

**Dissecting Collaboration in Environmental Management and Governance:
Examining Qualities, Outcomes, and Relationships**

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General Abstract

As a proposed strategy in addressing both limitations associated with conventional approaches to environmental management and governance, as well as challenges of wicked environmental problems, collaboration is a concept in which is highly examined yet unclearly assessed. The thesis aimed to explore collaboration in environmental domain to better understand this intricate process and how it works. Specifically, collaboration was explored terms of three elements: 1) the qualities which contribute to the process of collaboration (e.g. trust, social learning, shared understanding), 2) outcomes of collaborating, and 3) how qualities relate to outcomes (i.e. relationships). Two studies were conducted. The first study of this thesis involved conducting a systematic mapping review to unpack collaboration in environmental management and governance in the scholarly literature in terms of these three elements. The second study involved a multiple case study design to explore findings from this first study in empirical settings, in which three case studies of climate change adaptation collaboratives in New Brunswick were examined using a mixed methods approach. The overall findings from the studies are indicative of some similar elements examined in the literature and present in practice, as well as some discrepancies which should drive further examination into key elements of collaboration. The research contributes both conceptually and empirically to the scholarly literature by addressing gaps of understanding on collaboration in the environmental domain. It also contributes to collaboration in practice, to aid in determining how collaborative strategies can be understood to be more effective as an alternative approach to environmental management and governance.

Keywords: Collaboration, Environmental Management, Environmental Governance; Collaborative Qualities, Collaboration Outcomes, Collaborative Approach

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List of abbreviations

ACM	Adaptive Co-management
CCCVA	Community Climate Change Vulnerability Assessment
ECW	Eastern Charlotte Waterways
SCEP	St. Croix Estuary Project
TCCAC	Tantramar Climate Change Adaptation Collaborative

Chapter One: General Introduction

1.0 Introduction to collaboration

Limitations of conventional approaches to environmental management and governance are being realized. These approaches, characterized as command and control, assume problems are simple, clearly defined, and solvable with direct solutions (Holling & Meffe, 1996). Their effectiveness is limited when applied to environment-related situations, which are complex and unpredictable (Cradock-Henry et al., 2017; Chaffin et al., 2014; Benson et al., 2013a; Conley & Moote, 2003; Holling & Meffe, 1996) and sometimes identified as wicked problems. Wicked environmental problems are multifaceted and complex challenges in which solutions are difficult to identify due to incomplete knowledge and competing interests (Head et al., 2016; Game et al., 2014; Ludwig, 2001; Rittel & Webber, 1973). This class of problems draws attention to addressing multiple uncertainties in dynamic, complex human-environment systems (Baird et al., 2016; Patterson et al., 2013; Light et al., 2013). The contested, and often competing interests of humans involved, further bring to attention the need for alternative approaches to environmental management and governance (Head et al., 2016; Holling & Meffe, 1996).

In response, collaboration has been proposed as an alternative approach to navigate both limitations with conventional approaches to environmental management and governance, and challenges associated with wicked environmental problems (e.g., Cradock-Henry et al., 2017; Baird et al., 2016; van Tol Smit et al., 2015; Fliervoet et al., 2016; Sabatier et al., 2005). Collaboration is defined as “a process through which parties who see different aspects of a problem can constructively explore their differences and search for solutions that go beyond their limited vision of what is possible” (Gray, 1989, p. 5), and is described as occurring in relation to two opportunities: conflict resolution and advancing shared visions. Collaboration consists of an iterative process of shared responsibility, conflict resolution, and building common understanding between multiple, diverse actors (Lauber et al., 2011; Ansell & Gash, 2007; Selin & Chavez, 1995; Gray, 1989). It is argued to be a more effective approach because collaborative decisions have a higher likelihood of being implemented, as diverse stakeholders are able to negotiate and agree upon solutions (Ulibari, 2015; Emerson et al., 2012). There is also emphasis on inclusive participation and deliberation as part of the process, which can influence decision making in areas such as conservation (O’donnell & Stokowski, 2016). As an example, Lauber et

al. (2011) examined collaboration as an effective approach to improve the planning of environmental management activities to both operationalize and improve conservation action. Collaboration is also often described as a beneficial strategy to governance, public policy, management, and environmental issues broadly (van Tol Smit et al., 2015).

Collaboration is generally conceived as an important process in environmental decision making and is considered in terms of environmental (including natural resources) management and governance (Koontz & Newig, 2014; Plummer & Hashimoto, 2011; Ansell & Gash, 2007). Seminal work by Barbara Gray (1989) has shaped the field of study and focuses on collaboration as a method for addressing multiparty problems. In the environmental domain, it involves diverse stakeholders exploring a shared interest (Plummer & Fitzgibbon, 2004a). This occurs in a variety of different environmental and natural resource settings, such as freshwater, marine, or terrestrial resources (Koontz & Thomas, 2006). These settings include contexts such as various areas of watershed management and governance (e.g. Vinke-de-Kruijf et al., 2013; Browning-Aiken et al., 2004), agriculture (e.g. Fish et al., 2010), protected areas (e.g. de Koning et al., 2017), natural resource management (e.g. Davies & White, 2012), and climate change (Baird et al., 2016).

Collaboration is not the single solution to wicked environmental problems and conventional approaches (Bodin, 2017). Rather, it is considered a more holistic way to approach these problems versus the command and control methods (Head et al., 2016). Climate change provides an exemplary example of a wicked environmental problem in which collaborative strategies have been increasingly been adopted to develop solutions (Head et al., 2016; Kerret & Menahem, 2016). Collaboration among multiple actors has been identified as important for addressing the complexity of climate-related issues (e.g. Leck & Simon, 2013). Collaborative climate change adaptation strategies are growing in importance both in scholarship and practice as diverse actors need to collectively act on developing innovative tools and adaptation measures for dealing with the effects of climate change (Baird et al., 2014a). These strategies are also seen as a response which provides an opportunity for more robust outcomes, contingent on the willingness of a diverse set of actors to work together (Head, 2014). While acknowledging the many opportunities and cases in which collaboration can be used, this example of the context of climate change demonstrates its potential as a valuable strategy to work towards addressing

complex environmental problems. There is a need for better operationalizing solutions into action in environmental management and governance (Knight et al., 2006), and collaboration may aid with implementation (Ansell & Gash, 2007; Gray, 1989) of climate change adaptation strategies.

Collaboration has thus emerged with significance in the environmental domain. In particular, many collaborative approaches in this area of study spans both environmental management and governance. Environmental management often involves facilitation and implementation (e.g. Holling & Meffe, 1996), where environmental governance involves the steering of a process and organization of a strategy (Emerson et al., 2012). In instances of environmental management, collaboration is often incorporated into different decision-making approaches, seen with examples such as watershed management, collaborative conservation, community forestry, and community-based ecosystem management (Conley & Moote, 2003). Conley and Moote (2003, p.372) termed these “collaborative natural resource management efforts” to classify and evaluate these types of approaches to determine their effectiveness based on past scholarship. These examples also, however, collectively point to ways in which the term management merges with the term governance to incorporate all aspects of the decision-making process (Ansell & Gash, 2007). van Tol Smit et al. (2015, p. 425) applied the term collaborative environmental governance and its use of “collaborative processes for environmental problem solving in non-hierarchical settings, primarily at the local or regional scale”, explicitly identifying the use of the term in their study of water governance in New Brunswick, Canada. Ansell and Gash (2007) similarly argue that governance is a more effective term to use because it more broadly encompasses aspects such as process, planning, policy, and management, which are often used interchangeably with governance.

As a result of this variation in terms used by scholars, both environmental management and governance are relevant to consider when examining collaboration in the environmental domain. Scholars have acknowledged the often-indistinct boundaries between management and governance as overlapping terms and the importance of considering both. Lockwood (2010), for example, acknowledges a conceptual confusion between the two, proposing an evaluative framework in response for both in the context of protected areas. More recent scholarship incorporates both terms in order to capture both dimensions within case studies where

collaboration is being used (e.g. de Boer et al., 2016; Plummer et al., 2016). In recognizing this overlap between management and governance as well as their relevance in their use of collaboration in the environmental domain, the focus of this thesis is on collaboration in both environmental management and governance. Study One (Chapter Two) of this thesis examines scholarship spanning both of these terms, whereas Study Two (Chapter Three) purposively focuses on collaboration in environmental governance in the specific context climate change adaptation (see Baird et al., 2016; Baird et al., 2014a, b; and Leck & Simon, 2013 for examples of how this context has been explored in relation to environmental governance).

Collaboration is often an important and essential component of other, more specific environmental management and governance decision making approaches. Across the literature, collaboration represents a process (Plummer & Fitzgibbon, 2004a) with varied and often unclear terminology employed. Scholars have used terms which explicitly identify collaboration as apart of an approach (e.g. such as collaborative conservation, see Lauber et al., 2011 and Plummer & Hashimoto, 2011 for examples), and others are implicit about how it is a necessary component of a strategy or approach (e.g. adaptive management, see Dreiss et al., 2017 for example; or ecosystem-based management, see Brody, 2003 for example). Given this variation in terminology identified, a preliminary search of the environmental management and governance literature was conducted in order to capture scholarship which is implicit and explicit of the how collaboration is used (this search was “collaboration in environmental management AND governance” in Google Scholar). Findings from this initial search showed that four variations of terms were most frequently identified. These approaches were clear about incorporating collaboration as an essential component and most commonly used by scholars in the search: collaborative management, collaborative governance, collaborative/cooperative management (co-management), and adaptive co-management (ACM) (see Table 2.1 in Chapter Two for a summary of each). As a result of the initial search revealing these terms to be most relevant, they were the focus of this research. While it is recognized that much variation still occurs with terminology used in approaches that incorporate collaboration, selecting these four terms as the focus of this thesis is therefore a delimitation of this study.

As a result of its widespread use and uptake across several different decision-making approaches in management and governance, collaboration is often ambiguously and imprecisely

used as both a concept and in its applications. This ambiguity makes the concept difficult to study. Seen with the example of ACM, collaboration is a process which is intertwined with other components of approaches to environmental management or governance. For example, ACM focuses on collaboration and learning together (Plummer et al., 2017a), thus making it difficult to distinguish as a single concept. Collaboration is therefore challenging to distinguish as a central concept in the literature as a result of its incorporation within different strategies or approaches. Benson et al. (2013a, p. 1699) state that the “stretching out” of the concept over time has created this ambiguity. As a result, collaboration in the environmental domain is widely applied, yet broadly examined in nature due to differing terminology and focuses on specific strategies such as those mentioned previously.

There are key theoretical frameworks that have been developed on collaboration; however, many are typically developed for a specific collaborative strategy, approach, or context. Gray’s (1989) framework, for example, provides a foundation for the basic steps in any collaborative process. Selin and Chavez (1995) developed a more broadly defined model for collaborative environmental management using Gray’s (1989) framework as a guide, which included antecedents, problem solving, direction setting, structuring, and outcomes. Others have focused on evaluating the collaborative process and its outcomes using frameworks as applicable tools, such as Muñoz-Erickson et al.’s (2010) Holistic Ecosystem Health Indicator for evaluating a collaborative land management group, or Conley and Moote’s (2003) evaluative framework using process and outcome criteria for examining natural resource management in the United States. Theoretical models have been proposed to operationalize the concept of collaboration, such as Lauber et al.’s (2011) Collaborative Conservation model to assess United States Wildlife Action Plans, specifically focusing on learning and knowledge uses in the process of collaboration. These examples demonstrate the diverse ways in which collaboration has been conceptualized from broadly defined frameworks or models, to more specific, context focussed ones of collaborative processes and/or outcomes. The current state of the literature therefore shows much variation not just across strategies (and terminology) used, but also in frameworks applied using the concept.

Finally, few scholars have attempted to synthesize the inconsistencies of the collaboration literature by developing typologies or syntheses of all collaboration literature. Margerum (2008)

developed a typology based on the idea of institutional levels of collaboratives which included the operational, or action level, the organizational level, and the policy level. Kelman et al. (2018) identified key factors that influence effective collaborative environmental management for practitioners, focusing on both on structural and functional aspects of collaborating. Other scholars have also searched for “key ingredients” which influence successful collaboration (Schuett et al., 2001; Mattesich & Monsey, 1992), yet there still appears to be conceptual confusion regarding how collaboration occurs (Plummer et al., 2012). Finally, Ansell and Gash (2007) conducted a meta-analysis of collaborative environmental governance to determine the conditions in which collaborative governance works, developing an analytical framework to be used by both scholars and practitioners. They emphasized key contingencies of time, trust, and interdependence in their analysis (Ansell & Gash, 2007). Overall, a limited amount of scholarship thoroughly unpacks collaboration as a concept, and there is much more to be found on how the process and outcomes occur in environmental management and governance.

1.1 Synthesizing knowledge voids in the collaboration literature

Despite much emphasis on collaboration and its growth in associated scholarship, much more research is required with particular focus on how the process occurs (particularly the collaborative qualities which contribute to it- see void 1 below) and how it relates to outcomes. Three knowledge voids are evident and addressed in this research to improve understandings of collaboration in the environmental domain (in this thesis, this consists of environmental management and governance).

Void 1: Qualities that contribute to the process

There are often key qualities, or characteristics stated to be essential to the collaborative process in environmental management and governance (see Schuett et al., 2001 for example). Qualities (the term applied for these in this thesis) that contribute to the process of collaboration are one aspect of collaborative processes which can be explored. These qualities are defined as attributes, or characteristics, of stakeholder interaction in the process (see Table 1.0). Examples of these are the inclusion of diverse stakeholders; engagement in shared decision making; sharing knowledge; interaction through dialogue, acting, and reflecting; and, building shared understanding (e.g. van Tol Smit et al., 2015; Stern & Coleman, 2015; Ansell & Gash, 2007; Conley & Moote, 2003; Gray, 1989). There is a need for determining how these qualities which

contribute to the process of collaboration, lead to outcomes (Plummer et al., 2012).

Understanding how these qualities matter in different contexts for success needs to be examined in more detail (Emerson et al., 2012). Plummer (2009, online) draws evidence from a co-management model developed by Plummer and Fitzgibbon (2004b) which identifies inputs and outcomes of the collaboration, yet it "...offers relatively little guidance as to what actually occurs in the process." There is a stated lack of understanding of these qualities and how they produce outcomes in environmental management (Plummer, 2009). Accordingly, more focused research on understanding is needed on what the key collaborative qualities contribute to the process in order to demonstrate how collaboration works and is understood in both scholarship and practice. An important reason for understanding these qualities is demonstrated by Plummer and Fitzgibbon (2004b): In the context of co-management, they highlight collaboration as a "social process" and acknowledge the challenging nature of exploring this process (Plummer and Fitzgibbon, 2004b, p. 883). Thus, understanding collaborative qualities in the process can provide important insights into this social process. Subsequently, understanding how these influence and relate to outcomes (see Void 2) is also underreported (e.g., Blackstock et al., 2012; Plummer, 2009).

Void 2: Linking processes to outcomes

In addition to better understanding the qualities that contribute to the collaborative process, a better understanding of how these are linked, or related with outcomes is a second research gap (e.g. Craddock-Henry et al., 2017; Plummer et al., 2017a; Scott, 2015; Plummer et al., 2012; Bingham & O'leary, 2006; Koontz & Thomas, 2006; Schuett et al., 2001). Schuett et al. (2001, p. 591) recommends that "theoretically, further research should not only explore success during the collaborative process but also outcomes associated with it", bringing to attention the need for more a more extensive analysis of the relationship between process and outcomes. Outcomes have had limited attention in scholarship, and have also been suggested as ways to evaluate collaboration (Muñoz-Erickson et al., 2007; Koontz & Thomas, 2006). Scholars also bring to attention the difficulty in exploring outcomes (e.g. Koontz & Thomas, 2006). As a result, previous studies have not provided sufficient evidence on whether the process of collaboration (explored in this study through collaborative qualities that contribute to it) is more effective in implementing management strategies, and whether it is linked to improved outcomes

(Newig & Fritsch, 2009; Mandarano, 2008; Koontz & Thomas, 2006). Thomson et al. (2014, p. 115) stated that this lack of studies which test the process-outcome relationship have prevented theory-building on collaboration research by “identifying recurring similarities and differences in the pattern of results”. Similarly, Plummer and Armitage (2007) questioned whether ACM, which incorporates collaboration into an adaptive process, truly results in better management than alternative approaches. ACM is an example which has emerged as a highly relevant and frequently studied approach in scholarship, used to address environmental issues through incorporating both adaptive and collaborative management (e.g., Smedstad & Gosnell, 2013; Plummer, 2009). As a result, ACM scholarship highlights collaboration as a concept and often recognizes key areas in which it needs to be better understood. A significant challenge raised by Plummer et al.’s (2012, p. 15) systematic review of ACM highlights the difficulty in generalizing how specific process components relate to outcomes due to vague measurements and context specific situations:

Understanding of how outcomes are linked to goals and key features of ACM nonetheless remains hampered by the fact that many studies do not adequately clarify the goals of ACM under study, nor do they analyze the contribution of various key components of the ACM process to specific outcomes and their success or failure.

This area of research continues to create obscure and simplified assumptions in ACM research, as well as more broadly in terms of collaboration in environmental management and governance. Further exploring how the collaborative qualities that contribute to the process relate to outcomes in collaboration in the environmental domain is a gap identified by several scholars in addition to Plummer et al. (2012) (e.g. Scott, 2015; Young et al., 2013; Blackstock et al., 2012). As a result, linking collaborative qualities in the process to outcomes can better demonstrate how collaboration leads to different results and provides a means for addressing problems in the environmental domain.

Void 3: Empirical explorations

A third knowledge void is the lack of empirical research investigating the relationship between process and outcomes in collaborative environmental management strategies, thus providing little evidence on the overall effectiveness of the approach (Benson et al., 2013b; Plummer et al., 2012; Muñoz-Erickson et al., 2010; Mandarano, 2008). Several works highlight

this gap. For instance, Dandy et al. (2014) argue that existing empirical analyses are not substantive enough due to the lack of cross-comparisons across collaboration efforts. As a result, they highlight the importance of empirical investigations using multiple cases and their contributions to developing clearer theory (Dandy et al., 2014). Bidwell and Ryan (2006) also suggest case study research is needed to understand how the structure of collaborative water partnerships relate to outcomes across various contexts. Further support for comparative cases comes from Baird et al. (2014a) in the context of climate change adaptation. Baird et al. (2014a) conducted a social-ecological inventory to facilitate and engage actors to participate in climate change adaptation initiatives in Niagara, Canada, providing a local example of catalyzing collaborative strategies and encouraging participation amongst diverse actors. More recent work has emphasized the need for more empirical studies examining collaborative qualities and their relationship with outcomes. Particularly, Plummer et al. (2017b, online) examined collaboration in the context of ACM and stated that

Several works have synthesized principles and attributes that constitute a quality process in this context (e.g., Webler et al., 2001; Lockwood et al., 2010), with more recent works (Sandström et al., 2014; Birnbaum et al., 2015) emphasizing qualities associated with legitimacy (e.g., openness, deliberation, mutual respect, transparency). Many of these qualities transcend collaboration of different types, but specificity is required if empirical appraisals are to be meaningfully considered in relation to the aims and outcomes of the process (Conley & Moote 2003).

Plummer et al. (2017b) proposed a diagnostic approach for ACM to provide a means for linking process actions to outcomes noting this knowledge void. This approach provided a step towards gaining a clearer understanding of the ACM process itself. However, unravelling this further requires a closer look at collaboration as a process itself that is used in a variety of approaches, including ACM. While recent works have attempted to identify key components of successful collaboratives for practice (see Kelman et al., 2018; Cradock-Henry et al., 2017), there is still much evidence needed for examining collaboration in these settings. In addition to this, scholarship surrounding themes of how qualities occur in the collaborative process (such as through learning processes) is also present, and identifying such themes in relation to qualities

and outcomes in empirical contexts can contribute to further understanding the process of collaborating.

Overall, due to the unclear understandings of collaboration in environmental management and governance in both scholarship and practice, there is a pressing need for a better understanding of the paradigm shift to more collaborative management and governance from conventional approaches (Benson et al., 2013b). As a result, more attention is necessary in understanding collaboration in the environmental domain through how the process occurs (particularly through collaborative qualities in this thesis), what outcomes come about, how the qualities of the process are linked to outcomes, and providing empirical evidence of this to determine its overall effectiveness. This is important for scholarship in order to gain a clearer understanding of collaboration as a beneficial strategy used in environmental management and governance. Knight et al. (2006, p.414) states that “although people are the cause of conservation problems, they are also part of the solution”, emphasizing the importance of collaboration both in scholarship in the environmental domain, as well as in practical environmental settings. Addressing these three knowledge gaps can provide a basis for gaining new knowledge of collaboration in terms of both qualities that contribute to the process and outcomes that result from it. Exploring collaborative qualities that contribute to the process (void 1) and identifying those which are more studied or more critical (and whether these align) can allow for clearer insights into how collaboration is an effective proposed strategy. Exploring outcomes (and how these qualities relate to them- void 2) in this same manner can provide new understandings of all potential outcomes of collaborating. Finally, exploring these in empirical contexts (void 3) is important in order to distinguish and compare to previous scholarship in order to inform the focus of future research and how collaboration occurs in practice both to improve understandings and implement it as a strategy. Overall, addressing these voids can provide more sufficient evidence of collaboration as both a concept and a strategy (in scholarship and practice) used to address complex (or “wicked”) environmental problems, thus demonstrating why it is highly relevant to consider.

1.2 Study aim and objectives

There is a clear need to better understand how the process of collaboration influences outcomes in the environmental domain (e.g. Scott, 2015; Koontz & Thomas, 2006; Frame et al.,

2004; Schuett et al., 2001). In response, this research aims to unpack the process of collaboration (through the collaborative qualities that contribute to it) in environmental management and governance and examine how it relates to outcomes. Two objectives are associated with the aim of this research:

Objective One: To conceptually unpack the qualities that contribute to the process of collaboration from existing scholarship and establish connections to outcomes in the environmental domain (Chapter Two, Study One).

Objective One is oriented towards synthesizing the state of knowledge of how the process of collaboration relates to outcomes, through examining the qualities which contribute to the process of collaboration, outcomes of collaborating, and the qualities' relationships to outcomes. Classified in this thesis as "elements of interest", Table 1.0 identifies these three areas which are investigated in this study. Previous scholarship has indicated that qualities of shared decision making, diverse actors, relationships, deliberation, learning, and knowledge sharing are key collaborative qualities which should be examined more closely in collaboration research (e.g. Head et al., 2016; Muñoz-Erickson et al., 2010; Ansell & Gash, 2007; Schuett et al., 2001). However, there are several more which have been identified by scholars, and therefore this objective aims to synthesize all of the qualities which have been associated with collaboration in environmental management and governance. Outcomes (the term hereafter used in this thesis to refer to "results" of the process) are more specifically defined in this work as both tangible and intangible *results* which come about from the process of collaborating (Plummer et al., 2017a, b; Cundill & Fabricius, 2009). Effects are another type of outcome which are consequential to results (Plummer et al., 2017a, b), however are not included in the focus of this objective as it was outside the scope of the study and is therefore a delimitation.

Element of collaboration	Description
<i>Qualities</i>	Attributes of stakeholder interaction within the collaboration process.
<i>Outcomes</i>	Actions or impacts which influence the social-ecological system, that accrue from the collaborative process (Emerson et al., 2012). In this study the outcomes of interest are both tangible and intangible <i>results</i> which come about from the process of collaborating (Plummer et al., 2017a; Cundill & Fabricius, 2009).
<i>Relationships</i>	Qualities relating to outcomes.

Table 1.0: Summary of elements of interest being examined in relation to identified knowledge voids in collaboration scholarship within the environmental domain.

Aiming to better understand these collaborative qualities, outcomes of collaborating, and the manner in which qualities relate to outcomes, an inventory of scholarship on collaboration in environmental management and governance was systematically carried out. This was completed through a systematic mapping review, a literature search which surrounds questions based upon what research has been done on a specific topic, the types of settings which have been examined, and the methods used in an evidence base (Haddaway et al., 2016). This type of review was chosen over a traditional literature review because it follows more rigorous, transparent process similar to systematic reviews to search for evidence (James et al., 2016). Haddaway et al. (2016) argue that these types of reviews are appropriate for broad topics and provide a clearer depiction of the evidence base, where systematic reviews have a narrower, more focused question being sought. As seen with the concept of collaboration, it is a topic which ranges across several areas of scholarship, yet it is also complex in the single area of scholarship in the environmental domain. Haddaway et al. (2016) and James et al. (2016) discuss how systematic maps are increasingly being applied in environmental management contexts, thus demonstrating its usefulness for the aim of this research and its first objective. A more detailed outline of how this tool was used to meet Objective One is provided in Chapter Two.

