportunity to gain the trust of others when they are able to navigate outside the confines of their home organization. This enables a boundary spanner to encourage cross-domain and cross-disciplinary collaboration increasing the chance for social learning and an exchange of knowledge between stakeholders. Supplementary work along with these findings could advance the role which boundary spanners play in managing the different types of trust found in the collaborative process.

The consequences of having a boundary spanner actively involved in the collaborative process is potentially far reaching. While additional research is needed to explore the impact of boundary spanning, we can feel confident in their ability to build stronger, more resilient relationships. Furthermore, establishing a foundation of trust and respect between stakeholders does more than create an environment of goodwill. Stakeholders who can put aside animosities and misperceptions are less likely to feel marginalized and more willing to work toward a common goal. Boundary spanners not only look for opportunities to build consensus and repair damaged relationships but can also be alert to a collaborative process that fails to be dynamic and diverse in its approach.

While our work begins to shed light on the link between boundary spanning and the development of trust building conditions, more research is required to fully understand the capabilities and potential of a boundary spanner. The impacts associated with boundary spanning are vast, but without a community of practice or institutional support, boundary spanners may miss their opportunity to positively influence the engagement process.

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