Objective Two: To explore findings (qualities, outcomes, and relationships between these) from Objective One in empirical cases of multiparty collaboration in the environmental domain (Chapter Three, Study Two).

This objective is aimed at exploring the empirical relevance of the findings from Objective One in order to gain a better understanding of the importance of qualities that contribute to the collaborative process, as well as how these relate to outcomes in empirical settings. More specifically, this portion aimed to explore qualities, outcomes, and relationships found in the systematic map in terms of how they are important and how they are enacted in practical settings. Enactment was explored through inductive themes developed (hereafter referred to as “themes of enactment”), and are defined in this study as ways in which qualities, outcomes, and relationships occur, or are evident, in practice. To explore this, a case study research methodology was adopted. Case study research is defined as “an empirical inquiry that investigates a contemporary phenomenon in depth and within a real-life context (Yin, 2009, p. 18). A case study examines contextual conditions, and usually applies an inductive approach with qualitative methods (Bryman et al., 2009). Among different types, multiparty collaboration is the focus this study. A holistic, multiple case design after the work of Yin (1994) (see Figure 1.0 in section 1.3) was used. Yin (1994) argues that a multiple case study design is more beneficial to use because it can enhance generalizations, it is replicable, and the research findings can have more confidence due to the robustness and consistency of findings. According to Yin (1994), each case is designed to be examined individually, analyzed after data collection, the theory is revisited, and then the next case is conducted based upon new findings using a replication logic. This approach was adapted for the purpose of this study in order to examine the cases simultaneously, and then proceed to the analysis in relation to findings from both Objective One and Two. The logic for this adapted design is that the case studies were developed based on tightly defined criteria, and there was a prediction of similar results for each case due to this decision. A more detailed description of the process followed is provided in Chapter Three.

In addition to the benefits of examining empirical settings of collaboration, Objective Two also speaks to discussion surrounding context. Scholars (Zachrisson & Lindahl, 2013; Plummer & Hashimoto, 2011; Bingham & O’Leary, 2006) emphasize the importance of context in shaping collaborative strategies, stating that there is not one single solution to environmental problems. As the emphasis is on the exploration of the process and outcomes derived from previous scholarship, all contextual aspects were as similar as possible when selecting the three case studies for empirical analysis. Given this, three case studies of collaborative climate change adaptation were chosen in New Brunswick, Canada. The empirical investigation focuses on the

qualities, outcomes, and relationships identified in Objective One to determine congruence between findings from Objective One and Objective Two. More detail on the case studies and methodology is explained in Chapter Three. Using these findings from Objective Two and comparing them to findings from Objective One then provided a basis for discussion and analysis of collaboration in the environmental domain by bringing both the theoretical and empirical findings together in Chapter Four.

1.3 Organization of thesis

This chapter situated the proposed strategy of collaboration in the environmental domain consisting of environmental management and governance scholarship, with several examples identified in which collaboration can be applied, such as climate change. It identified three knowledge voids which will be addressed in the thesis, and the objectives of the overall investigation. Figure 1.0 provides a guide of the thesis structure, adapted from Yin's (1994) multiple case study design described in Objective Two. The first section of this diagram ("define and design") is captured in Chapter Two, which addresses Objective One (referred to as Study One). Objective One is to unpack the literature on collaboration in environmental management and governance to better understand the current state of the literature, specifically in terms of collaborative qualities, outcomes, and relationships. The next part of Figure 1.0 ("prepare, collect, and analyze") consists of Chapter Three, which addresses Objective Two of this thesis (referred to as Study Two). This chapter explores the findings from Chapter Two in an empirical setting of three case studies of collaboration involving climate change adaptation in New Brunswick, Canada. Finally, the last section seen in Figure 1.0 ("analyze and conclude") consists of Chapter Four. This chapter synthesizes the results from the two studies in a general discussion, bringing together findings from theory and practice to draw conclusions to better understand qualities of the process of collaboration in environmental management and governance and their relationship(s) to outcomes. Finally, the chapter presents overall conclusions. This includes the contributions of the research to both scholarship and practice, as well as recommendations for future study directions in order to continue to build a better knowledge base on how collaboration in the environmental domain occurs.

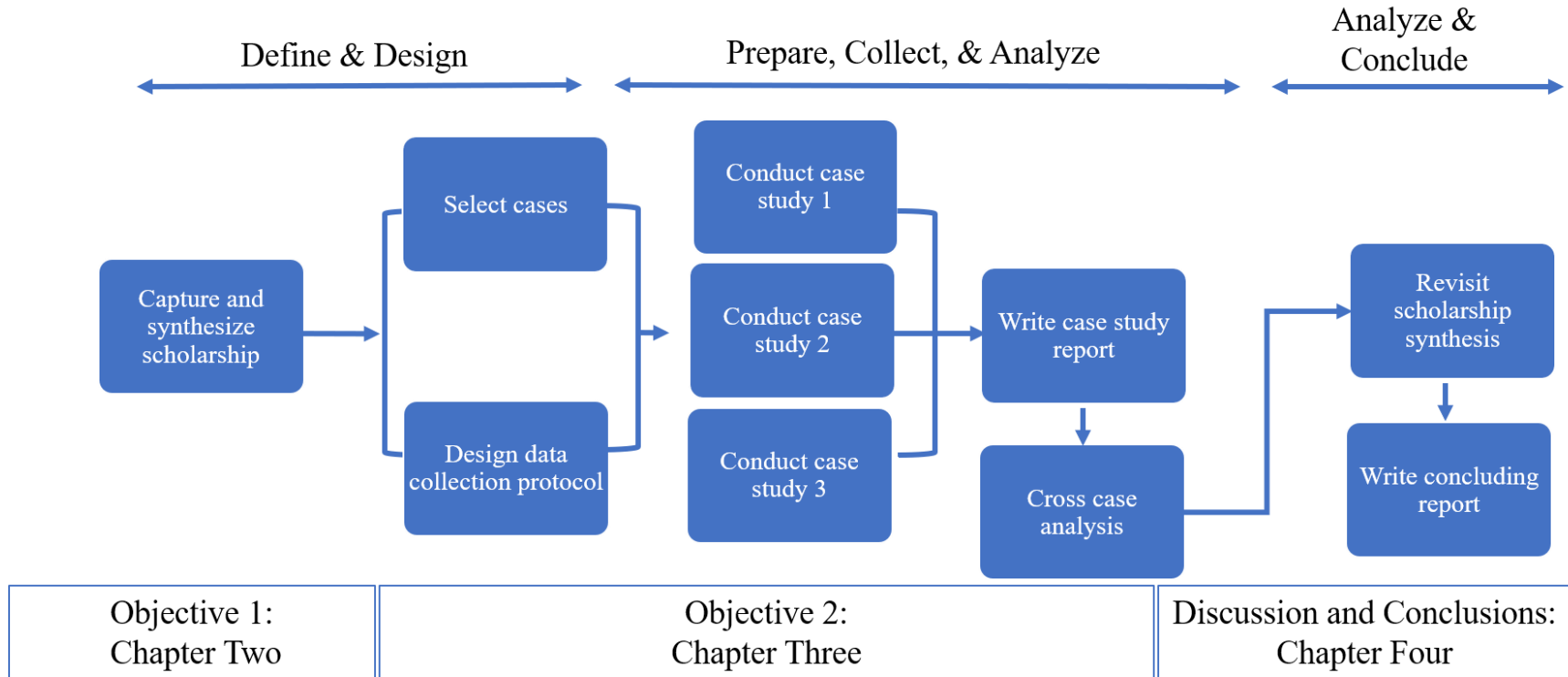


Figure 1.0: Summary of thesis structure adapted from Yin's (1994) case study design

1.4 References

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Chapter Two

Study One: A systematic mapping review on collaboration in environmental management and governance

2.0 Introduction

Collaboration is often regarded as an essential component to environmental management and governance strategies, in both theory and practice, for addressing complex environmental issues (Brisbois & de Loë, 2017; Ansell & Gash, 2007; Schuett et al., 2001). As compared to conventional approaches, it has been argued that collaboration results in a higher likelihood of implementation of solutions and enhances cooperation among diverse stakeholders (e.g. Scott, 2015; Light et al., 2013; Fish et al., 2010). Collaboration is thus seen many as an important strategy to explore with more depth (Head et al., 2016; Ansell & Gash, 2007; Bryan, 2004; Conley & Moote, 2003). Particularly it is seen as a response to limitations of conventional approaches such as ineffectively dealing with uncertainty (e.g., Armitage et al., 2009), along with the challenges of wicked environmental problems (e.g., Head et al., 2016).

Gray's (1989, p.5) seminal analysis of defines collaboration as—“a process through which parties who see different aspects of a problem can constructively explore their differences and search for solutions that go beyond their own limited vision of what is possible”. Since this influential analysis, the concept has garnered increased attention (Koontz & Thomas, 2006; Hibbard & Madsen, 2003) as well as has evolved in different ways (e.g., Benson et al., 2013; see Chapter One). However, due to its diverse applications and conceptualizations, barriers are present in theory building (Ansell & Gash, 2007). Particularly, collaboration scholarship in the environmental domain is often inconsistent and very vague in terms of interpretations of the concept and the ways in which it is analyzed (Benson et al., 2013). For example, collaboration between stakeholders has been classified in different types of ways, such as how decision making occurs, or how a group functions (Margerum, 2008; Bidwell & Ryan, 2006). With both it's evolution in scholarship and numerous applications (and terminologies) across different environmental contexts, a closer examination of collaboration in environmental management and governance is required to address these continued challenges and to synthesize components of it.

Several noteworthy studies attempt to better understand the complexity of collaboration. Some have addressed the need to identify key factors which influence effective collaboration (Cradock-Henry et al., 2017; Ansell & Gash, 2007; Schuett et al., 2001), whereas others have developed ways to characterize collaborative processes in different ways (see Margerum, 2008). Others have focused on confronting the limited evidence linking the collaborative process to its outcomes (Plummer et al., 2017a; Koontz & Thomas, 2006). Despite this proliferation of research examining collaboration, knowledge voids remain regarding a clear understanding of the process and outcomes and how they relate (e.g. Blackstock et al., 2012; Newig & Frisch, 2009; Koontz and Thomas, 2006). Particularly a better understanding what qualities contribute to the process of collaboration (see Void 1 in Chapter One) can aid in making connections of the process to the outcomes which come about (Cradock-Henry et al., 2017; Plummer et al., 2012; Plummer, 2009).

A recent study by Plummer et al. (2017a) provides empirical insight into the connections between process and outcomes of ACM, a collaborative strategy which has become especially noteworthy in its scholarship and practice. The collaborative process was explored through a set of collaborative qualities, and outcomes examined through results and effects. Although it was demonstrated that relationships are evident between the process and outcomes, there is still no account of all potential collaborative qualities which are seen in the process as well as their influence on specific outcomes in order to fully understand how the process occurs. Identifying and better understanding what collaborative qualities are present and contribute to the process, and how qualities are related to outcomes (Plummer et al., 2017b; Plummer, 2009; Mandarano, 2008; Schuett et al., 2001) are all areas of limited study. This research responds to these voids and aims to comprehensively unpack scholarship associated with the process of collaboration (specifically through the qualities which contribute to it) and establish connections to outcomes in environmental management and governance. The study specifically seeks to: a) identify both the collaborative qualities which are evident and contribute to the process and the outcomes (results) from it; and, b) reveal how these qualities relate to outcomes.

This study synthesizes current evidence and knowledge of collaboration in environmental management and governance processes through a systematic mapping review to better comprehend collaboration in the environmental domain. The systematic mapping methodology is

presented in the next section, which synthesizes the three identified elements of interest: collaborative qualities, outcomes, and relationships (between qualities and outcomes) (see Table 1.0 in Chapter One for descriptions of each of these). Following is a presentation of results drawn from scholarship on these elements of interest. The discussion then centers around key insights drawn from these results to consider what the current state of knowledge shows on collaboration in the environmental domain. Following are concluding remarks and how findings can be applied in future research and practice.

2.1 Methods

Systematic mapping reviews are evidence-based searches which aim to synthesize existing knowledge on a particular topic (James et al., 2016). Contrasting to a systematic review, systematic maps are more appropriate for broader topics and for evidence synthesis (James et al., 2016; Haddaway et al., 2016), aligned with the aims of this study. Systematic mapping reviews are increasingly popular methods used both researchers and practitioners in the environmental research field (Haddaway et al., 2016). A modified version of the proposed methodology of systematic mapping review in environmental management by James et al. (2016) was followed (see Figure 2.1). Stage One involved appropriately scoping the review. While acknowledging that the concept of collaboration spans multiple disciplines, the inquiry focuses exclusively on the environmental domain, consisting of environmental (including natural resources) management and governance scholarship. The time frame for each search was set from 1989-2017. Beginning with 1989 allowed for the consideration of all the published literature on collaboration since Gray's (1989) foundational book on the topic paved the way for emerging foci on this process in the environmental domain. The review queried "what does the evidence base of scholarly literature on collaboration in environmental management and governance show in terms of collaborative qualities, outcomes, and relationships with outcomes?"

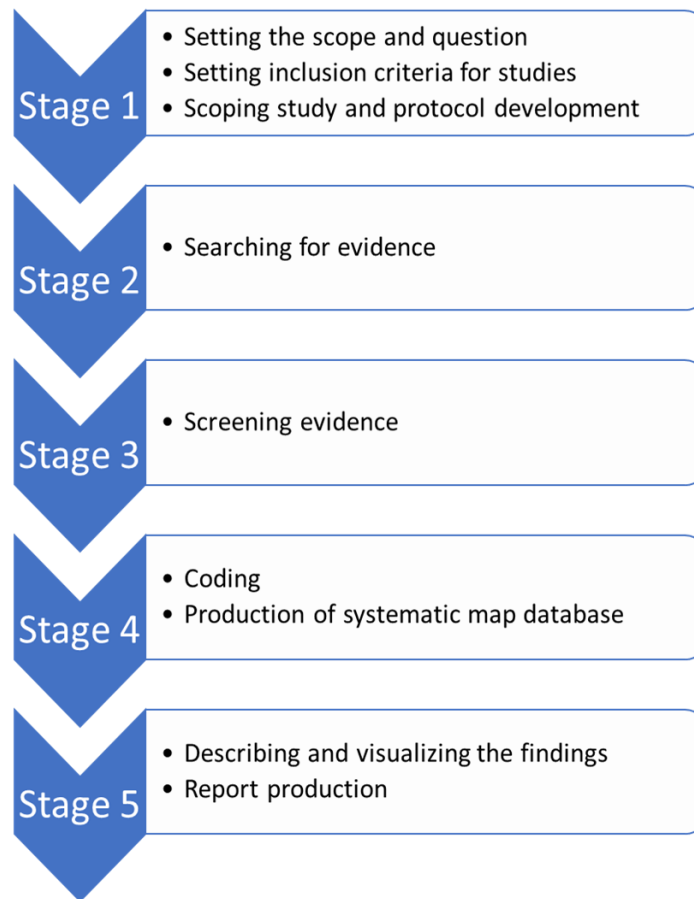


Figure 2.1: Modified version of James et al.'s (2016) systematic mapping methodology which was followed for this review.

After a preliminary review of the literature on collaborative approaches in management and governance in the environmental domain, four search terms more frequently used in scholarship were selected. These terms were adaptive co-management (ACM), co-management, collaborative environment and natural resource management, and collaborative environmental governance (see Table 2.1 summarizing these approaches; see also discussion of these in Chapter One). These approaches all incorporate collaboration as a necessary element and are collectively identified in this way (see Table 2.1). While it is recognized that various terminology is used when describing collaborative approaches (see Chapter One for discussion of this), these four terms were selected in order to scope the review based on their common use in scholarship and is therefore acknowledged as a delimitation to this study.

Management or governance approach	Definition	How collaboration is framed
Adaptive Co-management (ACM)	Adaptive management and co-management combined, involving heterogeneous actors and cross scale interactions (Plummer, 2009).	Diverse actors interacting in a process of shared decision making and authority, learning, and the capacity to change and adapt (Plummer & Hashimoto, 2011).
Collaborative or co-operative management (co-management)	Partnership in managing natural resources (Plummer & Fitzgibbon, 2004a).	Emphasis on power sharing between both state and local users; Collaboration used interchangeably with terms “partnership” and “co-management” (Plummer & Fitzgibbon, 2004a; Carlsson & Berkes, 2005).
Collaborative management	Government and non-government sectors jointly developing strategies (Kerret & Menahem, 2016).	Multi-party decision making processes, that build adaptive capacity, involve power sharing and shared decisions (Dandy et al., 2014; Conley & Moote, 2003).
Collaborative governance	Participation of both public and private actors in environmental decision-making processes (Ansell & Gash, 2007). *Sometimes involves multi-level governance (e.g. Newig et al., 2009).	Multiple actor engagement for shared motivations, joint action, mutual trust (Emerson et al., 2012).

Table 2.1: Summary of approaches in the environmental domain which incorporate collaboration as a necessary component.

The terms specifically inserted into the searches were: collabora* AND (“environmental management” OR “natural resource management”); collabora* AND environmental governance; collabora* AND co-management; and collabora* AND adaptive co-management. These terms were used to conduct searches of scholarly literature in two databases: Web of Science and Google Scholar. These databases chosen are reliable, extensive literature sources used in previous notable systematic reviews (e.g. Brisbois & de Loë, 2016; Plummer et al., 2012) conducted in environmental management and governance contexts, and were both accessible to the researcher. However, it is acknowledged that accessibility of certain articles and books, as

well as focus on searching for evidence of the elements in abstracts may have restricted some material to be included in the database.

The initial search process (see Stage Two in Figure 2.1) involved viewing search results until saturation was reached. This method was used in order to be able to capture the most appropriate articles on collaboration, continuing searches until there are no longer new or relevant references identified in relation to the search aim (Booth, 2001). Results were sorted by relevance in relation to the keywords applied to the searches in both Google Scholar and Web of Science. The initial screening of these results involved first identifying collaboration as the area of focus, and then specifically collaboration in environmental (or natural resources) management and/or governance in the abstract, introduction, or preface (depending on the source type). Other initial considerations included whether it was a scholarly source (i.e. journal article, book, book chapter), in English, and accessible to the researcher. Stage Three then involved a multi-step screening process to determine the article's further relevance in relation to collaboration in environmental management and/or governance, specifically in terms of the elements of interest (see Chapter One Table 1.0 for definitions of qualities, outcomes, and relationships used). Evidence of these elements of interest involved again reviewing the abstract, title, keywords, introduction, or preface (depending on the source type). If the relevance and mention of the elements of interest were not clear in these parts of the article, but it was implied that they may be discussed, the entire introduction was read to determine if the material would be useful and relevant (i.e. consideration was given to the purpose and objectives of study). If only one element was mentioned, an informed decision was made regarding the usefulness of the source in relation to the research aim. At each of these stages, the number of articles included and excluded was recorded. After the final screening and removing or sorting duplicates under the correct category, the final number of papers was 85, which was the final dataset used for the coding process.

Stage Four involved an iterative process of developing an evidence database using NVivo 11 Pro coding software (QSR International), using both axial and selective coding. Axial coding was used to categorize specific qualities and outcomes, used to determine which codes may be more prominent than others (Saldaña, 2013). While acknowledging that some codes were mutually exclusive at times, they were coded based on the manner in which they were discussed and the definitions developed in the codebook. For example, trust, relationships, and respect

were all identified as individual qualities as well as at times part of the quality of social capital¹; the same was for the quality of dialogue which was sometimes associated with social learning². In addition to this, some qualities were also identified as outcomes, so therefore they were coded appropriately based on the way in which it was discussed in a passage (i.e. in relation to the collaborative process or the outcomes). As a result, qualities occurred at different points in the collaborative process (although exactly when they occurred is a delimitation outside the study scope). Finally, once qualities and outcomes were coded, selective coding was used. Selective coding identified relationships between a set of codes (Saldaña, 2013), and thus was used to identify relationships between qualities and outcomes. This was done when a quality was mentioned as influencing or being linked to an outcome. In addition to coding for these three elements of interest, additional contextual information was recorded on methods used (i.e. qualitative or quantitative), specific definitions used for qualities or outcomes by the authors, and the type of study (i.e. theoretical or empirical).

Table 1.0 in Chapter One provides definitions of a quality, outcome, and relationship which were used to guide coding. Appendix 2-1 provides the inductive codebook which was developed for clearly defining the specific qualities and outcomes which were coded. To begin the analysis, as per Plummer et al.'s (2012) systematic review, results found in NVivo were sorted and summarized into tables. These contained total frequencies (number of times an element was coded overall in all sources), and magnitudes³ (extent to which an element was coded overall in all sources) for each element, the search category in which these were found in, and the type of study it was found in (theoretical or empirical). In Stage Five, results were summarized through calculating a strength score for each element (see Tables 2.2, 2.3, and Figure 2.2 in results), to depict the impact in which a quality, outcome, or relationship represented in the literature dataset, and analyzed in a discussion. Strength was defined as the combination of frequency and magnitude of the coded elements expressed in the literature. To calculate total strength, a rank order system

¹ Social capital was defined here, and in this thesis (as both a quality and outcome) as: relationships of trust, norms of reciprocity, and networks among individuals that can be drawn upon for an individual or a collective benefit" (Putnam, 1993). See Appendix 2-1 for this definition and others related to it.

² Social learning was defined here, and in this thesis (as both a quality and outcome) as: a change in understanding that goes beyond the individual to become situated within wider units or communities of practice through social interactions between actors (see Reed et al., 2010 in Cundill and Rodela, 2012). Through the process, mutual or shared learning occurs (Muñoz Erickson et al., 2010). See Appendix 2-1 for this definition and others related to it.

³ Magnitude was calculated using a minimum threshold of five references in a source for each element. The magnitude was therefore the total number of sources which met this threshold.

was administered for both the frequencies and the magnitudes from each set of results. This process involved ranking the frequencies and the magnitudes of a quality, outcome, or relationship (starting with 1 as the highest ranking) from highest to lowest. The strength was then calculated as the sum of the rank orders of the frequency and the magnitude. Therefore, lower frequencies and magnitudes resulted in higher rank orders, indicating a weaker total strength. Higher frequencies and magnitudes therefore resulted in lower rank orders, indicating a higher total strength.

After summarizing the strengths of qualities and outcomes in tables, UCINET Netdraw (Analytic Technologies), a network analysis software, was used to visualize the relationships and their calculated strengths. Network analysis maps relations (Borgatti & Everett, 1997), and Netdraw provided a tool to visualize the coding results for the relationships between collaborative qualities and outcomes. A matrix was created identifying qualities and outcomes, along with the calculated strengths of each relationship which was identified during the coding process. The visualization created, classified as a “two-mode network” (Borgatti & Everett, 1997), showed which qualities were related to outcomes, as well as which of these relationships are higher strength- this was indicated through both a bolder line connecting a quality and an outcome, as well as it being more centralized in the diagram. To highlight that lower numbers (which indicate a higher strength) the diagram was created using “reverse values” in order to clarify those stronger relationships. Qualities and outcomes which were not coded as being related to one another were still identified in order to show those which were and were not linked with one another in scholarship that was coded.

2.2 Results

After completing the screening process, the final dataset included 24 adaptive co-management papers, 16 co-management papers, 30 environment and natural resource management papers, and 15 environmental governance papers. The searches revealed several duplicates across terms. “Collabora* AND environment and natural resource management” for both Web of Science and Google Scholar produced the highest number of search results, as well as the highest number of results included throughout the screening process. The search term “collabora* AND environmental governance” produced the lowest number of results in both databases, with fewer of these being relevant due to their focus on governance as a broader concept. There were also a few key papers which appeared in all of the searches, such as Ansell

and Gash's (2007) meta-analysis of collaborative environmental governance, and Armitage et al.'s (2010) examination of ACM ideas, practices, and concepts which incorporate collaboration and learning. Many papers contained collaboration as a relevant topic, however were not included in the final dataset as a result of the absence of the three elements of interest (qualities, outcomes, relationships) being mentioned. The majority of findings reported by scholars on qualities and outcomes were also found using qualitative or mixed methods, with few studies focussing only on quantitative measures. Finally, the majority of the studies in the dataset were empirical based studies rather than theoretical.

2.2.1 Collaborative qualities

Qualities which contribute to the collaborative process identified through the systematic map are displayed in Table 2.2 along with their strength. Out of the twenty-seven qualities identified in the literature, there were four which showed much higher strengths: trust, social learning, dialogue, and active engagement. Breaking down the strength calculations in terms of frequencies and magnitudes of the coded qualities provide additional insights. The three most frequently coded qualities in the literature were social learning, diverse views represented, and dialogue. The highest magnitude qualities were trust, active engagement, social learning and dialogue. In many instances, specific qualities such as social learning and social capital were a central focus of an entire journal article or chapter (e.g. such as in Vinke-de-Kruijf et al., 2013; Schusler et al., 2003) as individual concepts, which meant they were often coded both more frequently and to a greater magnitude in these. Notably, as a result of this central focus, these qualities at times, along with shared understanding and power sharing, were also often coded as outcomes, dependent on how they were described by an author.

Quality	Frequency rank	Magnitude rank	Strength (frequency rank + magnitude rank)
Trust	2	1	3
Social learning	1	3	4
Active engagement	5	2	7
Dialogue	4	3	7
Diverse views represented	3	5	8
Multiple Knowledge Types	7	4	11
Shared understanding	6	6	12
Social Capital	9	5	14
Power Sharing	8	7	15
Negotiation	10	6	16
Deliberation	12	7	19
Relationships	11	8	19
Commitment	13	9	22
Inclusiveness	15	7	22
Joint goal creation	14	9	23
Shared decision making	13	10	23
Openness	15	9	24
Acquiring new knowledge (learning of other types; unspecified)	16	10	26
Transparency	17	9	26
Interdependence	19	10	29
Shared problem solving	18	11	29
Compromise	20	11	31
Empathy	21	10	31
Building respect	22	10	32
Shared awareness	23	11	34
Honesty	24	11	35
Sense of shared identity	24	11	35

Table 2.2: Total strength of collaborative qualities identified in the literature based on frequency and magnitude.

Some qualities were found to be closely related to one another, such as multiple knowledge types and diverse views represented, although their definitions distinguished these (see codebook in Appendix 2-1). Many qualities also lacked specific definitions in the literature, or definitions varied resulting in overlap between qualities. Overlap occurred between qualities as previously identified with trust, relationships, and respect- which at times were coded individually or as part of social capital. Trust was the most frequently coded of these three qualities (see examples in Cooke et al., 2011; Stern & Coleman, 2015) which are sometimes part of social capital. The majority of codes for the quality of trust (with a total of of 153 out of 188

codes, with higher magnitudes as well) were from theoretical based studies. With the quality of social capital (which was also stated to incorporate trust and coded as this when stated in relation to social capital), 89 out of 103 coded passages were from empirical based studies (see examples in Cheng et al., 2015; Armitage et al., 2009; Wagner & Fernandez-Gimenez, 2008). Dialogue was another quality which are times was stated individually or in conjunction with social learning, both of which were high strength qualities seen in Table 2.2. Some scholars identified dialogue as a quality which enables social learning (see in Lundmark & Jonsson, 2013, p. 162; Allen et al., 2011, p. 528). Based on the definitions used, results showed much variation with how these qualities are prevalent in scholarship.

2.2.2 Outcomes (results) of collaborating

A total of twenty-two outcomes (the term used in this thesis to identify results of the process) were coded in the literature, identified in Table 2.3. The table shows the demonstrably lower strength scores, indicative of the limited outcomes discussion. The outcomes which revealed the highest strengths were social learning and social capital. Breaking down these calculated strengths, the top three most frequently coded outcomes were social learning, social capital, and implementation. Differing to the frequency of codes, the highest magnitude outcomes coded were creative solutions and social capital. Five other outcomes had magnitudes of one (adaptive capacity, development of management and/or conservation plans, implementation, gaining a shared understanding, and social learning), while all other outcomes had magnitudes of zero. This was due to the limited number of times in which they were mentioned in scholarship, which was also often with brevity. Those outcomes which did have a magnitude above zero were from empirical based studies. In the environmental governance literature, which contained mostly theoretical based evidence, there was noticeably less evidence which mentioned outcomes.

In some cases, outcomes were also identified by an author as being intangible or tangible (e.g. see Cundill & Fabricius, 2009). The majority of the results identified were intangible (see Table 2.3). In addition, the majority of outcomes of collaborating which were coded relate to social results, rather than environmental (or ecological) results. Some of outcomes were much more broadly defined and non-specific compared to others, such as “win-win outcomes”, “social outcomes”, or “environmental outcomes” however were still relevant to code. These more

Outcomes	Frequency rank	Magnitude rank	Strength (frequency rank + magnitude rank)
Social capital	2	2	4
Social learning	1	3	4
Creative solutions	5	1	6
Implementation	3	3	6
Management and/or conservation plans	4	3	7
Adaptive capacity	6	3	9
Gaining a shared understanding	6	3	9
Collective action	7	4	11
Improved quality of efforts and solutions	8	4	12
Stakeholder empowerment	9	4	13
Better governance	10	4	14
Conflict resolution	10	4	14
Increased capacity to participate	11	4	15
New partnerships and collaborations	12	4	16
Win-win outcomes	13	4	17
Formal or informal agreements	14	4	18
Greater appreciation of issues	15	4	19
A benefit to the environment	16	4	20
Power sharing	17	4	21
Creation of policy	18	4	22
Small wins	19	4	23
A benefit to society	20	4	24

Table 2.3: Total strengths of outcomes of collaboration identified in the literature based on frequency and magnitude.

broadly defined outcomes often showed lower strengths. Interestingly, both social outcomes and environmental outcomes were only coded in the environmental governance literature, with very few passages coded. Social capital and social learning were outcomes examined most frequently in the ACM and collaborative environmental management scholarship. Finally, alike to the qualities, there was also a lack of specific definitions of many outcomes. Many were not mentioned with specificity, yet these were still more frequently identified in empirical based studies (as also found with qualities). As previously identified, there were qualities which were at times also considered to be outcomes (social capital, social learning, shared understanding, power sharing), all of which had fairly high strengths as outcomes.

2.2.3 Relationships between qualities and outcomes

Next, focusing on relationships between qualities and outcomes, there were 104 coded relationships between an individual quality and an individual outcome. Figure 2.2 illustrates these individual linkages in terms of which with qualities relate to outcomes in a network diagram. Nodes in the diagram (i.e. the qualities and outcomes) which are closer together indicate that they are commonly related to similar qualities or outcomes. Also, bolder (thicker width) lines and their location in the center of the diagram indicate those relationships which appeared to be of higher strength and therefore were identified more in scholarship. For example, the quality of social learning is seen in the middle, and through bolder lines, was linked to outcomes such as creative solutions and implementation of plans. Nodes which are located on the periphery of the diagram show lower strength relationships which exemplify less focus on these in scholarship. These others qualities which related to outcomes were of very low frequency and magnitude. For example, the quality of social capital related to formal or informal agreements, yet this is seen as a low strength relationship and is on the periphery of the diagram given that this was the only quality which the outcome related to. Similarly, the quality of shared awareness only showed relation to the outcome of more inclination to participate.

As a result of typically lower frequencies, the magnitude was often recorded as zero for all of the relationships. As identified, the strengths of these were often very low as a result of the various quality-outcome combinations and subsequent low frequencies and low magnitudes. There were many different relationships identified and as a result, their strengths were very low. High strength qualities and outcomes were those which typically seen as being linked together. Particularly social learning was the quality with the highest strength linkages, relating to outcomes of collective action, gaining a shared understanding, adaptive capacity, implementation, creative solutions, and better governance. Rather interesting was that these relationships were still not mentioned with great emphasis (in terms of frequency and magnitude) in the literature included in the systematic mapping review. Low strength qualities and outcomes found were also typically those which were not linked at all (see top left list in Figure 2.2), or had a much weaker strengths in terms of the relationship, seen with qualities and outcomes located on the periphery of the network diagram.

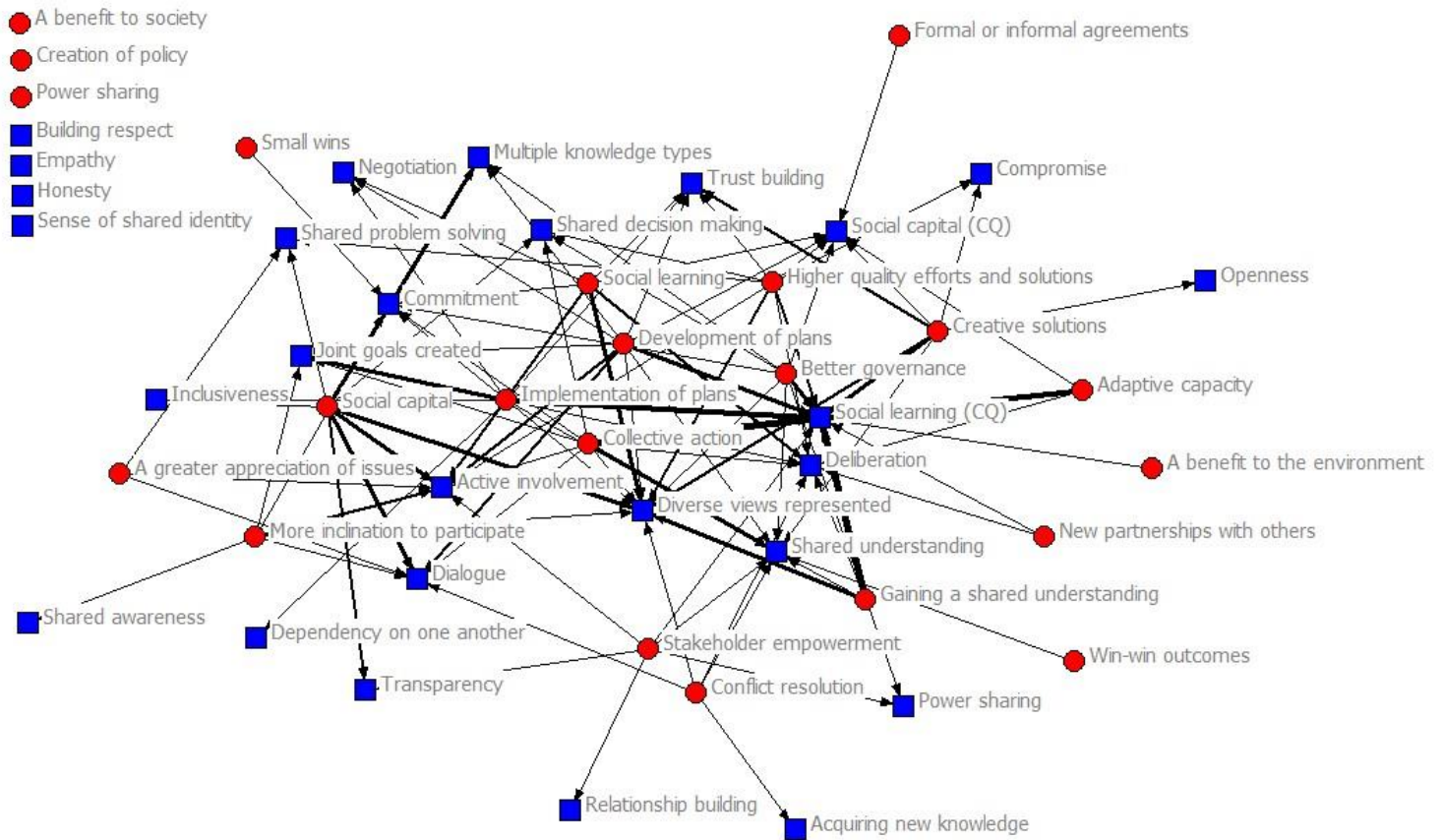


Figure 2.2: Individual relationships based on calculated strengths identified between a quality and an outcome in the literature based on frequency and magnitude. Collaborative qualities are seen in blue and outcome are in red. Line width indicates strength of relationship (i.e. a bolder line indicates a stronger linkage).

In addition to being a general trend of the entire evidence base, the majority of all of the relationships were based on empirical evidence. These relationships were also most prevalent in scholarship derived from the environment and/or natural resource management, co-management, and ACM search term categories, with even less mention in the environment and/or natural resource governance search term category. The connection between qualities and outcomes was often not identified or absent in many of the theoretical based studies across all search categories. Finally, of all the relationships coded, there was only one which had a magnitude above zero. This was the relationship between the individual quality of social learning with the outcome of implementation, with a magnitude of one (seen as a bolder line in Figure 2.2).

2.3 Discussion

The results illuminate several useful insights into collaboration scholarship in the environmental domain, and more specifically in environmental management and governance. Variation is seen with the terminology used in relation to collaboration in the environmental domain (i.e. the four different search terms which were used to synthesize the evidence of collaboration in environmental management and governance). For example, results from the search of “collaboration and environmental governance” yielded more theoretical based studies, whereas results under the other three search terms which used “management” consisted of more empirical-based studies. Armitage et al. (2012) states that “governance” is a more recent term used to encompass all environmental decision-making processes, calling for more environmental governance literature. While this provides one potential explanation for the lack of empirical studies seen under this search term, scholars have also identified the lack of case study investigations in collaborative governance literature (Kerret & Menham, 2016; Ansell & Gash, 2007). This further suggests why there may be a lack of empirical evidence of the elements found in this search category, especially in terms of relationships. The results therefore demonstrate that collaboration scholarship in environmental management and governance is diverse, and that the search terms which included “management” used more empirical evidence of the elements of interest, particularly in terms of the relationships which occur.

The results also confirm this diversity seen in scholarship in terms of which elements have been investigated, and how qualities are seen in the collaborative process and relate to outcomes (see Plummer et al., 2017a; Muñoz-Erickson et al., 2010). They show that a small number of qualities and outcomes are examined in-depth by scholars, and a large number of others are present, yet not fully explored. A limited amount of attention given to how these qualities may relate to outcomes is revealed. A discussion of these results is presented below.

2.3.1 Unpacking collaborative qualities, outcomes, and relationships

The highest strength qualities (see Table 2.2) were typically those which are most often stated to be key attributes of stakeholder interaction in collaboration, its conceptualizations, and definitions (e.g. Brisbois & de Loë, 2017; Head et al., 2016; Muñoz-Erickson et al., 2010; Ansell & Gash, 2007; Schuett et al., 2001). Trust, for example, is a quality often mentioned as being essential in collaborative settings. It has been stated that having mutual trust in both governance

(Fliervoet et al., 2016; Bodin et al., 2006) and/or management settings (e.g. Muñoz-Erickson et al., 2010) fosters more effective and promising collaborative processes. Positive interactions between stakeholders involving qualities of trust, along with others such as shared decision making and dialogue (e.g. Donoghue et al., 2010; Jum et al., 2009) may offer insights into the importance of the many qualities in the process, regardless of their strength seen in the results. In another example, active engagement of stakeholders in the process is confirmed by Plummer et al. (2017b) as an important quality that influences their evaluation of outcomes, demonstrating its potential importance and relationship to outcomes. Given these examples, the large number of qualities identified during the coding process points to the inevitable complex nature and variation of collaborative processes. These aspects are also often dependent upon a number of factors such as context, type of group, and group size (see Zachrisson & Lindahl, 2013 for example). The diversity of environmental contexts, analyses, and focuses of the different scholarship examined also confirms this. Nevertheless, high strength qualities seen in Table 2.2 still demonstrate those which have garnered most attention in scholarship.

Despite many results being comparable to collaboration scholarship in environmental management and governance, some of the lower strength qualities are opposingly noted by some scholars as being important. For example, interdependence, compromise, and honesty are qualities which were scarcely discussed in the coded data yet stated to be highly important to some scholars (e.g., Yeboah-Assiamah et al., 2016). Interestingly, these qualities have been stated in seminal scholarship as important attributes of stakeholder interaction in the process of collaboration (e.g. Ansell & Gash, 2007; Gray, 1989). This also is the case with some outcomes identified. For example, conflict resolution, an outcome which was stated by Gray (1989) as a situation in which collaboration can be useful, had an unpredictably low strength as an outcome. Multiple scholars argue that conflict resolution surrounding contested environmental problems can be approached by initiating a collaborative process, open for stakeholders to acknowledge this as an issue and work towards solutions (Head et al., 2016; Zachrisson & Lindahl, 2013; Ansell & Gash, 2007; Gray, 1989). As an instance in which collaboration is seen to be initiated (Gray, 1989), conflict resolution was an outcome identified in few cases in the scholarship examined, and typically as a brief statement. These results may be indicative of how the concept has evolved over time, in that conflict resolution may not be as frequently examined or focused on in collaboration scholarship in the environmental domain (or, due to the lack of outcomes

discussion, it is just simply not further explored). It also corroborates that different understandings of collaboration, and different examples explored may influence the qualities and outcomes in which scholars believe are most noteworthy.

High strength outcomes found were typically those which have been identified most often in relation to why collaboration is a useful strategy, in that it produces higher quality environmental efforts, innovative (creative) solutions, and fosters implementation (e.g. Scott, 2015; Frame et al., 2004), the latter two being more frequently identified in the systematic map. Although frequently mentioned, these outcomes are still often not further explored (Koontz & Thomas, 2006). There is much less discussion of and understandings of outcomes than the collaborative process (and qualities that contribute to it) in scholarship (Mandarano, 2008; Koontz & Thomas, 2006; Conley & Moote, 2003). Outcomes ranked as low strength are also difficult to compare across the collaboration scholarship, as they were often mentioned without elaboration. For example, small wins have been identified as important results of collaborating (Ansell & Gash, 2007), yet the low strength of this outcome reflects the lack of detail in which it is explored. More noteworthy with these outcomes are their potential linkages to qualities, in which some may be important to investigate further (see next section). Notably, the outcomes of interest in this study were defined as results which came about from the collaborative process. Plummer et al. (2017a, b) identified both results and effects, however results were the form of outcome of interest investigated in this study and may explain why most were identified as intangible.

In terms of relationships between qualities and outcomes, many of the higher strength qualities were those which were most often linked to outcomes. This coincides with previous studies which sometimes identify their linkages. Studies by Muñoz-Erickson et al. (2010) and Daniels and Walker (1996) provide an example of this in which key elements of mutual learning, sharing knowledge and information, social learning, and shared understanding parallel qualities in this study seen to be mentioned briefly in relation to outcomes (these include social learning, diverse views represented, multiple knowledge types, and shared understanding). Several identify groups of “key qualities” such as these in relation to outcomes, revealing that interactions between qualities occur within collaborative processes. For instance, multiple scholars have stated that shared decision making, relationships, deliberation, and considering

beliefs (i.e. diverse views represented) are both common elements to and definitive of collaborative processes (van Tol Smit et al., 2015; Booher & Innes, 2010; Ansell & Gash, 2007). Ansell and Gash (2007) highlight the group of dialogue, trust, commitment, and shared understanding in their meta-analysis of collaborative governance. These examples all highlight the potential of multiple qualities which may be interactive with one another and related to outcomes together. This interaction between multiple qualities has been identified as a knowledge gap by Plummer (2009), which confirms that these interactions are another complex area which needs to be better understood (however this was outside the scope of this study). They also show the patterns which are seen amongst higher strength qualities which typically were seen to be linked to outcomes.

It is noted that the strength findings of the relationships are not comparable with individual quality and outcome strength numbers due to the low numbers of combined frequency and magnitude. Additionally, these may differ across factors such as methods of analyses, cases, and contexts, which make them even more complex in nature. Therefore, the results do not show any high strength relationship across any of the search categories. As relationships between the process and outcomes were identified as a literature gap by Plummer et al. (2012) and Plummer (2009), the findings confirm this gap is still prevalent in more recent literatures.

2.3.2 The dynamic nature of collaborative qualities and outcomes

The results reveal the dynamic nature of qualities and outcomes in collaboration. Some qualities, for example, are considered to be integrated components of one another (e.g. dialogue with social learning; trust with social capital). This variation is representative of how there tends to be many different understandings of certain high-strength qualities and outcomes. In addition to this, the temporal dimension is an important consideration in which qualities, outcomes, and relationships occur, however was outside the scope of this study. For instance, many scholars cite social capital as a product which is built from the collaborative process (e.g. Wagner & Fernandez-Gimenez, 2008), rather than something which occurs during the process. This is seen in the results as social capital was a highly ranked outcome. Further demonstrating this temporal complexity is the quality of trust. Proving contested as it often relates to or is included as a part of the definition of social capital, trust is the highest strength quality and is described in different ways. Stern et al. (2015) identified trust as an important driver of conflict resolution (an outcome

identified in the systematic map), and others agree that it is built throughout the collaborative process to achieve results such as this (Fliervoet et al., 2016). It is also often considered as a component of social capital (e.g., Wagner & Fernandez-Gimenez, 2008; Berkes, 2007). These examples show the intricacies often associated with qualities or outcomes, and examples such as trust should be further examined with regards to it as a single quality to determine where it occurs in the process, and at what ways and points it should be characterized in relation to social capital. With this example, it also should be considered how trust is present in the outcome of social capital.

The complexity of the often-overlapping definitions of qualities, lack of their specific definitions, and alternative identifications as an outcome further demonstrate this interconnectedness. Some qualities were very closely related and therefore had to carefully be distinguished in the coding process. One example which demonstrated these intricacies is that of the qualities of dialogue and social learning. As both highly interconnected qualities, several perspectives reveal their complexities. Dialogue was at times identified as an individual quality, yet also mentioned in relation to social learning (both were also high strength qualities). One example which demonstrates their inevitable grouping with one another is Smedstad and Gosnell's (2013) ACM evaluation framework of public riparian lands. Both dialogue and social learning were understood as process criteria and frequently mentioned with one another, yet still distinguished as individual elements (Smedstad & Gosnell, 2013). Alternatively, social learning was also identified as an outcome yet dialogue was not, further demonstrating the complexity of qualities and outcomes and how certain ones may be more dynamic than others. Dialogue is often also stated as a quality which enables social learning, as mentioned previously (Lundmark & Jonsson, 2013; Allen et al., 2011). Dialogue is stated to occur as communication between stakeholders in order to work at solutions, yet social learning occurs through a process of dialogue, interaction between stakeholders, and changes in understanding (Smedstad & Gosnell, 2013; Schusler et al., 2003; see definitions in Appendix 2-1). These two qualities are directly connected, overlapping, and arguably very similar- thus explaining why they were coded both together and individually.

Further demonstrating the dynamic nature, some qualities are also considered to be or also exist as outcomes. Most noteworthy is that of social capital as well as social learning, which are the focus of some studies, and have also been acknowledged as contested concepts due to their

complexity (Adger, 2003). These examples also demonstrate the temporal aspect which must be considered, in that cases likely differ both in terms of how the quality is defined by an author and where they prove to be important in collaboration. It is also theorized that some qualities may be more present at the beginning (e.g. as a precondition) of the collaborative process, and others may be more present in the more mature stages of the process. This was a discussion point raised by Zachrisson and Lindahl (2013) as a way in which conflicts can be dealt with. These aspects are often unclear across the literature and could be further scrutinized, however are outside the scope of this paper. In addition to social capital and social learning, other qualities also characterized as outcomes included shared understanding, power sharing, and in a vaguer sense, the quality of relationships and outcome of new partnerships and collaboration with others. These all reveal that the iterative nature of the process of collaboration is important to consider when examining each. It may mean that relationships occur differently based on how the quality or outcome is defined at a specific point in the process. For example, some authors identify that social learning influences the outcome of gaining a shared understanding (e.g. Patterson et al., 2013; Cundill & Rodela, 2012). This was coded as a relationship in the systematic map, yet the inverse of this relationship was not evident. This suggests that much more can be investigated in terms of how and when these relationships occur throughout stakeholder collaborations, as qualities and outcomes are dynamic elements. Understanding and acknowledging these instances means that relationships between qualities and outcomes may vary greatly. As a result, it is therefore important to note that they are often understood differently, across different approaches which incorporate collaboration.

2.3.3 Understanding the complexity of relationships

More recent empirical evidence confirms the relationships between process elements (i.e. explored through qualities in this thesis) and outcomes, however these connections are still not well understood (Plummer et al., 2017a; Scott, 2015; Benson et al., 2013). It is not evident from this research as to what qualities are more influential in outcomes, as further research is required to understanding how these outcomes come about from collaborating (Scott, 2015). Qualities which have been focused on in more detail in scholarship also influences this current knowledge of these relationships. Social learning, as mentioned previously, is an example of this, where some scholars have focused solely on the relationship between the processes and outcomes of social learning itself (Cundill & Rodela, 2012). As a highly investigated and complex concept in

scholarship, it is expectedly the quality most linked to outcomes (or vice versa, as it is considered both a quality and outcome), often based on the context being explored. It is also often a focus of scholarship on collaborative natural resource and environmental management processes (Baird et al., 2014a). However, considering other qualities and outcomes in more detail may be crucial to revealing which qualities are most influential in certain outcomes. For example, high strength qualities such as active engagement and diverse views represented may be of interest to explore in more detail in relation to different outcomes identified. Acknowledging that collaboration occurs in different contexts and scales (Head et al., 2016), the results show that focuses on key qualities may be indicative of their importance in being linked to outcomes.

Theoretical frameworks of collaboration have illustrated process-outcome relationships, yet this study reveals that these causal connections are rarely empirically established. With outcomes, this lack of robust empirical knowledge is particularly evident. The majority of outcomes identified were also revealed as intangible outcomes (seen in Table 2.3), which are often difficult to measure and simply absent from discussions (Conley & Moote, 2003). However, the lack of further discussions of these outcomes results in challenges to understanding each and which qualities may have been linked to them. Armitage et al. (2009) acknowledges that outcomes must be considered at multiple tiers in both social and biophysical domains, also indicating that outcomes identified typically fall under the social domain. This may be the reason why many scholars continue to call for more work on the environmental outcomes domain (e.g. Scott 2015; Muñoz-Erickson et al., 2010). Results indicated that social outcomes are more prevalent, however these social outcomes may be more important to recognize as results of collaborating (i.e. immediate outcomes) given that collaboration as a concept itself focuses on the exchanges between diverse stakeholders. Alternatively, longer term outcomes, termed effects by Plummer et al. (2017a), may be hypothesized as relating more to the environmental domain (rather than social domain). Finally, the results also showed that these outcomes are often both conceptualized and measured differently, or not measured at all. This further contributes to the difficulty in understanding outcomes, and which qualities may have influenced those outcomes (e.g. see Cheng & Sturtevant, 2012; Conley & Moote, 2003). Considering multiple aspects of the process may therefore aid in making stronger connections to different outcomes that may occur, such as the suggestion by Armitage et al. (2009).

Finally, it is also important to recognize that some qualities and outcomes are simply closely related to one another. This also presents challenges when examining relationships between these elements. More challenging is the closeness of certain collaborative qualities. These qualities include the use of multiple knowledge types⁴, social learning, dialogue, and deliberation (see Table 2.2). These are all often cited as qualities which allow collaborative groups to both use their own knowledge, as well as what they have learned from others, to cooperatively develop management plans (Patterson et al., 2013; Cundill & Fabricius, 2009; Carlsson & Berkes, 2005). As an example, Patterson et al. (2013, p. 447) states that “processes of generating and integrating multiple types of knowledge are important for enabling implementation of local management action”, directly identifying the relationship between multiple knowledge types and how this influences outcomes. This statement also highlights the broader outcome of implementation being associated with the outcome of developing management plans. In addition to multiple knowledge types, diverse views represented are also often seen to influence management plans, as well as creative solutions through actors integrating and sharing their knowledge and experiences (van Tol Smit et al., 2015; Patterson et al., 2013). These two qualities relate to other outcomes such as social learning, although the lack of strength of these still indicate that linkages such as these have yet to be examined. However, other findings still confirm the importance of these qualities in relating to outcomes, such as leading to improvements in decision making, or better governance (van Tol Smit et al., 2015; Plummer & Fitzgibbon, 2004b). As a result, some qualities are seen to be closely related and subsequently influence similar outcomes.

2.4 Conclusion

The purpose of this study was to unpack the literature on collaboration in environmental management and governance and identify what is known in this area of scholarship. A systematic mapping review captured collaborative qualities (seen in this study as process elements), outcomes (results), and relationships (between qualities and outcomes) in scholarship spanning four commonly termed approaches in the environmental domain in which collaboration is an essential component. While it is acknowledged that many other terms are implicitly used in

⁴ This quality spans all knowledge types, including Traditional Ecological Knowledge (TEK), as it was often mentioned broadly in terms of multiple actors bringing their knowledge together in the process.

collaboration scholarship (see Chapter One), this study focused on collaboration explicitly in environmental management and governance contexts. The findings provide an inventory synthesizing three elements of collaboration in environmental management and governance scholarship. It provides a first step in understanding the messy state of knowledge on collaboration in the environmental domain in theory and in practice. Although Gray and Wood (1991) caution the difficulty in formulating a single general theory of collaboration due to the various perspectives and focuses on different kinds of outcomes, beginning with an analysis of the collaboration literature in the environmental domain helps direct ways in which both scholars and practitioners can continue to unravel the process while exercising this caution.

While acknowledging that different environmental contexts pose different challenges to collaboration (Armitage et al., 2012), the results provide a useful synthesis to inform theory and practice. It contributes to scholarly understandings of specific elements of the collaboration in the environmental domain, in which no known research thoroughly synthesizes these elements. It may also inform practice in that these new understandings can be considered when groups collaborate in environmental settings. Exploring these results in empirical settings is crucial for understanding the nuances with their strengths as well as continuing to reveal relationships to determine whether some prove to be more significant than others. This evidence provides insights into which qualities and outcomes may be more important in collaboration in the environmental domain. Further, the elements identified in this study can be used to assess collaboration in relation to other approaches. Additional research has the potential to reveal the intricacies of each quality, outcome, and their relationships with one another. There are multiple avenues for future work in which these findings can be further explored. First, the elements which are unique or emphasized to a greater extent in management or governance may be examined in relation to certain qualities or outcomes. For example, transparency is one quality often characteristic of and mentioned in relation to “good governance” (Plummer et al., 2013, online), and may therefore be more heavily concentrated in the environmental governance literature. Separating management and governance may further provide insight into which elements have been focused on in these specific areas of scholarship. It also may help explain why there was less evidence of the elements of interest observed in the environmental governance literature. Second, future studies should also focus on the dynamic and temporal nature of qualities and outcomes identified in this study to begin to establish a clearer theoretical understanding of collaboration in the environmental domain. Understanding which

relationships occur and when they are important can be informative for future collaborative efforts. Further, clearer conceptualizations, evaluations, or frameworks developed on collaboration using these findings in an environmental setting can also inform these efforts.

Some scholarship has shown how studying empirical case studies can be beneficial in developing clearer knowledge of how collaboration works (e.g., see Head et al., 2016). As a result, exploring the elements in different empirical contexts of collaboration in environmental management and/or governance can provide additional insights into understanding the elements and how they occur in these practical settings. In terms of collaborative qualities, further understanding how multiple qualities influence an outcome can begin to provide the understanding of the intricacies of collaborative processes. Findings revealed that multiple qualities likely occur together and contribute to a collaborative process and its outcomes. Plummer (2009, online) identified that “interactive process of collaboration” remains abstract, calling for more work to explore this complexity in collaboration. Further exploring these “interactions” in scholarship through a similar procedure may aid with beginning to unravel the complex interconnectedness and presence of qualities which have been identified in scholarship.

In terms of outcomes of collaborating (explored and manifested in this study as results of collaborating- see Plummer et al., 2017a), effects are another type of outcome identified by Plummer et al. (2017a) which could be studied to fully understand what comes about from collaborating. These longer-term, consequential outcomes could be essential to both understanding all types of outcomes of collaborating, as well as establishing different or similar relationships with qualities of the process. Identifying ecological versus social outcomes may also help with characterizing these relationships (see Armitage et al., 2009). Finally, exploring these qualities, outcomes, relationships, (and potential interactions between qualities) in a variety of different environmental contexts can provide more evidence and establish a clearer direction for fostering collaboration to use as a method for addressing complex environmental issues. Case studies therefore can be useful for exploring these elements of interest, to exemplify how collaboration actually occurs in empirical settings versus how it is conceptualized in theory.

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Chapter Three

Study Two: Examining collaborative climate change adaptation processes in New Brunswick, Canada

3.0 Introduction

Collaboration has emerged as an important strategy used to address complex environmental challenges as well as wicked environmental problems (e.g. Head, 2014; Head et al., 2016; Simmons, 2013; Muñoz-Erickson et al., 2010; Margerum, 2008). Although not a new phenomenon, collaboration has “quickly become a leading paradigm for environmental management” (Margerum, 2008, p. 487) as well as governance. One type of collaboration, multiparty collaboration, involves “a process of joint decision making among key stakeholders in a problem domain directed towards the future of that domain” (Bouwen & Taillieu, 2004, p. 139). This is a common form of collaboration which is often used synonymously by scholars referring to “collaboration” in terms of multiple parties exploring a shared interest (e.g., see Plummer & Fitzgibbon, 2004; Conley & Moote, 2003). It is argued by many that it is highly beneficial as an approach in which multiple perspectives contribute to more robust and innovative solutions in the environmental domain (Head, 2014; Isley et al., 2014; Koontz & Newig, 2014). However, it has also been argued that there is a gap between the theory and practice of collaboration (Dandy et al., 2014; Muñoz-Erickson et al., 2007). Collaboration as a strategy is complicated, and as a result, important aspects are not well understood. There is a lack of understanding seen in scholarship in terms of how the collaborative process occurs (Plummer, 2009) and how it relates to outcomes (Plummer et al., 2017; Koontz & Thomas, 2006; Schuett et al., 2001). In addition to this, there is a lack of clarity in evidence of how these occur in empirical cases (Plummer et al, 2012; Muñoz-Erickson et al., 2010; Mandarano, 2008; Frame et al., 2004). Therefore, much more clarity is needed in these areas in order to better understand how collaboration is a useful strategy in addressing wicked environmental problems.

Many scholars often investigate multiparty collaboration in the environmental domain through case studies. For example, some have explored how collaboration has been a useful or effective solution in addressing wicked environmental problems through multiple case study examinations (e.g., Fliervoet et al., 2016; Head et al., 2016). These studies have investigated broad contexts such as natural resource management (e.g., Head et al., 2016), to more specific

contexts such as flood plain management (e.g., Fliervoet et al., 2016) and water quality monitoring (e.g., Koontz, 2014) with much focus on the challenges that arose with collaboration. Comparative case studies are also often used for understanding collaborative approaches at similar scales (e.g. Koontz & Newig, 2014; Davies & White, 2012; Margerum, 2002) and generalizing findings to other cases, yet the focuses often vary. For example, some have examined perceptions of implementation of solutions (e.g., Koontz & Newig, 2014; Selin et al., 2000), where others have focused on the obstacles to consensus building in collaboration (e.g., Margerum, 2002). While these examples demonstrate the myriad of directions in which collaboration has been investigated in scholarship, much less attention is focused on examining how specific aspects of the collaborative process are important, and making the connection with how these may relate or influence certain outcomes.

Particular there is a lack of focus in scholarship on linking the collaborative process to outcomes. Many opt to focus on the process itself, and even fewer examine outcomes in detail (see Chapter Two). With outcomes, the focus is often on developing evaluation models to determine whether the collaboration has been a success in terms of conservation of the environment or natural resources (e.g., Isley et al., 2014; Smedstad & Gosnell, 2013; Muñoz-Erickson et al., 2010; Fernandez- Gimenez et al., 2008), however few specifically identify all the outcomes which may result from collaborating. In terms of connecting the process and outcomes, case studies of local-level collaborative groups also demonstrate how cases have been evaluated based on frameworks specific to an environmental context. Examples of these include local scale watershed planning (e.g. Roth & de Loë, 2017), or collaborative regional land-use planning and management (e.g. Frame et al., 2004). Other cases are evaluated based concepts often associated with the collaborative process, such as knowledge use (see van Tol Smit et al., 2015), or ways in which the process occurs, such as through social learning (e.g. Schusler et al., 2003). Scholarship also identifies themes such as learning as ways in which the process and outcomes of collaborating come about (e.g., Daniels & Walker, 1996), which may also provide useful insights into understanding how collaboration works. While collaboration has demonstrably been examined by many, focusing on how stakeholders interact in the process, identifying specifically what outcomes result from collaborating, and linking the process with outcomes has been underexamined and is very unclear as a result.

In addition to different focuses when examining case studies of collaboration, many have also acknowledged or focused on the need to understand contextual factors of collaboration in similar cases (Reed et al., 2013; Plummer & Hashimoto, 2011). While acknowledging that social-ecological systems are dynamic and are difficult to fully understand (Reed et al., 2013, p.293), context considers the “circumstances that surround and shape a situation”, as well as at a range of scales (Plummer & Hashimoto, 2011, p. 224). Through this consideration of context, scholars have demonstrated often through multiple cases designs, how factors such as local personnel involved, discourses, circumstances in which people come together to collaborate, and geography all influence the context of collaboration in this manner (see Reed et al., 2013; Zachrisson & Lindahl, 2012). As there are a variety of different environmental conflicts and wicked problems, “context helps shape both process and outcome” (Bingham & O’Leary, 2006, p. 166). This recognizes the importance of studying collaboration in different environmental contexts such as with watershed management, forestry, or climate change, in both similar and dissimilar case studies.

Amongst many environmental contexts in which collaboration is used, climate change is one which is especially relevant. Climate change is often considered a “super wicked problem” due to the unprecedented effects projected to occur as well as the urgency in addressing challenges associated with its impacts (Baird et al., 2016, p. 747). Collaboration is considered as an important way to address the multifaceted challenges associated with climate change, and it is especially important that multiple different types of actors take action in order to adapt to these changes (Baird et al., 2014). While many cases highlight climate change as a challenge in relation to the more specific contexts such as watershed management (e.g. Browning-Aiken et al., 2004), forestry (e.g., Zachrisson & Lindahl, 2012), and wildlife (e.g., Decker et al., 2005), there is limited work to date which specifically examines collaboration as a strategy in addressing climate change.

Many different management and governance approaches that incorporate collaboration as a necessary element have been assessed in these aforementioned contexts. These include adaptive co-management (ACM), co-management, collaborative environmental management, and collaborative environmental governance (see Table 2.1 in Chapter Two). However, there is much less examination of how collaboration is seen to work across these approaches in terms of

the context of climate change adaptation and how it is used to address this “super wicked problem” (Baird et al., 2016, p. 747). As a result, there is a pertinent need for further examination of collaboration due to the knowledge voids in past empirical examinations and the absence of scholarship focusing on understanding collaboration in climate change settings.

While most of these aforementioned studies have shortcomings with respect to examinations of how the collaborative process occurs and how it relates to outcomes, particularly in empirical settings, two studies offer advancement in these areas. First, a multiple case study by Plummer et al. (2017) examined operational measures of collaboration and learning to assess outcomes of ACM in four Biosphere Reserves. Key findings from this study demonstrated empirically that ACM processes contribute to outcomes (in terms of both results and effects), pointing to its importance in addressing current environmental challenges (Plummer et al., 2017). More specifically, this study examined the correlation of collaborative qualities to outcomes (Plummer et al., 2017), quantitatively demonstrating the presence of these linkages. They captured ten qualities believed to be important features of collaboration which included openness, deliberation, respect, and transparency (Plummer et al., 2017). These were measured and linked to outcomes through stakeholder’s perceptions and experience of the ACM process and its outcomes in Biosphere Reserves (Plummer et al., 2017). Despite this important advancement, the limited number of potential collaborative qualities investigated was identified as a shortcoming. Second, the study in Chapter Two presents a systematic mapping review to identify all collaborative qualities, outcomes (specifically results), and relationships between qualities and outcomes in a review of collaboration scholarship in environmental management and governance. Results from this study in Chapter Two identified twenty-seven different qualities and twenty-two outcomes, some of which are studied more than others. The relationships between qualities and outcomes proved to be complex and highly dynamic (see Chapter Two). Given the contributions of these identified studies, it is necessary to further understand these qualities that contribute to the process, outcomes, and relationships between these in empirical settings in order to establish more comprehensive evidence of how collaboration occurs and works to address wicked environmental problems.

In response to the aforementioned knowledge voids, and building upon the findings from Chapter Two, this study aims to a) explore the relative importance of collaborative qualities, outcomes, and their relationships and b) deepen understanding of how they are enacted (are

occurring) in practice. Three cases of collaborative climate change adaptation in New Brunswick, Canada are investigated.

3.1 Methods

A modified version of Yin's (1994) case study methodology was followed in this study (see Figure 1.0 in Chapter One). According to Yin (1994), a process called replication logic is used to examine cases individually, analyze them after data collection, theory is revisited, and then the next case is conducted based upon new findings. This approach was adapted for this study in order to select similar cases and examine these cases simultaneously. The first step of the case study design (see Figure 1.0 in Chapter One) involves capturing and synthesizing the current state of scholarship (completed through a systematic mapping review in Chapter Two) of three elements of interest: the qualities that contribute to the process, outcomes, and the relationships between qualities and outcomes (see definitions of these in Table 1.0 in Chapter One). This first stage provided an inventory of these elements to explore in the second stage identified in Figure 1.0 in Chapter One, which involves defining and designing a multiple case study approach for further exploring the elements in empirical settings (the focus of this second study).

The next step of the case study process involves case selection. Criteria for case selection were developed based on both previous analyses of collaborative processes (e.g. Plummer & Stacey, 2000), as well as the purpose of predicting similar results for ensuring internal and external validity of the study (to ensure analysis and conclusions can be drawn from the similar cases). As a result, the criteria for case selection were:

1. The form of collaboration is multiparty, with representatives from government and non-government actors and others engaged in the process (i.e. through regular participation) (see Bouwen & Taillieu, 2004; Gray, 1989 for defining multiparty collaboration).
2. The collaborative process is at a well-established stage of development, where an initiative or strategy has been implemented (see examples from Isley et al., 2014; Koontz, 2014; Plummer & Stacey, 2000; Selin et al., 2000; Yin, 1994;2009 for multiple case study design).

3. The collaborative process is focused, in a broad sense, on contextually similar natural resource, environmental management and/or governance, or conservation initiative with similar goals (see examples from Head et al., 2016; Smedstad & Gosnell, 2013).
4. The collaborative process is focused in a Canadian context, within a single province or territory (see examples from Brisbois & de Loë, 2017; Head et al., 2016; Margerum, 2002).

The selection process involved identifying potential collaborative groups in provinces in Canada which would fit the criteria, and then determining which are most appropriate based on the scope and focus of the study. With current collaborative efforts well underway, three case studies were selected in New Brunswick, Canada based on their relevance to the aim of this study and satisfying the criteria. The three collaborative groups have all conducted vulnerability assessments to identify risks in their region associated with climate change (e.g. such as sea level rise) and are using these to work at or move forward with climate change adaptation plans and build collaborative capacity.

Once cases were selected, data collection protocol was developed (see Figure 1.0 in Chapter One). A mixed methods approach was chosen to investigate each case, in order for a richer, stronger understanding of evidence (Yin, 2009) of the collaborative qualities that contribute to the process and the outcomes. First, a questionnaire instrument focussed on understanding the qualities, outcomes, and relationships which were important in the collaborative processes for each case study (aligned with the first aim of this study). Participants were asked to select five to seven qualities and five to seven outcomes which they believe were important in their collaborative group. This was selected based on the “rule of hand” proposition by Walker et al. (2006, online), who stated that “critical changes in social-ecological systems are determined by a small set of three to five key variables”. As a result, the range of five to seven was considered adequate for individuals selecting qualities and outcomes which they believe are important. In this section, participants were asked to identify, using only the qualities and outcomes which they selected, qualities which they believe had influenced an outcome (see Appendix 3-1 for the informed consent and questionnaire script used). The questionnaire was then used to inform the qualitative portion of this study, which was key informant interviews. This stage was focused on understanding the results of the questionnaire and provide qualitative

context surrounding the collaborative elements in the cases and how they occurred (aligned with the second aim of this study). Appendix 3-2 provides the informed consent and semi-structured interview script used.

Research Ethics was cleared prior to the next step of data collection. After pilot testing of questionnaire, a convenience sampling method was chosen to select participants for each case. It was confirmed with the key informant that members of each group represent various different types of stakeholders which include both government, non-government, general citizens, and other types of actors (multiparty), in which the questionnaire provided a selection to identify the type of actor which they represent. Four key informants were identified (one for Case 1 and 2, and two for Case 3). The key informants, who are individuals highly involved in the collaborative process through both information sharing and facilitation, are familiar to potential participants and therefore were asked to send out an invitation letter to these participants. Two key informants were selected for Case 3 (Tantramar) as a result of this level of involvement in the collaborative process, while also acknowledging that the group was larger both in working group members and in the region in which they collaborate in. The collaborative working groups consisted of a maximum of twenty members. The key informants were sent an email with a letter of invitation which contained the link to the survey, which they were asked to forward to potential respondents. Two email reminders were sent to these groups over the span of three to four weeks for completion of the questionnaire. Key informants were also asked to complete a questionnaire.

After questionnaires were completed, results were analyzed for each case by counting the frequency in which a quality and outcome was selected by a participant as being important. With regard to relationships, a matrix was created with qualities and outcomes to show the number of times a quality was selected as influencing an outcome by members in each case. These data were imported into a social network software, UCINET and Netdraw (Analytic Technologies), used to better visualize these relationships and show the qualities and outcomes that are linked with one another. After compiling the questionnaire data, UCINET was also used to identify those qualities, outcomes, and relationships which occurred most frequently in each case. Not all qualities and outcomes were further examined in key informant interviews due to the study scope. Therefore, the most important elements to focus on in the second aim of the study (which

involves conducting interviews) were determined through a “core-periphery” analysis using UCINET (see Everett & Borgatti, 2013 for method) to identify a core group of qualities and outcomes for each case. These “core” qualities and outcomes were both the ones which participants selected most frequently, as well as the qualities and outcomes which co-occurred (i.e. were most often selected as being connected with one another) most frequently.

Each interview lasted for fifty to sixty minutes in total. Questions focused on asking key informants how the qualities, outcomes, and relationships chosen by their respective collaborative case occurred in practice. Notably, these interviews therefore provide a single (or multiple in Case 3) viewpoint or interpretation of how the elements were enacted, however the informants’ high level of involvement in the process provides useful insights into understanding how the collaborations occurred. The interview ended with a final open discussion in which the visual network diagram developed from the questionnaire data was presented to the informant. This helped both show key relationships between qualities and outcomes which were selected by participants, and probe how these occurred in collaborative group meetings. After the interviews, interviewees had the opportunity to review their interview script afterwards for verification, known as “member checking” (Carlson, 2010). Interview analysis consisted of first transcribing interviews and subsequently using NVivo Pro 11 coding software (QSR International) to begin data analysis. An inductive coding process was used to develop codes surrounding “themes of enactment”, identifying how qualities, outcomes, and relationships were stated to occur in practice. Open coding was first used to identify broad themes which emerged from the all of the interviews, and then each interview was then coded through multiple rounds of pattern coding. Pattern coding was used to identify emergent themes and explanations regarding how each element of interest occurred, and then grouping each set of themes into a smaller number of themes or constructs found (Saldaña, 2013, p. 2010). These “final pattern codes” for these themes of enactment were then created and combined into a codebook containing tables of codes for qualities, outcomes, and relationships which were identified in each of the cases. The codebook was then used as a guide to synthesize results for each case.

Finally, questionnaire and interview findings were then put together for each case, and findings from each case study were then assessed individually. Qualities and outcomes identified in the analysis were summarized in individual case tables. To present key relationships between

a quality and outcome for each case, results were presented where at least 30% of participants selected the relationship. This was chosen because there was generally a lack of consensus on these (i.e., there were several different combinations of relationships based on what qualities or outcomes people selected), therefore common relationships typically involved this percentage of individuals who made the same selection. After synthesizing individual case study findings, a cross-case synthesis was conducted. This synthesis is a type of cross-case analysis technique which aggregates individual case findings to compare, observe patterns, and draw cross-case conclusions (see Yin, 2009). This involved the comparison of the individual case results and subsequent creation of a cross-case table to synthesize these patterns.

3.2 Results

Results in Tables 3.1-3.3 show the qualities, outcomes, and relationships most frequently selected by respondents as being important, and the themes of enactment (i.e. how they came about in the collaborative group) derived from the key informant interviews. Individual case results in terms of qualities, outcomes, and relationships are presented below.

3.2.1 Case 1: Saint John River Collaborative

World Wildlife Fund Canada's Freshwater program activity with the Saint John River influenced the collaboration with the local Regional Service Commission (RSC) and municipalities of Woodstock, Hartland, and Florenceville-Bristol (see Figure 3.1 for a map showing the general location of these). The Saint John River Community Climate Change Vulnerability Assessment (CCCVA) process was completed from 2014-2015, with current stages focusing on using this assessment to develop a climate change adaptation plan for the three municipalities. The purpose of the CCCVA was to "enable the participating communities and the RSC to share knowledge and concerns relating to climate, while developing a more intimate understanding of local hazards, namely flooding from extreme rain events and Spring Freshet" (Mitchell & Reeder, 2017, p. 1). Each municipality had central areas of concern in relation to their vulnerabilities living along the Saint John River, such as power outages, flooding, and impacted water delivery lines. The collaborative also incorporated a variety of other actors, including New Brunswick Power, Emergency Measures Organization, and fire departments. The next stages of the process after completion of the CCCVA surround building adaptive capacity

through community engagement and developing a climate adaptation plan for the region using CCCVA findings, which was led by the key informant.

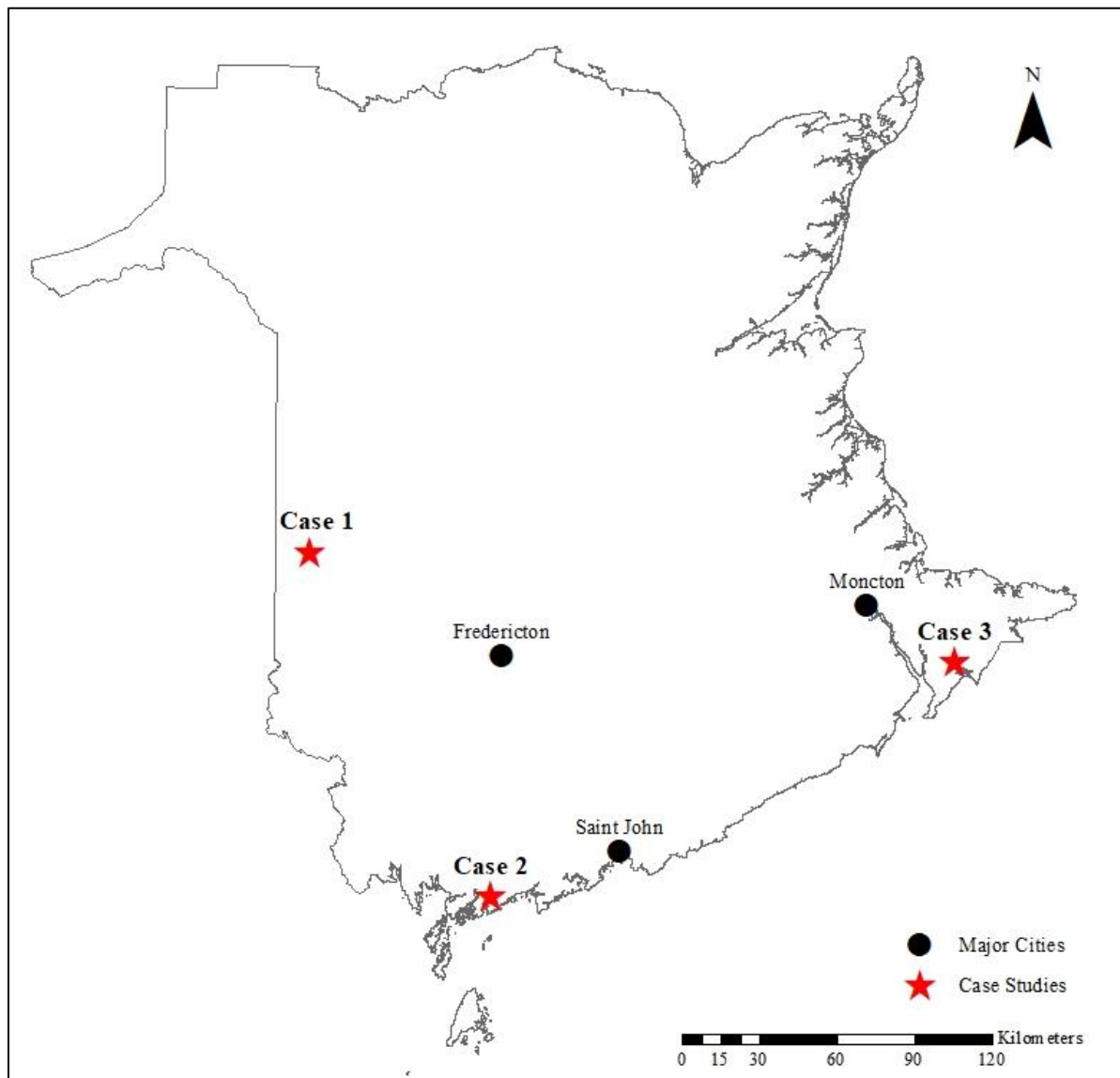


Figure 3.1: Map of general locations of the case studies (GeoNB, 2018; ESRI, 2003). Case 1 is the Saint John River Collaborative; Case 2 is Charlotte County and surrounding area Collaborative; and Case 3 is the Tantramar Climate Change Adaptation Collaborative.

For the Saint John River Collaborative (Case 1), a total of ten out of 16 respondents completed the questionnaire, representing various types of actors. The majority of respondents identified fairly low activity levels, with an average perceived level of influence of five and a half out of ten. Participants who were involved with the collaborative for at least two or more years were often those who perceived themselves to have a higher influence in the process. After

the core-periphery analysis, nine qualities and eight outcomes were identified. Table 3.1 displays these top questionnaire results along with a summary of themes of enactment.

Case 1: Saint John River		Questionnaire results: N= 10	Key informant interview results:
	Collaborative element	# respondents who selected element as important	Synthesis of themes of enactment
Qualities	Joint goals created	5	<ul style="list-style-type: none"> - Creating opportunity - Exposure to other views and actor types
	Relationship building	5	<ul style="list-style-type: none"> - Facilitation to ensure a productive process - Ensuring effectiveness through precursors and planning of collaboratives - Acting on common interest
	Diverse views represented	4	<ul style="list-style-type: none"> - Creating opportunity - Ensuring effectiveness through precursors and planning of collaboratives
	Acquiring new knowledge	4	<ul style="list-style-type: none"> - Using visual tools for sharing and discussing information - Exposure to other views and actor types - Communication of knowledge - Acting on common interest
	Active involvement	4	<ul style="list-style-type: none"> - Using visual tools for sharing and discussing information - Communication of knowledge - Facilitation to ensure a productive process - Exposure to other views and actor types
	Inclusiveness	3	<ul style="list-style-type: none"> - Using visual tools for sharing and discussing information - Facilitation to ensure a productive process
	Shared problem solving	3	<ul style="list-style-type: none"> - Exposure to other views and actor types - Acting on common interest
	Multiple knowledge types	2	<ul style="list-style-type: none"> - Communication of knowledge - Exposure to other views and actor types
	Shared awareness	2	<ul style="list-style-type: none"> - Using visual tools for sharing and discussing information
Outcomes	A greater appreciation of issues	6	<ul style="list-style-type: none"> - Education - Learning through various types of resources
	A benefit to the environment	6	<ul style="list-style-type: none"> - Learning through various types of resources
	Gaining a shared understanding	6	<ul style="list-style-type: none"> - Education - Learning through various types of resources
	Social learning	4	<ul style="list-style-type: none"> - Learning through various types of resources - Creating positive opportunity

	New partnerships with others	4	<ul style="list-style-type: none"> - Education - Creating positive opportunity - Moving work to action
	Win-win outcomes	3	<ul style="list-style-type: none"> - Education - Moving work to action
	Creative solutions	2	<ul style="list-style-type: none"> - Education - Moving work to action
	Development of management or adaptation plans	2	<ul style="list-style-type: none"> - Creating positive opportunity
	Collective action	2	<ul style="list-style-type: none"> - Education - Learning through various types of resources - Fairness and acknowledgement as a regional effort
Relationships	Relationships → a benefit to the environment	4	<ul style="list-style-type: none"> - Acting on common interest - Learning occurring for positive action
	Relationships → gaining a shared understanding	3	<ul style="list-style-type: none"> - Learning occurring for positive action
	Acquiring new knowledge → gaining a shared understanding	3	<ul style="list-style-type: none"> - Acting on common interest - Learning occurring for positive action

Table 3.1: The Saint John River Collaborative (Case 1) results showing top qualities and outcomes identified in the core-periphery analysis, and top relationships in which at least 30% of respondents selected. A summary of themes of enactment are also identified in relation to each.

Qualities of relationship building and joint goals created were most important to individuals in this case. While joint goal creation had one theme of enactment which was creating opportunity (such as through addressing both individual and group needs), relationships as a quality were seen to occur through multiple different ways. For example, having a facilitator during group meetings resulted in a more productive process, and this was a theme of enactment stated to assist with building relationships between actors. Other important qualities such as active involvement and multiple knowledge types were enacted through the theme of communication of knowledge. More specifically, the key informant described interactive activities such as questionnaires being used during meetings. Other qualities such as acquiring new knowledge was most often identified through the theme of enactment of sharing climate change related data visually from experts. The key informant discussed the importance of this through the example of maps being used as a tool to show data visually to group members:

They had also known there was an issue, they'd all seen the flooding there, but until somebody put it on a map and it was verified by an outside source, or an expert, or however you want to characterize that person, but nothing had happened- well, now something is going to happen (key informant 1, verbal communication, April 23, 2018).

Overall, this theme of enactment (of sharing data visually), was emphasized often with the two qualities of acquiring new knowledge and active involvement, as using maps engaged and allowed group members to learn directly from experts about areas vulnerable to flood risk, for example.

The outcomes of a greater appreciation of issues, a benefit to the environment, and gaining a shared understanding were the identified by respondents as being most important in the Saint John River Collaborative. Learning through various types of resources and education were key themes of enactment among all these outcomes. For example, these “resources” for learning included simply creating a space for discussion, and more specifically through the creation of this opportunity for actors to come together, discuss ideas, and develop social cohesion. The key informant described how both hearing from different community members and climate experts in this safe space for discussion enabled them to continue to move forward as they realized they all had common interests and concerns.

There was less agreement seen with the relationships between qualities and outcomes. However, qualities of relationships or acquiring new knowledge were selected as more influential in outcomes of either a benefit to the environment and gaining a shared understanding. These relationships all occurred through themes of enactment of acting on common interest. A more specific example in which this theme was stated to occur was through group members sharing similar experiences that they have had with the environment (for example, living along the river and being affected by floods or intense storms). Although variation occurred with the remainder of the relationships selected (outside of those mentioned above), the themes of enactment identified in relation to all of these were generally similar. One theme of enactment, learning occurring for positive action, was found to be most common for these relationships. More specifically, this was seen through groups bringing in and having more accessible information and data; relational learning⁵; and simply being apart of (and participating in) the process. Under this theme of enactment, qualities such as acquiring new knowledge, relationships, diverse views represented related to results of creative solutions and new partnerships with others; diverse views represented, multiple knowledge types, and joint goal creation were seen to related to results of social learning and the development of management and adaptation plans in these ways.

3.2.2 Case 2: Charlotte County and surrounding area collaborative

Charlotte County and surrounding area (see Figure 3.1 for general area) began development of the climate change adaptation planning from 2013-2014 with the Charlotte County CCCVA led by Eastern Charlotte Waterways (ECW) and the St. Croix Estuary Project (SCEP) in Southwestern New Brunswick. This process had a similar objective as Case 1, which was to engage five Charlotte County communities to collaborate and identify climate-related concerns and hazards such as floods, ice storms, subsequent health impacts, and infrastructure damage (Signer et al., 2014). After completion of the CCCVA, the second phase of the climate adaptation initiative was to complete a risk assessment with local stakeholders to both identify

⁵ This specific theme of enactment was defined as learning from one another, in which members gained new knowledge and understanding from each other about climate change- influencing their learning for developing adaptation action plans. This is acknowledged to be similar to social learning, in that the process fostered both learning and knowledge sharing (see Schusler et al., 2003)

and quantify risks (e.g. sea level rise, increased intensity of heavy rainfall events) and identify potential actions to address the risks (vulnerabilities). After completion of this, the final step was to develop a full climate change adaptation plan for Charlotte County and its surrounding area. This was completed in 2016, a plan which outlines an adaptation plan for five municipalities, what they are adapting to, and a schedule of implementation. The plan was developed under categories of action, such as emergency planning, community engagement, climate change action plan review (see St. Louis & Killorn, 2016). Building adaptive capacity and collaborative capacity continues to be a focus with building community resilience to respond to climate related changes.

For the Charlotte County and surrounding area (Case 2) collaborative group, eight out of nine respondents completed the questionnaire, all of which were moderately to highly involved in the process. All respondents were involved with the CCCVA and risk assessment, and five with the most recent climate adaptation plan. Their average perceived influence was seven out of ten, with those being involved in four or more years having a higher level of perceived influence than those involved for less time. After the analysis, six qualities and seven outcomes were identified to further explore. Table 3.2 displays these top questionnaire results along with identified themes of enactment.

The qualities of diverse views represented and acquiring new knowledge were identified as most important, and both occurred through several different themes of enactment. For example, diverse views represented were identified by key informant 2 as a quality which occurred through the planning of the collaborative group, as it was essential at the start of the CCCVA process to ensure a broad representation of actors. For acquiring new knowledge, showing data visually from experts was emphasized, with examples of flood maps and Lidar data mentioned as ways in which people acquired new knowledge. Many other qualities were often stated to occur through the theme of enactment of simply having exposure to other views and actor types. For example, acquiring new knowledge, commitment, shared problem solving, active involvement, and multiple knowledge types were all qualities which were stated to occur under this theme of enactment. In particular, group members both felt engaged with group discussions and/or activities, and felt comfortable with contributing their ideas to discussions.

Case 2: Charlotte County and Surrounding Area		Questionnaire results: N= 8	Key informant interview results:
	Collaborative element	# of respondents who selected element as important	Synthesis of themes of enactment
Qualities	Diverse views represented	5	<ul style="list-style-type: none"> - Exposure to other views and actor types - Ensuring effectiveness through precursors and planning of collaboratives - Communication of knowledge
	Acquiring new knowledge	5	<ul style="list-style-type: none"> - Use of visual tools for sharing and discussing information - Exposure to other views and actor types - Communication of knowledge - Acting on common interest
	Commitment	4	<ul style="list-style-type: none"> - Exposure to other views and actor types - Creating opportunity - Facilitation to ensure a productive process - Communication and learning
	Multiple knowledge types	4	<ul style="list-style-type: none"> - Exposure to other views and actor types
	Active involvement	3	<ul style="list-style-type: none"> - Exposure to other views and actor types
	Shared problem solving	3	<ul style="list-style-type: none"> - Exposure to other views and actor types - Acting on common interest
Outcomes	Development of management or adaptation plans	6	<ul style="list-style-type: none"> - Education - Moving work to action
	Social learning	5	<ul style="list-style-type: none"> - Education - Creating positive opportunity
	Better governance (decision making)	5	<ul style="list-style-type: none"> - Education - Learning through various types of resources - Moving work to action
	A greater appreciation of issues	4	<ul style="list-style-type: none"> - Education - Learning through various types of resources
	Higher quality efforts and solutions	4	<ul style="list-style-type: none"> - Education - Learning through various types of resources
	Adaptive capacity	2	<ul style="list-style-type: none"> - Learning through various types of resources

			- Moving work to action
	A benefit to society	2	- Learning through various types of resources
Relationships	Acquiring new knowledge → better governance	5	- Acting on common interest - Learning occurring for positive action
	Acquiring new knowledge → a greater appreciation of issues	4	- Acting on common interests - Learning occurring for positive action - Visual communication methods used - Taking advantage of opportunity to collaborate, implement solutions, and be prepared
	Acquiring new knowledge → development of management or adaptation plans	3	- Acting on common interest - Learning occurring for positive action - Visual communication methods used
	Active involvement → better governance	3	- Learning occurring for positive action
	Commitment → development of management or adaptation plans	3	- Taking advantage of opportunity to collaborate, implement solutions, and be prepared *discussed with qualities of multiple knowledge types, shared problem solving
	Diverse views represented → a greater appreciation of issues	3	- Taking advantage of opportunity to collaborate, implement solutions, and be prepared - Acting on common interest
	Multiple knowledge types → development of management or adaptation plans	3	- Taking advantage of opportunity to collaborate, implement solutions, and be prepared *Was also identified with the outcomes “adaptive capacity” and “better governance by the key informant
	Multiple knowledge types → social learning	3	- Acting on common interest
	Shared problem solving → development of management or adaptation plans	3	- Taking advantage of opportunity to collaborate, implement solutions, and be prepared

Table 3.2: Charlotte County and Surrounding Area Collaborative (Case 2) results showing top qualities and outcomes identified in the core-periphery analysis, and top relationships in which at least 30% of respondents selected. A summary of themes of enactment are also identified in relation to each.

The outcome of the development of management or adaptation plans was selected by 75% of participants in the questionnaire, indicating the importance of collectively creating strategies for adapting to climate change in Charlotte County and surrounding area. A greater appreciation of issues was also an outcome seen to be highly important. This outcome, along with the former, was identified in relation to the theme of enactment of education. The key informant explained that group members began to further understand the complexities and issues (such as flooding) associated with climate change because they were educated on it. The other common theme of enactment mentioned by the key informant was learning through various types of resources (for example, through learning ways to become more resilient as a community). This was mentioned by the key informant in relation to other outcomes selected by participants such as better governance and adaptive capacity. Although adaptive capacity was an outcome selected by fewer individuals in the questionnaire, the key informant highlighted this outcome and the fact that people learned to become more resilient. They emphasized the importance and necessity of this outcome in order to adapt to risks associated with coastal communities, such as sea level rise.

The relationships between qualities and outcomes in this case had the highest percentage of people who commonly selected a relationship: 62.5% of respondents identified that acquiring new knowledge was influential in better decision-making processes, identified in this study as better governance. This often occurred through the theme of enactment of learning for positive action. Under this theme, specifically cognitive learning was mentioned in relation to how the group acquired new knowledge which then influenced the outcome of better governance. Cognitive learning is defined by the acquisition of new knowledge and/or restructuring of existing knowledge (Baird et al., 2014, p. 53). The key informant explained how cognitive learning was the way in which this relationship was seen, as climate experts showed data through flood maps, sea level rise contours, and Lidar data. They also described how this relationship was influential for the collaborating actors:

Adapting to climate change is like building a pyramid, and you move up the pyramid, you take raw data and that becomes processed into vulnerability data and then you process that and you get your risk assessment and then you process that and that gives you your adaptive actions. So, everything is built on quantitative and qualitative data and the qualitative data

comes from the people in response to the quantitative data (key informant 2, verbal communication, April 24, 2018)

This demonstrated the importance of acquiring new knowledge as a quality which influenced many outcomes, including a greater appreciation of issues. Themes of enactment, particularly learning occurring for positive action and acting on common interest, highlights the importance of these relationships in terms of group members being able to learn from climate experts as well as participate in data collection. Table 3.2 also highlights the many relationships between qualities and outcomes in which at least 30% of participants selected. Notably, many qualities were also often identified by the key informant as co-occurring in influencing outcomes. For example, multiple knowledge types, commitment, and shared problem solving were all selected as being linked to outcomes of the development of management or adaptation plans, and these relationships were all stated by the key informant together in relation to the theme of enactment of simply taking advantage of the opportunity for collaborating, implementing solutions, and being prepared. In other words, the continued collaboration and participation of individuals in working group meetings demonstrated their dedication to advancing ideas to collectively move towards adaptation action.

3.2.3 Case 3: Tantramar Climate Change Adaptation Collaborative (TCCAC)

Formed in 2013, the Tantramar Climate Change Adaptation Collaborative (TCCAC) is coordinated by a local non-governmental organization and collaborates with communities along the border of New Brunswick (see Figure 3.1), and also sometimes bringing in members from Nova Scotia to address common climate change related issues (EOS Eco-energy, 2018). A number of workshops are held throughout each year with representatives from areas in the Tantramar region of New Brunswick, and a Regional Adaptation Plan was developed in 2013. In collaboration with Mt Allison University, a vulnerability assessment was also conducted in 2013-2014 to further identify vulnerabilities in the region. (EOS Eco-Energy, 2016). With much progress from this, the TCCAC outlined their achievements and goals in a climate adaptation plan in 2017 (see Marlin & Wooley-Berry, 2017). The success of the collaborative's activities was measured through positive feedback and larger numbers of participants in their annual Climate Change Week, engagement and outreach activities, and workshops such as the state of the dykes and how to prepare for flooding (EOS Eco-Energy Inc., 2018). Moving forward, the

TCCAC continues to engage various actors and communities to work towards resilience and adaptation in vulnerable regions in Tantramar, also identifying future work that still needs to be done such as water quality monitoring.

In the Tantramar Case (Case 3), 15 of the 20 individuals comprising of the working group completed the questionnaire. The average perceived influence which respondents selected as having on the collaborative was four and a half out of ten, and the numbers were fairly even with those who have been involved for many years already (46.67%), or for one or less years (40%). After the core-periphery analysis, nine qualities and nine outcomes were identified to further investigate. Two key informants were interviewed in this case. Table 3.3 displays top questionnaire results along with identified themes of enactment by both informants.

For qualities, acquiring new knowledge was unequivocally most important to collaborative group members, with the majority selecting it as an important quality. This quality was described as occurring in many different ways, however both informants identified key themes of 1) using visual tools for sharing and discussing information (mostly from experts), and 2) communication of knowledge, through bringing in new individuals with different perspectives. Communication of knowledge was a theme of enactment in which other qualities such as diverse views represented, shared understanding, shared decision making, and commitment were stated to occur. For example, it was stated by both key informants that informal brainstorming sessions occurred in every meeting, and this example shows how these qualities were important as individuals all participated in these sessions. One quality, relationships (or relationship building), was selected by 40% of participants and interestingly was the only quality which was stated in relation to the theme of enactment of facilitation in order to ensure a productive process. Under this theme, it was evident that relationships were important in that the facilitator created a safe area for discussion, which allowed for individuals to more comfortably speak with one another about their perspectives or ideas on an issue.

Case 3: Tantramar		Questionnaire results: N= 15	Key informant interview results: (N=2)
	Collaborative element	# of respondents who selected element as important	Synthesis of themes of enactment
Qualities	Acquiring new knowledge	10	<ul style="list-style-type: none"> - Creating opportunity - Use of visual tools for sharing and discussing information - Educating one another about climate change - Communication of knowledge
	Diverse views represented	8	<ul style="list-style-type: none"> - Creating opportunity - Exposure to other views and actor types - Communication of knowledge
	Shared awareness	8	<ul style="list-style-type: none"> - Creating opportunity - Educating one another about climate change - Using visual tools for sharing and discussing information
	Shared understanding	7	<ul style="list-style-type: none"> - Exposure to other views and actor types - Facilitation to ensure a productive process - Communication of knowledge
	Relationship building	6	<ul style="list-style-type: none"> - Facilitation to ensure a productive process
	Commitment	6	<ul style="list-style-type: none"> - Facilitation to ensure a productive process - Communication of knowledge - Acting on common interest
	Social capital	6	<ul style="list-style-type: none"> - Exposure to other views and actor types - Facilitation to ensure a productive process - Communication of knowledge
	Shared decision making	6	<ul style="list-style-type: none"> - Creating opportunity - Exposure to other views and actor types - Facilitation to ensure a productive process - Communication of knowledge - Acting on common interest
	Multiple knowledge types	6	<ul style="list-style-type: none"> - Use of visual tools for sharing and discussing information - Facilitation to ensure a productive process
Outcomes	A greater appreciation of issues	10	<ul style="list-style-type: none"> - Education

	New partnerships with others	9	<ul style="list-style-type: none"> - Learning through various types of resources - Moving work to action
	Gaining a shared understanding	8	<ul style="list-style-type: none"> - Education - Moving work to action
	The development of management or adaptation plans	6	<ul style="list-style-type: none"> - Learning through various types of resources - Moving work to action - Creating positive opportunity
	Social learning	5	<ul style="list-style-type: none"> - Learning through various types of resources - Moving work to action
	Win-win outcomes	5	<ul style="list-style-type: none"> - Education - Creating positive opportunity
	Small wins	5	<ul style="list-style-type: none"> - Education
	More inclination to participate	4	<ul style="list-style-type: none"> - Education - Learning through various types of resources - Moving work to action - Creating positive opportunity
	A benefit to society	4	<ul style="list-style-type: none"> - Education - Learning through various types of resources - Moving work to action - Creating positive opportunity
Relationships	Shared awareness → a greater appreciation of issues	6	<ul style="list-style-type: none"> - Learning occurring for positive action
	Acquiring new knowledge → a greater appreciation of issues	5	<ul style="list-style-type: none"> - Acting on common interest - Learning occurring for positive action - Visual communication methods used - Informality of the process to create a comfortable environment (space) for dialogue
	Acquiring new knowledge → gaining a shared understanding	5	<ul style="list-style-type: none"> - Acting on common interest - Learning occurring for positive action - Informality of the process to create a comfortable environment (space) for dialogue
	Relationships → new partnerships with others	5	<ul style="list-style-type: none"> - Acting on common interest - Learning occurring for positive action

Table 3.3: Tantramar Climate Change Adaptation Collaborative (Case 3) results showing top qualities and outcomes identified in the core-periphery analysis, and top relationships in which at least 30% of respondents selected. A summary of themes of enactment are also identified in relation to each.

For outcomes, a greater appreciation of issues, new partnerships with others, and gaining a shared understanding showed high importance in the questionnaire results. With a greater appreciation of issues, education was a highly evident theme of enactment, and key informant 4 emphasized the importance of group members understanding the complexities of climate change in relation to this outcome:

I think once you appreciate climate change and you understand it and it's not a belief but a fact, then you, I think, are more motivated to act and to adapt and work on these issues and you see, you know, the necessity and the urgency of it all (key informant 4, verbal communication, April 26, 2018).

Under the enactment theme of education, group members were stated as being simply educated on what climate change means in general and for the Tantramar region, and recognizing the complexities of its associated issues and the need for action. The example of sea level rise also points to its importance to TCCAC members, as simply realizing how it will influence their region was often stated by both key informants as a way in which outcomes such as a greater appreciation of issues, social learning, and gaining a shared understanding both were important and seen to occur as a result of education. Other outcomes, such as more inclination to participate, was often identified by both informants in relation to the theme of learning through various types of resources. Further, this theme of enactment of was stated with the example of creating a forum in which people could comfortably voice their opinions or ideas, and as a result develop a sense of social cohesion. More inclination to participate was also identified in relation to the theme of enactment of creating positive opportunity, in that group members that collaborated began to adopt a more positive vision of what the collaborative can accomplish. This theme of enactment was also highlighted with the outcome of win-win outcomes. Turning work into action was a theme in which other outcomes such as the development of management or adaptation plans, gaining a shared understanding, and a benefit to society were realized. With this theme, the informants described how new data, expertise in various areas (such as planning or engineering), and other available resources helped contribute to moving their efforts into actionable outcomes related adaptation.

In terms of relationships, there were also mixed results regarding which qualities influenced outcomes the most. However, highly selected qualities acquiring new knowledge and

shared awareness were both selected as most influential in a greater appreciation of issues, the most important outcome selected by respondents. The common theme of enactment in which these relationships were seen to occur was with learning occurring for positive action. More specifically, this learning occurred in several different types of ways: through bringing in and being able to access new information (such as through sharing data, and having guest presenters or speakers), and through two types of learning: cognitive learning, and relational learning. All of these themes were emphasized by key informants often in relation to several different relationships during the interview. For example, diverse views represented was a quality stated as influencing the outcome of development of management and adaptation plans through cognitive learning by key informant 4, and also influencing the outcome of social learning through relational learning (similar to social learning itself, as these are both recognized to be complex, closely related concepts) as identified by key informant 3. Finally, the other relationships between qualities and outcomes identified in Table 3.3 showed that although not the highest selected outcome, the people who selected the quality of relationships mostly agreed on its influence on the outcome of new partnerships. This relationship was mentioned in relation to themes of enactment of acting on common interest and learning occurring for positive action. Acting on common interest was explained as a theme of enactment in terms of group members becoming comfortable with speaking with different actor types and as a result having a more positive vision of the collaborative. Learning occurring for positive action was also a theme of enactment for the quality of relationships influencing new partnerships in terms of the collaborating actors being able to access new information which they did not have before (see examples described above in relation to this theme).

3.3 Cross-case summary and discussion

The following discussion summarizes a cross-case synthesis which both identified cross-case findings as well as examines these in light of scholarship. Table 3.4 summarizes common qualities, outcomes, and relationships found to be important in all cases. All three cases showed overlap with three key qualities and three outcomes, and few common relationships were seen across cases. Cross-case comparisons also show overlap of other important qualities and outcomes between at least two cases (see Table 3.4). Most similarities in enactment were between the Saint John River and Charlotte County and surrounding area cases, however there

were common themes of enactment seen in general for several of the quality-outcome relationships.

	Case 1: Saint John River	Case 2: Charlotte County	Case 3: Tantramar	Common themes of enactment
Common Qualities	Acquiring new knowledge			Use of visual tools for sharing and discussing information; communication of knowledge
	Diverse views represented			Use of visual tools, communication of knowledge; exposure to other views and actor types (case 2,3); Ensuring effectiveness through planning of collaboratives (case 1,2)
	Multiple knowledge types			Exposure to other views and actor types (case 1,2)
	Active involvement			Exposure to other views and actor types
	Relationships		Relationships	Facilitation to ensure a productive process
	Shared problem solving			Exposure to other views and actor types; acting on common interest
		Commitment		Facilitation to ensure a productive process; communication of knowledge
Common Outcomes	A greater appreciation of issues			Education; learning through various types of resources (case 1,2)
	Social learning			Creating positive opportunity (case 1,2); Learning through various types of resources (case 1,3)
	Development of management or adaptation plans			Moving work to action (case 2,3); Creating positive opportunity (case 1,3)
		A benefit to society		Learning through various types of resources
	Gaining a shared understanding		Gaining a shared understanding	Education
	Win-win outcomes		Win-win outcomes	Education
	New partnerships		New partnerships	Moving work to action
Common Relationships	Acquiring new knowledge → gaining a shared understanding		Acquiring new knowledge → gaining a shared understanding	Acting on common interest; learning occurring for positive action
		Acquiring new knowledge → a greater appreciation of issues		Acting on common interest; learning occurring for positive action; visual communication methods used

Table 3.4: Cross-case summary of results. Common qualities, outcomes, and relationships are shown between cases, along with those themes of enactment which were similar.

3.3.1 Collaborative qualities

In terms of collaborative qualities, across all three cases, diverse views represented (the various views, perspectives, and experiences incorporated together in the process), acquiring new knowledge (unspecified types of learning), and multiple knowledge types were common. In contrast, the Saint John River and the Tantramar cases had some case specific qualities. For the Saint John River case, these were joint goals created, and inclusiveness; and for Tantramar these case-specific qualities were shared understanding, social capital and shared decision making.

A closer look at common qualities found across cases reveal their importance and is also comparable to past empirical examinations of collaboration. Firstly, a diverse set of views when addressing local climate change issues has often been emphasized in literature (e.g. Few et al., 2007; Cohen, 1997), and across cases the data demonstrates the importance of this quality and its influence in almost all outcomes. In both the Saint John River and Charlotte County cases, this quality was also mentioned as occurring in the planning of the collaboratives, as a precursor for ensuring that several different actor types are involved in the process. Interestingly, this may suggest that it is a quality which needs to be present earlier on in the process. This theme of enactment may therefore be indicative of the temporal aspect of this quality, which is an area of knowledge absent from the scholarly literature (Smedstad & Gosnell, 2013). Important to note in addition to this is that contrary to diverse views as an important quality, it is also acknowledged in scholarship as a challenge to collaborative groups' functioning (e.g., Sandström & Rova 2010). However, all key informants emphasized the importance of the quality of diverse views represented. They also all acknowledged that despite the challenges of this quality, their collaborative groups have still functioned effectively as a result of the group members' common interests of addressing climate change concerns.

Acquiring new knowledge also emerged as one of the most important qualities across cases. This quality was identified in Chapter Two as a nonspecific quality of learning (i.e. learning of various types). This quality appeared to be of greater importance to participants rather than social learning, which was identified as a more precise type of learning quality in Chapter Two. Acquiring new knowledge as a nonspecific type of learning is a quality mentioned frequently within the definitions of collaboration, with several scholars referring to the iterative nature of learning, discussing, and then acting (Caves et al., 2013; Leach et al., 2013; Allen et al.,

2011; Muñoz-Erickson et al., 2007). Arnold et al. (2012) also identifies collaboration broadly as a way to enhance learning about complex systems. In this manner, gaining new knowledge occurs when individuals come together to collaborate (Bodin, 2017), and some scholars find it as a highly important attribute of stakeholder interaction (i.e. collaborative quality) (e.g., Leach et al., 2013). As a highly important quality, acquiring new knowledge often occurred in many different ways, both within cases and across cases. One of the most important themes of enactment (ways in which it occurred across all cases) was using visual tools for sharing and discussing information, specifically on projected and past climate change impacts such as the flooding of the Saint John River in the Saint John River Case. This example relates to Gray's (1989, p.237) statement of collaboration as "action learning", with emphasis on bringing individual interests together and reframing problems in order to address all of these interests. Acquiring new knowledge is thus a quality which both appears to be important in the cases, as well as significant to collaboration in theory, despite social learning often being the focus of collaborative strategies in scholarship (e.g. Cundill, 2010).

In addition to being an important quality in the climate change collaborative groups, diverse perspectives and acquiring new knowledge often were mentioned in relation with multiple knowledge types when asked about how each occurred in interviews. Multiple knowledge types highlight scientific and traditional knowledge (Plummer et al., 2013). These qualities are often mentioned together in literature, with emphasis on the importance of diversity in collaboration, as well as the types of knowledge involved, both expert and lay, or local (e.g. van Tol Smit et al., 2015). One aspect of lay knowledge in which informants stated as something they need to work on is incorporating traditional views; however, there was still a broad representation of knowledge types with respect to local and scientific knowledge. Several scholars often identify knowledge and learning together as a key piece to collaboration in environmental management and governance (e.g. Leach et al., 2013; Muñoz-Erickson et al., 2010; Plummer & Armitage, 2007). This may indicate why these qualities can be seen as occurring together to influence different outcomes, and often through mechanisms of learning. This highlights their overlap and importance in terms of sharing views and learning from others.

3.3.2 Outcomes (results) of collaborating

Three outcomes were common across all cases: a greater appreciation of issues (new respect, appreciation, or view of the climate related issues), social learning (collective learning and subsequent new understandings which result from interacting with one another), and the development of management or adaptation plans. This last outcome was not selected as frequently in The Saint John River Case; however, one discrepancy may be that the adaptation plan was not complete at the time of the questionnaire completion. Some differences in outcomes were also seen between cases. The Saint John River case had unique outcomes selected of creative solutions, collective action, and a benefit to the environment. Charlotte County and surrounding area had outcomes of better governance, higher quality efforts and solutions, and adaptive capacity. Tantramar had unique outcomes of small wins and more inclination to participate. Although these outcomes were unique to individual cases, themes of enactment were similar, with education and learning through various types of resources being the most important themes.

A greater appreciation of issues is an outcome not typically explored in scholarly studies (see Chapter Two). It is a result mentioned only briefly in some empirical studies where qualitative data has pointed towards its potential importance (e.g. Fernandez-Gimenez et al., 2008). It was evident in all four interviews that the collaborative members being able to learn about, see evidence of climate change and its complexities, and how it will affect people locally resonated the most. These themes of enactment support why the most important outcome was a greater appreciation of the issues in the questionnaire. Connecting to “action learning” as identified in relation to acquiring new knowledge stated above, a greater appreciation of issues was also identified as a result of this learning, along with gaining a shared understanding by Gray’s (1989) seminal book. As a result of individuals sharing their own knowledge and seeing other perspectives, they begin to have this greater appreciation for the environment (Gray, 1989). More specifically, acknowledging the urgency of climate change clearly resonated with the collaborative groups. This realization of the need to act together on complex issues has been stated as a direct result of collaborating (Fish et al., 2010). The case studies confirm this through the importance of the outcomes of a greater appreciation of issues, as well as gaining a shared understanding.

Social learning (stated in plain language in the questionnaire as “learning from one another”; see Appendix 2-1 for specific definition used in this thesis) was seen as an important outcome in all cases, and is examined in much detail in collaboration scholarship in environmental management and governance (see Vinke-de-Kruijf et al., 2014). Social learning has been stated to contribute to collaborative relationships (Schusler et al., 2003), indicative of its dynamic nature and influence as both a quality and an outcome (See definition and discussion of this in section 2.3.2 of Chapter Two). The reason for this dynamic nature may result from it being considered a process itself (Baird et al., 2014; Cundill & Rodela, 2012; Muro & Jeffrey, 2008), therefore its occurrences as both a quality and an outcome need to be recognized. With this consideration, many propose that collaboration as a process can be a component of and promoter, or enabler of, social learning (e.g., Egunyu et al., 2016; Koontz, 2014; Mostert et al., 2007; Schusler et al., 2003). This further complicates how social learning is understood within collaboration as a quality and/or outcome. Nonetheless, its importance to individuals as an outcome may be indicative of its important linkages to other qualities selected. For example, scholars often identify qualities such as social capital as influential in social learning, and that these linkages are often difficult to measure due to its complexity (Allen et al., 2011; Plummer & Fitzgibbon, 2007). These discrepancies demonstrate how social learning is often intertwined and linked to collaboration (Mostert et al., 2007), further confirming its importance in each of the three cases.

The development of management or adaptation plans can be seen as a tangible result and be indicative of an effective collaborative process (Schuett et al., 2001), and all key informants agreed that due to the collective effort to develop plans, the collaboratives have been effective and people continue to participate. Although there were fewer themes of enactment noted, themes of moving work to action and creating positive opportunity reveal that these collaborative groups have been effective in working towards a common goal, and that outcomes which will result in a tangible product for people to see is important for continuing these collaborative initiatives. The development of these plans was also often identified as an example of the outcome of a “small win” by key informants in the Tantramar case. Small wins are intermediate outcomes that are often seen to be critical for successful collaboration (Ansell & Gash, 2007), and therefore may be seen to be closely linked with the outcome of the development of management or adaptation plans. This may have resonated more with respondents as they were

all contributors to the vulnerability assessments and subsequent climate adaptation plans. As a result, this outcome is evidently an important result in which collaborations may be considered effective.

3.3.3 Relationships between qualities and outcomes

In terms of the relationships between qualities and outcomes, and as seen in the individual analyses, top qualities were most often selected as influencing top outcomes in all cases. These were also the qualities and outcomes which were selected most as being related to one another, although there was evidently a lack of consensus on these relationships within individual cases. As a result of this, the cross-case analysis shows that there is still much variation seen with the relationships, thus explaining why only two overlapping ones are seen in Table 3.4 within the 30% selection mark shown. This is a result of variation (and case-specific qualities and outcomes selected) within individual cases, where there were mixed results in terms of which relationships were important. For example, the Saint John River case was unique in that the top quality, which was relationships, influenced most outcomes. The Tantrammar case showed that the quality of shared awareness, which was selected by 53% of people, influenced the outcome of a greater appreciation of issues the most. Despite these case-specific observations, the three qualities and three outcomes common across all cases were still those which were more often seen in cross-case relationships (i.e. relating to one another) identified in Table 3.4. So, although the relationships varied between cases due to different quality-outcome combinations (found in the questionnaires), themes of enactment (found in the interviews) for relationships in general were overall very similar to one another. As a result of this, these themes are the focus of the second half of this discussion of relationships.

First, some relationships unique to individual cases are comparable to relationships which have been cited in other empirical studies (see Figure 2.2 in Chapter Two). In the Saint John River case, for example, the quality of relationships was seen to produce a benefit to the environment through the theme of enactment of acting on common interest. More specifically, group members were able to share and discuss their similar experiences with the environment. Relationship building has also been identified as important and linked to achieving goals and positive outcomes (Schuett et al., 2001), however this was of less importance in the latter two cases. Diverse perspectives, a common quality across all cases, is also stated to be linked to

beneficial environmental outcomes (Scott, 2015), however this relationship was not identified by many across cases. In other instances, the quality of a shared understanding has been stated to be connected to the development of social capital (Plummer & Fitzgibbon, 2007). In comparison to this example from the literature, a shared understanding was important in the Tantramar case, and social capital was identified as an important quality rather than an outcome. Similar to social learning and a shared understanding, social capital may be considered both a quality and an outcome, further complicating observations of relationships. Other factors may also influence these blurred distinctions such as the types of actors who are involved in the collaborative process. For example, the key informant from Charlotte County noted the difficulty with examining groups when there is turnover with members in the process, bringing to attention other aspects which may be influencing qualities and outcomes which are important to people. Factors such as this may have influenced the level of importance of qualities and outcomes to people, along with other drivers such as pre-existing relationships between actors, or pre-existing views that they have had about one another or about collaboration more generally. As a result of these case-specific relationships and other influences, linkages between the collaborative process and its outcomes prove to be difficult to synthesize.

While acknowledging the overlap which often occurs between the qualities and their relationships to outcomes, collaboration can be seen as highly dynamic due to the iterative nature of the process (Ansell & Gash, 2007). The open discussion of these relationships with key informants revealed that often several qualities influence an outcome together, such as with Charlotte County and surrounding area, where qualities of acquiring new knowledge, commitment, shared problem solving, and active involvement were selected as influencing both better governance and the development of management or adaptation plans. Although outside the scope, several qualities likely occur together in the process and should be acknowledged (see Chapter Two for similar observations). As a result, although there are fewer patterns seen across cases with the relationships between qualities and outcomes, the findings indicate that there may be qualities which are together influential in an outcome.

Overall, relationships found between individual qualities and outcomes revealed many differences across cases, and similarities between cases with these were seen through the themes of enactment in which they occurred. There were two themes of enactment which relationships

were most frequently seen to occur under: learning occurring for positive action and education. These themes for relationships highlight key findings, regardless of the quality and outcome which were linked. These themes of enactment were identified in relation to how the groups first became more familiar with the risks associated with climate change, and then understood what it meant for their region. This then allowed for them to better (and more collaboratively) determine how to best adapt to changes which are projected to occur. Other empirical studies of collaboration identify the importance of collaborative arrangements in enabling these dynamic learning processes (e.g. Smedstad & Gosnell, 2013), and the various different linkages which occurred between qualities and outcomes under common themes of enactment of learning and education revealed their importance.

Learning occurring for positive action was a top theme of enactment for many relationships which occurred. Within this theme, the most important areas in which enactment occurred under this category were through both cognitive learning and relational (closely related to social learning and social aspects of learning- see Baird et al., 2014) learning. All informants indicated that both types of learning were important in the process, and it was often the case that the former occurred and then the latter followed. Qualities such as acquiring new knowledge and diverse views related to outcomes such as a greater appreciation of issues, social learning, and gaining a shared understanding through these themes. Relational learning, classified in this study as similar to social learning, is a key mechanism identified by Baird et al. (2014) as both being central to interactive decision-making processes, and also emerges as a product of collaborative processes. As a result, much literature focuses on this interactive way of learning (see Chapter Two), however cognitive learning also proved to be important ways in which relationships between qualities and outcomes were seen. In addition to this, several interviewees also identified that people learning how to be resilient was important mechanism which influences outcomes of adaptive capacity, win-win outcomes, a greater appreciation of issues, and new partnerships. All of these secondary themes which occurred under learning for positive action resonate with broader literature findings in which learning is discussed in a broader context and seen as influential in the relationship between the collaborative process and its outcomes (see Leach et al., 2013; Plummer et al., 2017).

Education was also an important theme of enactment found across all three cases. Qualities in which this was most seen to occur through was acquiring new knowledge, multiple knowledge types, active involvement, and shared awareness- all of which education of climate change impacts influenced people's understanding and recognition of the urgency for adaptation action. Several outcomes were stated to be connected to these qualities, including gaining a shared understanding, win-win outcomes, a greater appreciation of issues, social learning, and more inclination to participate. Through education, these relationships between qualities and outcomes were evident in the qualitative data, as all informants used flood maps as an example of a way in which these elements were linked from collaborative working group meetings. Providing and presenting scientific information to a variety of stakeholder types has also been found by Monroe et al. (2013) to be a successful strategy for both gaining new knowledge and fostering empowerment and action. Acquiring new knowledge was a quality both highly important in the process, as well as was more frequently related to multiple different outcomes. Also, in relation to the theme of education, the importance of sharing climate change data has been recognized in that "Increasing the probability that conservation is guided by science depends on the recognition that science is one of the many elements that determines whether conservation will be successful" (Lauber et al., 2011, p.1193). This starting point may be beneficial in also beginning to incorporate other knowledge types once there is a more common understanding of climate change science itself (and how it contributes to knowledge), further confirming the importance of educating one another.

Overall, the quality-outcome relationships show how respondents' perceptions often differ in terms of which linkages are most important, based upon the diverse selections in the questionnaire. Relationships between process and outcomes are widely seen as an obstacle in knowledge surrounding how collaboration occurs in practice (see Plummer et al., 2017; Scott, 2015; Thomson et al., 2014; Blackstock et al., 2012; Muñoz-Erickson et al., 2010; Koontz & Thomas, 2006). Exploring collaborative qualities which contribute to the process and how they influence results of collaborating provides a means for exploring this difficult area of study. Given the long list of qualities and outcomes which could be selected in the questionnaire, the various combinations of relationships selected between these also point to the "black box" of the intricate process of collaboration being poorly understood, as identified by scholars (Plummer et al., 2017; Thomson & Perry, 2006). Although a study by Plummer et al. (2017) quantitatively

confirmed the presence of these relationships, results from this study confirm that these relationships will still differ both within and between cases. This could be assessed as either there is a lack of consensus on which relationships are most influential, or that people in the collaboratives themselves do not make the connections as they taking part in the process and therefore do not consider their importance.

3.4 Conclusion

This study addresses the gaps surrounding understanding how the collaborative process occurs (through the collaborative qualities that contribute to it) (Plummer, 2009) and how this relates to outcomes (Plummer et al., 2017). It also addresses the need for more empirical explorations which demonstrate how collaboration in the environmental domain occurs (e.g., Muñoz-Erickson et al., 2010). The multiple case study analysis provides important understandings surrounding what qualities, outcomes, and relationships between are seen to be important in collaborative groups. It is also important to acknowledge that these processes are ongoing. New members are consistently brought in, new ideas are developed, and new information is brought in or discussed. This creates more complexity in understanding when these elements of interest occur. This is, however, essential to recognize because factors such as these may influence the qualities which people believe to be more important in the process, and subsequently which of these influence outcomes. As a result, relationships may be more important to consider in individual case settings. Despite these acknowledged limitations, the cross-case comparison showed acquiring new knowledge, diverse views represented, and multiple knowledge types are important qualities of the process; and a greater appreciation of issues, gaining a shared understanding, and developing management or adaptation plans are key outcomes which group members found most important. The key relationships seen were often between these top qualities and top outcomes, occurring mostly through themes of learning occurring for positive action and education. This may suggest that relationships differ across similar cases yet are enacted in similar ways. Finally, the results demonstrate that although there may not be a specific set of “key ingredients” in collaborative climate change adaptation, there are some elements which may be more effective (e.g., the quality of acquiring new knowledge and outcome of a greater appreciation of issues). Overall, the findings provide deeper insight into

collaboration in practical settings through identifying specific elements which are important to individuals who are experiencing and participating in a collaborative process.

The case studies explored are informative for collaboration in local climate change adaptation efforts. They suggest that the groups can be effective in collaborating to address a wicked problem such as climate change, and the cross-case qualities and outcomes may inform other collaborative efforts. The positive manners in which key informants spoke about their collaborative and examples used related to their successes when discussing how qualities, outcomes, and relationships were enacted indicated this. The findings also highlight the importance of themes of enactment surrounding learning and knowledge more broadly, especially for progressing with group meetings and their functioning. While these broad themes have been considered in relation to this context in previous studies (e.g. Plummer, 2013), the analysis undertaken provides new knowledge of which qualities and outcomes are associated with these themes. It enhances current understandings surrounding how collaboration works in practice, particularly with climate-based collaboratives. Collaborative groups will therefore find useful these results as it enables them to acknowledge the qualities which are most important in practice and the types of outcomes which they aim to realize as a result of collaborating. As a whole, understanding these key qualities and outcomes which are present in collaborative groups can help foster actionable solutions as multiparty collaborative groups recognize the purpose and benefits of the collaborating.

Finally, it must be acknowledged that key informant perspectives represent only one perspective of how collaborative qualities and outcomes occur, and that others may perceive these to be enacted in different ways. In addition to this, the type of stakeholder which an individual represents, as well as their level of involvement, may be influential in the types of qualities and outcomes which they believe to be most important. Measurements of participant attitudes and perceptions of collaborative initiatives has been suggested as a way to understand the effectiveness of collaboration (Selin et al., 2000). This demonstrates the importance of acknowledging and considering the influence of perceptions of stakeholders involved when studying collaboration. Therefore, these additional considerations provide an avenue for future research on understanding how perceptions and different types of stakeholders influence the

qualities, outcomes, and relationships which they both perceive to be more important, as well as perceive to be enacted in practical settings.

Finally, future research should also involve further exploring qualities, outcomes, and their relationships in other case studies. This can be further explored in both climate-based collaboratives to see if cross-case findings in this study hold true with other cases, as well as whether in other contexts of collaboration in the environmental domain to see whether results can be generalizable to this. Additionally, it would be useful to explore the nuances between larger versus smaller collaborative groups to better identify settings in which each element is important and how they occur in these varying settings and/or contexts. In addition to this, longitudinal studies are recommended (Plummer et al., 2016) and can aid in better exploring how these qualities and outcomes occur at different stages in the process as well as over time could contribute our understanding of these elements in practice. This temporal dimension has been identified as an influencing factor to collaborative processes (Smedstad & Gosnell, 2013), and removing limitations of one data collection point may reveal further the influence of different qualities on different outcomes. Despite this temporal limitation to this study, collaboration as an overall approach seems to be a promising method for addressing and beginning to determine ways to adapt to climate change.

3.5 References

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Chapter Four: General Discussion and Conclusions

4.0 Thesis summary and discussion

Collaboration is seen to be highly beneficial in environmental management and governance processes because of the inclusiveness of diverse actors and increased likelihood of achieving improved results (e.g. Ansell & Gash, 2007; Innes & Booher, 1999). It is also valuable for resolving conflicts, operationalizing action, and fostering social-ecological sustainability (e.g. Fliervoet et al., 2016; Muñoz-Erickson et al., 2010; Armitage et al., 2009; Margerum, 2008; Selin & Chavez, 1995). Several examples in scholarship demonstrate the potential of collaboration, ranging from examples of fisheries co-management (Plummer & Hashimoto, 2011) to broader examples of collaborative climate change adaptation (e.g. Head et al., 2016; Leck & Simon, 2013). Using collaboration as an approach to both 1) deal with limitations of conventional approaches to environmental management and governance, and 2) address the complexities of wicked environmental problems, posits it as a noteworthy strategy to investigate (Cradock-Henry et al., 2017; Baird et al., 2016; Head et al., 2016; Ansell & Gash, 2007; Conley & Moote, 2003).

The overarching objective of the thesis was to both explore and better understand collaboration in environmental management and governance. Three knowledge gaps (outlined in Chapter One) were addressed in the thesis. The first knowledge void focuses on the lack of understanding seen in scholarship on how the collaborative process occurs (Plummer et al., 2012; Plummer, 2009). This was examined in this thesis through collaborative qualities which contribute to the process (See Chapter Two), which expands on new knowledge of these from a recent study by Plummer et al. (2017a). The second void addressed the challenges with understanding the relationships between the collaborative process (particularly in terms of the qualities that contribute to it) and its outcomes (Plummer et al., 2017a, b; 2012; Blackstock et al., 2012; Scott, 2015; Koontz & Thomas, 2006; Schuett et al., 2001). Finally, the third void addressed the need for empirical evidence of these relationships to demonstrate how collaboration occurs as an alternative approach in practice (Mandarano, 2008; Muñoz-Erickson et al., 2010; Plummer et al., 2012). In addressing these voids, Study One (Chapter Two) aimed to conceptually unpack the qualities which contribute to the process of collaboration in the environmental domain from existing scholarship and establish connections to outcomes. Study

Two (Chapter Three) aimed to explore these findings in empirical cases of multiparty collaboration in the environmental domain, using a multiple case study methodology.

Study One aimed to synthesize the current state of the scholarly literature on collaboration in environmental management and governance. An inventory was developed through a systematic mapping review on three elements of interest: collaborative qualities, outcomes, and relationships between qualities and outcomes of collaborating. The systematic map demonstrated the diversity in qualities which are stated to contribute to the collaborative process, with fewer outcomes identified in the literature. Many different combinations of relationships were also identified in different examples of collaboration. Building upon this synthesis, Study Two aimed to explore findings from the systematic map in empirical settings to determine the relative importance of the qualities and outcomes as well as the relationships between them. A multiple case study methodology adapted from Yin (1994) was followed to explore three cases of climate change adaptation in New Brunswick, Canada. The two studies in this thesis overall show some similarities, however many differences were identified between them in terms of which relationships occur. The thesis findings provide an entry into gaining a deeper understanding of how collaboration in environmental management and governance works in both theory and practice, through addressing the three knowledge voids outlined.

Brought together, findings from the thesis both relate to scholarship on collaboration in the environmental domain and contribute to the aforementioned knowledge voids. These overall findings from the thesis follow and are presented in terms of collaborative qualities, outcomes, and relationships.

Collaborative Qualities

Overall, both studies in the thesis showed variation in terms of which collaborative qualities were most important in the process. The strongest qualities and outcomes identified in Study One were not always the same as the ones selected as important by collaborative group members in Study Two. In Study One the strongest qualities were trust, social learning, active engagement, dialogue, diverse perspectives, and multiple knowledge types (see Table 2.2 in Chapter Two). In Study Two, qualities identified as important by all three collaboratives were acquiring new knowledge (nonspecific types of learning), diverse perspectives, and multiple knowledge types (see Table 3.4 in Chapter Three). Other qualities found in Study Two, such as relationships and joint goals created, were of mid-level strength in Study One. Although this

variation was found, common or similar qualities found to be important in both studies are further examined together in relation to scholarship below.

Especially noteworthy was the importance of acquiring new knowledge (unspecified learning) in Study Two, whereas literature in Study One focused much more on social learning. As identified in Study One, social learning is often the type of learning associated with collaborative processes (e.g. Mostert et al., 2007) and is extensively examined as a result of this (e.g. Cundill, 2010; Plummer & Fitzgibbon, 2007; Bouwen & Taillieu, 2004). It was defined (both as a quality and outcome) as a change in understanding through social interactions between actors, in a process of mutual or shared learning (see Muñoz Erickson et al., 2010; Reed et al., 2010 in Cundill and Rodela, 2012; see also complete definition in Appendix 2-1). However, Study Two demonstrates that learning occurs in different ways, seen through themes of enactment such as the use of visual tools for sharing and discussing information. This nonspecific learning quality is identified as simply acquiring new knowledge during the collaborative process (e.g., Leach et al., 2013; Allen et al., 2011; Muñoz-Erickson et al., 2007). Where Study One highlighted social learning as a high-strength quality and outcome, Study Two indicated that this unspecified learning (acquiring new knowledge) was an important quality and social learning an important outcome (which were also often linked with one another). The reason these discrepancies are seen are likely due to social learning being understood in different ways both as a concept and as a process itself (see Baird et al., 2014; Armitage et al., 2008), influencing how it varies in importance as a scholarly concept versus how it is seen in practice. These also may indicate the different ways in which people learn throughout the process, depending on the type of actor they represent. As collaboration is also experienced differently by individuals (Fresque, 2008), it can be hypothesized that both qualities are considered highly relevant, contributing to knowledge of how the collaborative process occurs (Plummer, 2009).

Qualities of diverse views represented and multiple knowledge types were also seen as important both in Study One and Study Two. As these two qualities are closely related, as well as often interconnected with social learning and acquiring new knowledge, it was evident in both studies that the diversity of actors and their perspectives and knowledge which they bring is beneficial. Diverse stakeholders which can provide different perspectives and experiences are considered by many an imperative element to collaborating (e.g. Plummer et al., 2016; Margerum, 2008). In accordance with this, the quality was often identified in Study Two under

the theme of enactment related to the planning of the collaborative process. This planning was done to ensure that these different views are represented and integrated in discussions. This also relates to how scholars have discussed the importance of knowledge (see van Tol Smit et al., 2015) and its necessity in contributing to decision making processes (Plummer & Fitzgibbon, 2004). This demonstrates the importance of the quality of multiple knowledge types. Although these different knowledge types may be used at different stages in collaborative processes (van Tol Smit et al., 2015), this quality appears to be important in many empirical cases of collaborative environmental management and governance processes (e.g. Lundmark & Jonsson, 2014). These qualities therefore, in addition to acquiring new knowledge and social learning, emphasize key attributes that contribute to the process.

Other examples demonstrate divergence between the qualities which were higher strength in Study One and qualities which were of lesser importance in Study Two. Social capital was a quality which was fairly strong in Study One, however was unimportant in Study Two (only one case identified its relative importance). Several scholars suggest social capital is essential as a quality (e.g. Adger, 2003), however it is also arguably more relevant as an outcome (Koontz & Thomas, 2006), or as both of these (Wagner & Fernandez-Gimenez, 2008). One reason for these variations between studies may relate to the complexity in which qualities of trust, relationships, and respect which are both identified as individual qualities and are also discussed in relation to social capital (see Chapter Two outlining the overlap between these qualities). For example, as an individual quality, trust was more important in Study One (e.g., see Muñoz-Erickson et al., 2010; Ansell & Gash, 2007), yet relationships appeared to be more important in Study Two. There are several reasons why this may have occurred. The first is that much evidence of the quality of trust was often described in relation to theoretical understandings of collaboration (e.g. Stern & Coleman, 2015). Relationships is a quality which has emerged as a factor in scholarship to be considered a key to successful collaboratives (Schuett et al., 2001), and more recent findings confirm its importance (e.g., Brisbois & de Loë, 2017; Allen et al., 2011). In addition to this, it is also acknowledged that trust and relationships as separate qualities may also influence one another, which could affect their importance in different scholarship and practical settings. As a result of the complexity of social capital and parts of it which are sometimes considered separate, assumptions could be made that relationships and trust may be more important

separately as qualities and translate into the important outcome of social capital as mentioned above, based on the empirical evidence.

Overall, qualities identified in both studies address the gap of understanding in relation to how the collaborative process occurs (Plummer, 2009), which was explored in this thesis through collaborative qualities which contribute to the process. These qualities in the process can be examined in relation to outcomes (Plummer et al., 2017a, b; Blackstock et al., 2012), the second void of knowledge which was addressed.

Outcomes (results) of collaborating

Outcomes, which are often discussed in less detail in scholarship, continue to be absent from analyses and are often unclear in both the literature and in practice (Plummer et al., 2017; Scott 2015; Mandarano, 2008). This was observed when comparing Study Two to scholarship findings in Study One. Further, most scholars identify ecological or environmental outcomes as important yet difficult to measure in evaluating success or effectiveness of collaboration (e.g. Scott 2015; Muñoz-Erickson et al., 2010; Mandarano, 2008; Koontz & Thomas, 2006). However, the results from the studies reveal the importance of social outcomes, such as social learning or gaining a shared understanding. In Study One, outcomes ranked highest were social learning, social capital, implementation, creative solutions, and the development of management or conservation plans (see Table 2.3 in Chapter Two); cross-case findings in Study Two showed that a greater appreciation of issues (with a strength ranked 17 out of the 22 outcomes in Study One), social learning, and the development of management or adaptation⁶ plans were most important (see Table 3.4 in Chapter Three). These results may arguably be key to effects of collaborating (i.e., longer term outcomes which were not examined in this thesis; see Plummer et al., 2017a, b), yet more knowledge is needed surrounding how these findings may influence both social and environmental effects of collaborating. The mixed results for outcomes seen in both studies therefore reveals the inconsistencies of what is considered to be important or relevant outcomes.

Given these nuances, many more differences than the qualities results are seen with outcomes between the studies. As seen above, outcomes typically identified as important results

⁶ Note adaptation was specific to the context of Chapter Three, where in Chapter Two it was coded broadly as “management or conservation plans”

of collaborating in Study One appeared to be unimportant in Study Two. As an example, implementation, the third strongest outcome in Study One, is typically identified as a beneficial outcome to collaborating (e.g. Brisbois and de Loë, 2016; Stern & Coleman, 2015; Schuett et al., 2001). However, it also comes with barriers and difficulties in management and governance plans (Guerrero et al., 2015; Knight et al., 2006; Frame et al., 2004). The absence of this outcome in Study Two may point towards its ambiguity to people and potential lack of importance in the practical setting. In other words, implementation may have already been assumed as a result since the collaboratives formed with the intention of first completing regional vulnerability assessments and subsequent adaptation plans. Alternatively, it may not have been relevant had implementation of the adaptation plans not occurred yet. This may explain why the outcome of developing management or adaptation plans was more important to individuals in the case studies, as it was a necessary stage of the process and implementation therefore may be considered as an effect rather than result with these specific cases. Where these nuances are seen, it is therefore not yet known to what extent outcomes such as these appear to be most important.

Although many differences were seen with the strength or importance of outcomes between both studies, the one most consistent outcome finding between both was the importance of the result of social learning. As previously identified, social learning is often closely associated with collaborative processes (Mostert et al., 2007; Bouwen & Taillieu, 2004) and is also often identified as an outcome in relation to successful collaborations (e.g. Jacobson et al., 2009; Schusler et al., 2003). Interestingly, this outcome has also been found directly relate to social outcomes, and has also been stated to promote the realization of environmental outcomes (Vinke-de Kruijf et al., 2014), which were absent from the results. Therefore, the results suggest the importance of social learning as an influential result of collaborating. It also indicates that it is related to many qualities which occur in the process. While the focus of this thesis was not on evaluating the success of collaboratives, social learning has been frequently examined in successful settings (e.g., Schusler et al., 2003), and this validates its importance as a positive outcome of collaborating. This knowledge of outcomes as a result provides evidence as to which of these appear to be important in both theory and practice.

Relationships

Both studies also verify the high level of complexity and overlap seen when identifying relationships between qualities and outcomes in both diverse (see Chapter Two) and similar (see

Chapter Three) environmental settings. Koontz and Thomas (2006), among other scholars (e.g. Blackstock et al., 2012; Muñoz-Erickson et al., 2010), acknowledge the challenges associated with linking processes to outcomes. This variation and lack of consensus on relationships which occur in collaboration was seen in both studies. In Study One, several different combinations of qualities relating to outcomes were identified in scholarship. In Study Two, variation in relationships selected occurred both within and across cases. There was no single relationship in which individuals in all cases identified as commonly important. Social learning was the quality of the collaborative process which was linked most frequently with outcomes in Study One, whereas Study Two showed social learning as an outcome, yet not influenced by qualities as frequently. In general, there is still much difficulty with linking process features such as the qualities which contribute it, to outcomes, however evidence of these linkages is present (Plummer et al., 2017a), and further confirmed in this thesis. This shows how a handful of certain qualities such as social learning may be more often connected to outcomes than others, but also encourages for other qualities to be investigated deeper.

Social learning, social capital, and shared understanding as both qualities and outcomes seen to be most often linked with other qualities or outcomes in the studies (with some discrepancies between studies) are unsurprising given their more detailed examinations in scholarship, particularly with social learning and social capital. For example, social learning has been linked as a quality to outcomes of small wins, and inversely as an outcome influenced by active involvement (Bouwen & Taillieu, 2004). These findings imply that due to their dynamic nature and occurrence throughout the entire process (see discussion in Chapter Two), these qualities and outcomes may be considered as being highly interconnected in terms of their relationships. Although this may be true, it is still cautioned that some may be more influential in collaboration theory and conceptualizations. Particularly social capital, which was highly linked as a quality and outcome in Study One, and its lack of presence found in Study Two may indicate a need for further exploring its relationships in empirical settings to better determine its importance and influence as a quality or outcome. While social capital has been stated to be built through collaborating and changes over time (Kerret & Menahem, 2016; Wagner & Fernandez-Gimenez, 2008), it may also be often interconnected with other qualities or outcomes (see discussion in Chapter Two) and should therefore not be ignored based on its lack of presence in Study Two results. For example, social learning and social capital (regardless of being qualities

or outcomes), are often stated as being “inextricably linked” Plummer & Fitzgibbon, 2007, p.57). This demonstrates the complexity of studying these dynamic qualities and/or outcomes, as well as their potential importance in collaboration.

As mentioned, relationships between qualities and outcomes shown in Study One (see Figure 2.2 in Chapter Two) sometimes had contradictory results in Study Two. A greater appreciation of issues in Study Two was an outcome influenced by many qualities, whereas Study One showed minimal scholarly evidence of this outcome and as a result was low strength. This suggests that there is often substantial focus given to relationships between the qualities and outcomes which are examined more frequently in scholarship (see top outcomes in Table 2.3 in Chapter Two). Study Two, however, reveals that these frequently examined outcomes may not be the most important in practice and that understudied outcomes such as a greater appreciation of issues may be more linked to qualities than typically hypothesized. Given this, some outcomes which are not examined as frequently in scholarship than others may have important unknown linkages with qualities, as identified in the first paragraph of this section. Study Two demonstrates this with a greater appreciation of issues as an example of an outcome which may be more important than expected in collaboration in the environmental domain, as noted in Chapter Three.

While the complexity of relationships has been acknowledged by scholars (Plummer et al., 2017a; 2012), the thesis addresses this void through both synthesizing relationships (Study One) as well as explaining how they occur in empirical settings (Study Two). Although both findings showed a lack of a pattern on the important relationships, the qualitative portion of Study Two informed on how these may occur in practice, with key themes of enactment evident in the cases. One theme which appeared to be highly important in how these relationships are seen was through the theme of learning occurring for positive action. Findings in Study One on qualities which were linked to outcomes tended to be those qualities which related to learning, knowledge, and shared understandings (Muñoz-Erickson et al., 2010; Daniels & Walker, 1996), which coincides with the findings from the empirical study. These are suggestive of the importance of learning and knowledge as broad ways in which collaboration may occur and how groups move forward with solutions. These findings also demonstrate that although relationships are imperative to consider in collaborative processes, they likely vary in importance in all cases (both similar and dissimilar, based on both study findings).

Overall, findings highlight the disconnect which is observed between theory and practice of collaboration in environmental management and governance. Although similarities were seen between collaborative qualities and outcomes (results) of collaborating between studies, it must be acknowledged that there is no set of “key” ingredients in collaboration. It has been demonstrated that there are several qualities and outcomes which are important in different settings of collaboration in the environmental domain, and that relationships are contingent upon which of these are important. This may provide explanations for the “messiness” of the collaboration scholarship, in that it is difficult to explore as a result of the variation in environmental management or governance approaches, settings, people involved, and other factors. While this difficulty in examining collaboration as a concept in this area of scholarship prevails, the synthesis of the elements of interest provides useful insights into qualities and outcomes that may be important to consider. It highlights those elements which may potentially be more common to collaboration in environmental management and governance processes.

4.1 Conclusions

More scholarship continues to emerge on the topic of collaboration to understand it as a concept and/or strategy, as well as the challenges that come with it (see Bodin, 2017; Plummer et al., 2017a, b; Cradock-Henry et al., 2012). While it must be acknowledged that collaboration is not a single solution to solving environmental problems, or effective in all situations (Bodin, 2017; Conley & Moote, 2003; Selin & Chavez, 1995), it is seen as a positive strategy to overcome past management and governance limitations (e.g. Holling & Meffe, 1996) as well as address wicked environmental problems (e.g. Head et al., 2016; Conley & Moote, 2003). Developing a more robust knowledge base of both its process (through the collaborative qualities that contribute to it) and outcomes (through the results) and how they relate provides important steps in advancing theory and practice for collaboration in environmental management and governance. Thus, the aim of the thesis was to unpack this process in terms of these three elements of interest: collaborative qualities, outcomes, and relationships. The objectives associated with this aim were to 1) explore what is known in the scholarly literature on these elements and 2) explore them in empirical cases of environmental collaboration. The overall results contribute to both theoretical and empirical understandings of how collaboration in the environmental domain works and can be understood, through addressing voids in the literature brought to attention by scholars such as Ansell and Gash (2007), Koontz and Thomas (2006),

and Plummer et al. (2012;2017a, b). Particularly Plummer et al.'s (2017a, b) studies on exploring these in the context of ACM provided rationale for investigating the elements of interest in this thesis more closely.

This study contributes new knowledge about collaboration in the environmental domain to both scholarship and practice. Study One addressed Objective One of this thesis through providing a synthesis of current understandings of collaboration in environmental management and governance through highlighting three elements of interest. This inventory allows for both a clearer representation of which of these elements are examined most in the literature, and to what extent. It also highlights the complexities associated with linkages in terms of relationships. Study Two addresses Objective Two of this thesis and contributes to empirical scholarship and shows how collaboration can be understood in practice, particularly in a climate change adaptation setting. The case studies explored provided examples of groups advancing shared visions and shared challenges associated with the effects of climate change impacts such as increased intensity of storms and flooding. Through exploring the elements of interest, this study revealed how certain ones are both important and enacted in similar ways to address urgent issues associated with climate change. They also provide context on how these occur from perspectives of individuals who are highly involved in these processes.

The results of this thesis can contribute to fostering more effective and meaningful collaboration in the environmental domain with a more comprehensive understanding of the qualities in the process and outcomes. The findings indicate that some qualities and outcomes are often the subject of theoretical knowledge (such as trust) and discussion of collaboration as a concept, and that empirical settings may reveal other important elements which should be further examined. Key qualities from both studies differ, however diverse perspectives, multiple knowledge types, and learning (as either social learning or unspecified types of learning) appear to be important to collaboration in environmental management and governance. Outcomes reveal that there is a need for further analysis of those which are not as commonly studied, such as a greater appreciation of issues. Relationships demonstrate the complexity of collaboration as an iterative, constantly changing process, and both strong qualities in Study One and important qualities in Study Two are often those which are seen to be more influential and connected to outcomes. These relationships are essential for better conceptualizing collaboration as a process in the environmental domain, which continues to be difficult to piece together by scholars who

study these strategies (e.g., Schuett et al., 2001). In addition to this, further examining these relationships in empirical settings would support the speculation that the high strength qualities in Study One and important qualities in Study Two may also be those which may be linked more frequently with one another. Finally, in examining these, it was also important to acknowledge the inevitable temporal aspects of the process in which qualities and outcomes overlap and/or occur at different stages (see Chapter Two). As this is a limitation to this study, the results nonetheless indicate that many relationships occur in collaboration and add to their complexity.

In concert, the thesis addresses the aforementioned knowledge voids related to challenges with understanding the nuances of collaboration in the environmental domain (Plummer et al., 2017a; Bingham & O’leary, 2006; Koontz & Thomas, 2006). With these new understandings, findings from this thesis suggest how collaboration can be understood in terms of two areas: as a concept in environmental management and governance scholarship, as well as a concept specific to the context of climate change adaptation. With the former, this research contributes knowledge of how the entire collaborative process occurs. It reveals how variation between the elements of interest occur within this area of scholarship, and that the concept continues to evolve since Gray’s (1989) seminal work. Knowledge from this study also indicates that approaches which incorporate collaboration, such as the key example of ACM, also vary in terms of elements of interest and it should therefore be acknowledged that this dynamic process can be understood in different ways. With the latter, in terms of climate change adaptation, findings show that these elements can inform how collaboration occurs, functions, and can move forward in practical settings. Climate-based collaborative group may find these results useful in terms of understanding how the dynamic of groups may differ and how certain qualities may be more necessary or important in realizing different results. Findings also may be useful in that the evidence can provide interested group members, facilitators, or convenors a glimpse into which qualities and outcomes are thought to be important, and how these may be seen in their own collaborative group context. These findings overall can be useful for further research and application of collaborative strategies in the two areas identified above.

4.1.1 Recommendations for future research and practice

- a) Recommendations for future research

Based on the findings from the thesis, several recommendations can be made for future research. First, future research should probe the differences seen between 1) theoretical and empirical understandings of collaboration in scholarship and 2) perspectives of scholars versus practitioners. For the former, qualities such as deliberation and negotiation are stated to be key qualities in theory of collaboration (e.g. Head et al., 2016), along with outcomes such as conflict resolution and implementation (e.g. Smedstad & Gosnell, 2013; Selin & Chavez, 1995). However, Study Two indicated that there may be other elements which are more important. Although the majority of scholarship identified in Study One consisted of empirical evidence, beginning to explore the nuances associated with the variation seen between Study One and Two can help to more clearly understand collaboration in different environmental contexts. This also relates to the observed disconnect between important elements identified by scholars versus practitioners. Further, acknowledging and identifying key differences in how the collaborative process may be perceived from a scholarly lens versus a practitioner lens of collaboration can be useful for future research. Exploring how these perspectives of collaboration vary may provide useful insights into the stated importance of certain elements. Finally, in exploring these nuances between theoretical and empirical evidence, as well as between scholars' perspectives versus practitioners, future work could also focus on how the elements vary in similar and different environmental contexts. Some patterns may be found in similar environmental contexts such as with climate-based collaboratives, or collaborative forestry management groups. Overall, the findings from this thesis can be examined through different lenses which would contribute to future scholarship and better inform how collaboration may occur differently depending on the type of study, perception of collaboration, and type of environmental context.

Second, it was noted in both studies that there are likely multiple qualities which influence the process of collaboration as well as different outcomes which come about. These were noted as "interactions" between qualities and has also been identified as a literature gap (Plummer et al., 2012; Plummer, 2009). As a result, future work could add to knowledge gained from the thesis by accounting for and synthesizing interactions which may occur between collaborative qualities. Understanding how qualities themselves are linked may prove useful in understanding which are important to have together (in which some initial insights of this were observed in the thesis) in the process, as well as more clearly linking their influence on outcomes.

Third, the temporal aspects of when these qualities, outcomes, and relationships actually occur (i.e. at what stages of the process are they important or occurring) was beyond the scope of the thesis, but the findings support calls for longitudinal inquiries (e.g., Plummer et al., 2016) to enhance knowledge and to further understand the dynamic nature these elements of interest (see Chapter Three for discussion of this). They can also be useful in terms of informing how to monitor and evaluate collaborative efforts to determine their success, which has also been cited as a knowledge void in collaboration scholarship (Conley & Moote, 2003). In addition to the benefit of examining temporal aspects in a longitudinal study, this would also allow for more comprehensive examinations and understandings of outcomes. As results were the type of outcome examined in this thesis, effects (see Plummer et al., 2017a) should be further considered in order to capture both the shorter term (results) and longer term (effects) outcomes of the process of collaboration. Applying the findings from the thesis and exploring the elements over a time period would be beneficial for further understanding collaboration, and these suggestions can all be explored in different empirical cases.

Fourth, future work may also aim to understand how collaboration works in other approaches in the environmental domain, outside of the management-governance context examined in this thesis. This includes inquiries unique to management or governance as well as other strategies. For example, it has been recognized that there are several approaches in which collaboration is implicit (see Chapter One), such as ecosystem-based management (e.g. Brody, 2003), or adaptive governance (e.g., Chaffin et al., 2014). A more comprehensive understanding of how collaboration works in the environmental domain may emerge from this line of inquiry.

Lastly, the findings and methods employed in this thesis can provide a departure point for future scholarly research exploring collaboration across disciplines. Findings may be able to inform the inconsistencies and messiness of collaboration in other research fields such as public administration (e.g. Thomson & Perry, 2006) or psychology (e.g. Bouwen & Taillieu, 2004). The findings on qualities and outcomes can be explored to see the extent to which they may apply to these other disciplines, with the potential for identifying new qualities and outcomes that emerge specific to other disciplines. The relationships may also reveal interesting results when assessed in these other types of contexts. While cautious to not generalize the findings from the thesis beyond the environmental domain, exploring these elements in different disciplines using the methods described here may aid in grasping how collaboration is conceptualized in many

different ways. As identified in Chapter Two, there is caution with formulating a single general theory of collaboration (Wood & Gray, 1991), yet future work may inform on how it can be understood specifically in different disciplines.

b) Recommendations for practice

In terms of practice, the thesis contributes to informing and improving collaboration in the environmental domain, and therefore, collaborative groups may find useful the examples of cases in Study Two and consider the presence of certain qualities and outcomes when fostering an effective process. One recommendation for practice is to encourage multiparty collaboration and consider that certain elements will likely differ between groups. Facilitators, convenors, or people wishing to develop or move forward with collaborative groups can consider examples such as the cases in Study Two to help inform the directions they would like to go with their own group. Adopting a similar questionnaire format as used in Study Two, other collaborative environmental groups can use a similar tool to identify what group members have found to be most important in terms of the qualities of the process and outcomes. Using the identified elements from the thesis, practitioners could use this group-specific information to inform their group actions by acknowledging which elements have resonated most with the group. Thus, understanding group dynamics through these elements can provide useful insights for collaborative groups.

Lastly, limited work has presented information for non-researchers/practitioners targeted at ensuring effective collaboration, with Kelman et al. (2018) being one recent example. With new knowledge of specific elements of collaboration in environmental management and governance, more recommendations can be generated for current and emerging groups which can help to better plan for the process of collaboration. In addition to this, practitioners should work with researchers to develop specific methods of measurement for the identified qualities and outcomes to better determine their presence in different cases, as well as evaluate the level of importance each has with the collaborative group members. Developing measurements for each of these can provide more detailed understandings of both their importance and relevance in practical settings, as well as how they occur in these settings. Overall, the results can be informative for future work which better advises collaborative groups on how the process may be

effective. Similarly, more detailed analyses and measurement for evaluating each of the elements of interest can provide this necessary information for encouraging positive collaboration.

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Appendices

Appendix 2-1: Inductive codebook developed on qualities and outcomes

1. Collaborative qualities

Quality	Code Definition
Acquiring new knowledge (Learning of other types; not specified)	Learning mentioned broadly and not specified as a certain type (not in relation to social learning). References to learning and gaining new knowledge through methods such as learning by doing, interacting, and mutual learning (see Leach et al., 2013; Allen et al., 2011).
Active engagement	Reference to stakeholders being involved and interactive or participating in the process; reference to the repeated interactions, involvement (Caves et al., 2013; Muñoz Erickson et al., 2010; Fernandez- Gimenez et al., 2008), and participation (Reed et al., 2013) of stakeholders in collaboration (see also Armitage et al., 2009).
Building respect	Reference to actors gaining respect of one another through the process of collaborating; see social capital.
Commitment	Actor's ongoing dedication to the process and their willingness or agreement to work with others, learn, and participate in collaborative efforts (Muñoz-Erickson et al., 2010; Manring, 2007; Margerum, 1999).
Compromise	Reference to actors recognizing the trade-offs necessary for coming to agreements and (compromising) in order to make decisions and to collaborate; additionally, this includes the acceptance of others' viewpoints during this acknowledgement of trade-offs.
Deliberation	Any process to communicate, raise, and collectively consider issues, increase understanding, and arrive at substantive decisions (see in Schusler et al., 2003). This includes reference to processes of reflective, critical consideration and discussion of perspectives in a collaborative forum for working towards advancing joint preferences, agreements, and consensus (Yeboah- Assemiah et al., 2016; Brewer, 2013; Cooke et al., 2011; Armitage et al., 2007).

Dialogue	Reference to communication, conversations, and connections that bring new insights to every collective endeavour between actors (Allen et al., 2011; Donoghue et al., 2010).
Diverse perspectives	Reference to the full range of worldviews, perspectives, experiences, and interests that actors contribute to and consider in the process (Brewer, 2013; Allan & Stankey, 2009). This includes perspectives on what success is defined as, views of the issue being discussed, and reference to the involvement and incorporation of each of these views in the collaborative process (Fernandez-Gimenez et al. 2008; Ferreyra & Beard, 2007).
Empathy	Direct reference to actors envisioning (empathizing) situations through the eyes of other actors in order to understand them better (see in Wald et al., 2017). This is also examined through perspective taking, a critical component of empathy (e.g. see in Wald et al. ,2017).
Honesty	Actors being upfront and forthright, and truthful with one another (see Metcalf et al. 2015; Leach et al. 2013). Note: this is often closely related to trust, but coded when it was mentioned as an individual.
Inclusiveness	Reference to the fair inclusion of a diverse group of stakeholders and all actors being and feeling included in discussion, decision making, etc. when interacting in the collaborative setting.
Interdependence	Actors becoming dependent on one another in the process as they each gain benefits through collaborating, and as a result, overall interests are considered; also termed mutual dependency, exploring mutual gains, dependent (e.g. Donoghue, 2010; Manring, 2007).
Joint goal creation	Reference to actors agreeing upon and creating strategies together and this is present through actors achieving a common purpose (Ferreyra et al., 2007) and developing a common goal(s) (Davies & White, 2012; Selin & Chavez, 1995). this quality is both mentioned as occurring at the beginning of the process (e.g. Isley et al., 2013), or towards the end of the collaborative process (e.g. Vinke-de-kruijf et al., 2014).
Multiple knowledge types	Reference to the diverse set of knowledge types, including both western and traditional knowledge systems, coming together and collectively being used in the process for more effective solutions to be built (e.g., Hill et al., 2012; Muñoz-Erickson et al., 2007).

Negotiation	References to actors negotiating, bargaining, debating issues and views, and recognizing these conflicting interests (Jum et al., 2009)
Openness	Being flexible and open to (with references to an actor “believing” in) the process and recognizing differences (de Boer et al., 2016; Browning-Aiken et al., 2004; Schusler et al., 2003; Taipa et al., 1997).
Power sharing	Reference to the sharing of power and responsibility between actors (e.g. government, resource users, etc.) (Armitage et al., 2009; Carlsson & Berkes, 2005).
Sense of shared identity	References to collaborating actor’s feeling of unison and comfort gained through interacting with different types of actors for a more joint sense of visioning and cohesion (see Koehler & Koontz, 2008).
Relationships	Reference to actors coming together and building connections with new people as a result; see social capital also.
Shared awareness	References to each stakeholder in the process knowing and being aware of (being on the same page) what is happening in the process, with information being conveyed to all who are involved (Allen et al., 2011).
Shared decision making	Reference to the action of collective/collaborative decisions made with some sort of consensus among groups (Margerum, 1999).
Shared problem solving	Reference to process of actors working together (collectively) to solve problems and find solutions to those problems (e.g. Koontz, 2014) or resolve/reduce conflict and/or disputes (e.g. Isley et al., 2013). This includes the process of joint fact finding, which helps to approach problems through agreements on research questions, study methods, and resources for solving those issues (see Peyser, 2006, in Leach et al. 2013).
Shared understanding	References to collective/collaborative understandings of an issue being developed; Participants jointly agreeing on problems to be solved in the future (Cundill, 2010) and developing a common goal(s) or purpose (Davies & White, 2012; Schusler et al., 2003; Selin & Chavez, 1995). This quality also includes references to shared values in relation to developing or gaining mutual and shared understandings (Davenport et al., 2007; Stern & Coleman, 2005).

Social capital	<p>"relationships of trust, norms of reciprocity, and networks among individuals that can be drawn upon for an individual or a collective benefit" (Putnam, 1993 in Wagner and Fernandez-Gimenez, 2008, Kitts et al., 2007; Coleman, 1990). This includes building respect, relationships, and trust. If all of these elements were mentioned in relation to social capital, then it was coded as the quality social capital. If they were mentioned individually, not in relation/mention of being about social capital, then they were coded as individual qualities. If mentioned all in relation to social capital or identified as social capital, was coded as this. See individual codes below for detailed sub-codes.</p>
Social learning	<p>A change in understanding that goes beyond the individual to become situated within wider units or communities of practice through social interactions between actors in social networks (see Cheng et al., 2015; Smedstad & Gosnell, 2013; Cundill and Rodela 2012). Through the process, mutual or shared learning occurs (Caves et al., 2013; Muñoz Erickson et al., 2010). Also includes references to double loop and single loop learning (Fish et al., 2010; Fernandez-Gimenez et al. 2008).</p> <p>Also, may include dialogue and learning. If these elements were mentioned in relation to social learning, then it was coded as the quality social learning. If they were mentioned individually, not in relation/mention of being about social learning, then they were coded as individual qualities. If mentioned all in relation to social learning or identified as social learning, was coded as this.</p>
Transparency	<p>Reference to the actors being open, fair, transparent, and considered equally in collaborating (Wagner & Fernandez-Gimenez, 2008).</p>
Trust	<p>Reference to trust and confidence in others, and also identified as something that is built throughout the iterative process (Miles, 2013). This also includes the willingness of an actor to assume risk based upon their positive expectations of another's actions (Stern & Coleman, 2015; Koontz, 2014), and the willingness to be vulnerable to one another (Metcalf et al., 2015; Vinke-de-Kruijf et al., 2013).</p>

2. Outcomes (results) of collaborating

Outcome	Description
A benefit to the environment	Broadly defined environmental outcomes related to improvements in terms of the environment, such as evidence of flood risk reduction, water quality improvement (Vinke-de-Kruijf et al., 2013). An effect in the long term from collaboration (see Brisbois and de Loë, 2017). Also includes ecological outcomes, which are outcomes that are “expressed in terms of change of landscape structure and function” (Chapman, 2014, p. 49).
A benefit to society	Broadly defined social outcomes related to social aspects of collaboration; a long-term effect on society (see Brisbois and de Loë, 2017 for discussion)
Adaptive capacity	The ability of the group to both respond and deal with uncertainty and change related to complex problems and being able adjust over time and adapt to situations as needed in order to meet management or governance objectives (Caves et al., 2013; Monroe et al., 2013; Armitage et al. 2008). This also includes outcomes of resilience, with reference to actors being able to sustain social-ecological systems and respond to changes collectively (see Fernandez-Gimenez et al., 2008 for example).
Better governance	Governance involves both private and public interactions undertaken to address challenges and create opportunities (Armitage et al., 2009, p. 96). Improved governance therefore incorporates references to improved decision making, governance; managing problems; improvements in decision making process which set up the collaborative strategy for increased likelihood of success (see de Koning et al., 2017 for example); also includes references to administration related to the problem at hand (Lundmark & Jonsson, 2013).

Collective action	“Cooperative action taken by a group of individuals in order to achieve a common goal” (Lozano & Heinen, 2016, p. 760). This includes reference to achieving common goals through cooperation, coordination, and advancing shared visions through collaborating- which fosters this (see Lauber et al., 2011 and Selin & Chavez, 1995 for examples).
Conflict resolution	Reference to actors overcoming or managing their differences related to their values, interests, and/or misunderstandings (Roth and de Loë, 2017; Arnold et al., 2012; Muñoz-Erickson et al., 2007). Also includes references to reduced disagreement or tensions among actors (Mandarano, 2008; Mostert et al., 2007;).
Creation of policy	A longer- term result of collaboration where new rules or norms are developed (see Brisbois & de Loë, 2016; Cheng et al., 2015 for examples).
Creative solutions	Reference to innovative solutions as a result formulated in the process (see Levesque et al., 2017 and Mandarano 2008 for example). Other terms used include, “well-crafted” (Manring, 2007), “alternate solutions” (Mutimukuru et al., 2006), and “novel solutions” (Kallis et al., 2009).
Development of management/conservation plans	Reference to the action of plans, strategic goals, tools, programs, etc. being developed and created for the management and/or conservation and/or governance of an environment or natural resource issue (see van Tol Smit et al., 2015; Cooke et al., 2011).
Gaining a shared understanding	Through collaborative communication and the exchange of various different perspectives, actors coming to collective (shared), more deepened understandings about issues (Egunyu et al. 2016; Smedstad & Gosnell, 2013; Fernandez-Gimenez et al. 2008). This includes through the process of producing new information together through joint fact finding collaboratively (Smedstad & Gosnell,

	2013; Mandarano, 2008; Ansell & Gash 2007), the recognition of new knowledge gained from other perspectives (Leach et al., 2013; Allen et al., 2011).
Greater appreciation of issues	Reference to actors gaining more respect; changing attitudes and beliefs; and new appreciation and acceptance of either the problem being discussed or other types of viewpoints as a result of collaborating (see Fernandez-Gimenez et al., 2008; Mandarano 2008 for example).
High quality efforts and solutions	Reference to improvements in actors' work towards being apart of the collaborative process, developing goals and solutions, and increased confidence and understanding to work towards these higher quality efforts in collaboration (e.g. Brewer, 2013; Cundill, 2010).
Implementation	Initial result of collaboration for management and governance solutions, with successes in the "doing" and moving forward of plans on the ground such as in restoration (e.g. Metcalf et al., 2015), management projects or strategies (e.g. Donoghue, 2010; Margerum, 1999), and mapping and assessments (e.g. Isley et al., 2013).
Increased capacity to participate	Reference to stakeholders feeling more inclined and willing to partake in collaborative initiatives as they become apart of the process (see Caves et al., 2013 for example).
Informal or formal agreements	Reference to either binding agreements (e.g. guidelines, regulation) or non-binding agreements collectively developed (e.g. operational plans). See Mandarano, 2008 for examples.
New partnerships and collaborations with others	Reference to actors developing new collaborations, plans, or organizations to collaborate as a result of a process (e.g. Mostert et al., 2007). Also includes mention of new cooperative undertakings (Plummer et al., 2017) and the formation of new partnerships or alliances for collaboration (e.g.,

	Jum et al., 2009; Browning-Aiken et al., 2004).
Power sharing	Reference to actors, as a result of collaboration, sharing and distributing power in working towards solutions (Monroe et al., 2013; Koehler & Koontz, 2008).
Small wins	Reference to improvements that result from collaboration including deepened trust, commitment, and shared understanding (Ansell & Gash, 2007). Direct reference to these as small wins.
Social capital	"Relationships of trust, norms of reciprocity, and networks among individuals that can be drawn upon for an individual or a collective benefit" (Putnam, 1993 in Wagner and Gimenez 2008; Kitts et al., 2007; Coleman, 1990). Reference to this as a <i>result or outcome</i> of collaboration (as identified by Wagner & Fernandez-Gimenez, 2008; Koontz & Thomas, 2006). This includes reference to built trust (e.g. Levesque et al., 2017; Davenport et al., 2007; Mostert et al., 2007) networks, partnerships, and/or relationships (e.g. Levesque et al. 2017; Mandarano 2008) and built respect (e.g. Wagner & Fernandez-Gimenez, 2008; Schusler et al., 2003;).
Social learning	"A process shared among diverse groups, for making sense of complex, turbulent environments" (Cundill & Rodella, 2012, p. 10); reference to collective learning enabled through collaboration with communication, participation, knowledge and skills acquisition, as a result rather than reference to it during the process (Egunyu et al. 2016; Vinke-de-Kruijf et al., 2013; Fish et al., 2010; Schusler et al., 2003). Also includes references to double loop and single loop learning (Fish et al., 2010; Fernandez-Gimenez et al. 2008).
Stakeholder empowerment	As a result of collaborative process, actors involved feel more empowered, included, supportive, and confident with collaborating and finding solutions; and as a result, more

	incentive to learn, compromise, and act on solutions (see Monroe et al., 2013; Muñoz-Erickson et al., 2010 for examples).
Win-win outcomes	Reference to either: a) benefits that are both in the interest of human and environmental values (see Paulson, 1998 for example) or; b) Reference to shared benefits for all actors involved (see Kallis et al., 2009) for example.

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Appendix 3-1: Questionnaire informed consent and questionnaire script

Part A: Informed consent form for questionnaire

Date: January 18, 2018

Project title: Dissecting collaboration in environmental management and governance: examining qualities, outcomes, and relationships

Principal Investigator (PI): Dr. Ryan Plummer, master thesis supervisor
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Department of Environmental Sustainability Research Centre (ESRC)
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Student Principal Investigator (SPI): Alison Feist, Master of Sustainability candidate
Department: Environmental Sustainability Research Centre (ESRC)
Brock University
Email: af16pq@brocku.ca

Invitation

You are invited to participate in a study that involves research. The purpose of this study is to explore the process of collaboration in environmental management and governance. It will examine how collaboration works to influence certain outcomes. This will be done through exploring a set of assumptions made from past research in three case studies to better understand this.

What's Involved

As a participant, you will be asked to complete a short questionnaire. The goal of the questionnaire is to examine your perceptions of how the collaborative process occurred and what the results of this process were. It will begin with general questions on your role as a participant in [insert case study name] collaborative process. Next, research has shown that we need to know more on how characteristics, or “key ingredients” of the process (e.g. trust and learning) work together to influence more positive outcomes. You will first be asked to select which of these key ingredients you believe were important in the process, and then will be asked to identify whether these were connected to results, which will also be listed. The questionnaire will take fifteen minutes out of your time to be completed and is accessed online. Upon request, it can be mailed to you should you not have this access.

Potential Benefits and Risks

Possible benefits of participation include the opportunity to reflect on your participation in the collaborative process and how you have interacted with others to work towards solutions. You will also have the opportunity to learn about the findings by the researcher which could provide additional insight into the effectiveness of your collaborative initiative and relationship of the process to the outcomes. There also may be risk associated with participation, such the disclosure of your opinion on the process and outcomes of the collaboration or type of interaction with others, however your personal information and identity will be kept confidential.

Confidentiality

All information you provide is considered confidential; your name will not be included or, in any other way, associated with the data collected in the study. Furthermore, because the interest of the research is the comparison on responses in three collaborative groups, you will not be identified individually in any way in written reports of this research.

Additionally, these data will be kept confidential, and with your permission, useable for future analysis by the thesis student's supervisor.

Data collected during this study will be stored under password protection on the researcher's laptop, and will only be accessible by the thesis student and supervisor and if necessary, the two committee members. Written notes will be locked in a cabinet in the master's student's office. Data will be kept preceding the study for potential use by the supervisor as a component of a larger research area of interest by the supervisor. The information found in this study could be potentially used as a secondary data source, with your permission (you can indicate this below). The data would be used as a supporting data source for studying other types of collaborative contexts or contribute to future studies relating perceptions of the process and outcomes of collaboration in environmental management and governance. Using variables such as qualities and outcomes will contribute to this larger area of study and help us ask more questions surrounding how collaborative processes can be understood to a greater extent and how they work best in different contexts and at different scales. Should you wish for your responses to be used as secondary data, your data will be kept under password protection indefinitely after the study for potential use. Should you not wish for your responses to be used as secondary data, the data will be destroyed immediately after the research project is officially complete. Any printed data will be paper shredded and any data on the laptop will be destroyed and permanently deleted.

Voluntary Participation

Participation in this study is voluntary. If you wish, you may decline to answer any questions or participate in any component of the study. Further, you may decide to withdraw from this study at any time and may do so without any penalty or loss of benefits to which you are entitled.

Publication of Results

Results of this study may be published in professional journals and presented at conferences. Feedback about this study will be available from Alison Feist, who can be contacted at af16pq@brocku.ca once the study has been completed.

Contact Information and Ethics Clearance

If you have any questions about this study or require further information, please contact Dr. Ryan Plummer or Alison Feist using the contact information provided above. This study has been reviewed and received through the Research Ethics Board at Brock University [file # 17-007]. If you have any comments or concerns about your rights as a research participant, please contact the Research Ethics Office at (905) 688-5550 Ext. 3035, reb@brocku.ca

Thank you for your assistance in this project. Please print a copy of this form for your records.

CONSENT FORM

- I agree to participate in this study described above and continue to the questionnaire. I have made this decision based on the information I have read in the Information-Consent Letter. I have had the opportunity to receive any additional details I wanted about the study and understand that I may ask questions in the future. I understand that I may withdraw this consent at any time.

Use of responses as secondary data for future studies:

[must also be checked in order to proceed to survey]

- I permit my responses to be kept indefinitely after the study is completed and used as secondary data for use in future research studies which further examine collaborative environmental management and governance processes by the student's supervisor.
- I would not like my responses to be kept or used as secondary data in future studies which further examine collaborative environmental management and governance processes (data will be destroyed immediately after the study is completed).
- I do not wish to participate in the study described above and would not like to proceed to the questionnaire

Part B: Questionnaire on collaboration in environmental management and governance

Alison Feist, master's thesis student

Summary: Collaborative climate change efforts in New Brunswick are working towards both adapting to and mitigating the effects of climate change. The way in which you, among other actors, collaborate on these issues is of interest for this questionnaire. When we look at past research in the environmental field, it has shown that we need to gain a better understanding of the process of collaboration itself and how it connects to outcomes (things that can be defined as results that come about from your collaborative climate change related efforts). The goal of this questionnaire is to examine your perceptions and experiences from the process of collaboration as well as the outcomes from engaging with climate adaptation plans. Gaining insights into the

process as well as outcomes is essential for understanding and enhancing collaborative efforts regarding climate change.

Instructions: Please go through each section and select your answers based on your own experience collaborating with others. The first section contains general questions about your role in collaborating, and the following sections will ask you to select some qualities and outcomes of interest. Please answer the questions to the best of your ability and in your own opinion. Remember, you do not have to answer any questions that you do not want to answer, and you have the right to withdraw at any time from this questionnaire. This questionnaire should take you 15 minutes to complete.

Section 1: Introduction – case specific questions

Case 1: Woodstock, Hartland, Florence- Bristol

The following questions will examine your role in the collaborative vulnerability assessment and/or climate change adaptation process on the St John River. Please answer to the best of your ability.

1. Please check what type of stakeholder do/did you represent in the Community Climate Change Vulnerability Assessment and/or current stage of climate adaptation planning? (check all that apply).
 - a) A First Nations group
 - b) A non-governmental organization
 - c) A government actor (from any level of government)
 - d) A private, for-profit organization
 - e) An educational institution
 - f) Not representing a stakeholder- a general citizen
 - g) Other (please indicate what) _____

2. How were you involved in the Community Climate Change Vulnerability Assessment, or current adaptation planning process? (e.g. working group member, workshop participant)

3. Please estimate what your level of involvement (your amount of activity) is/was in this role (s).
 - a) Low activity (involved in less than 25% of the process)
 - b) Moderate activity (involved in 50-75% of the process)
 - c) High activity (involved in 75% + of the process)

4. How much influence in decision making power in the climate change collaborative would you say you have? Please indicate on the slider.

No power or influence	All power or influence
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1	2	3	4	5	6	7	8	9	10
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5. How long have you been involved in the climate adaptation collaborative process (from the vulnerability assessments onwards)?
- a) 0-1 years
 - b) 2-3 years
 - c) 4+ years

Case 2: Charlotte County

The following questions will examine your role in the collaborative climate change adaptation process in Charlotte County and surrounding area. Please answer to the best of your ability.

1. What type of stakeholder do/did you represent in the Charlotte County climate change adaptation, vulnerability, or risk assessment collaborations? (check all that apply)
 - a) A First Nations group
 - b) A non-governmental organization
 - c) A government actor (from any level of government)
 - d) A private, for-profit organization
 - e) An educational institution
 - f) Not representing a stakeholder- a general citizen
 - g) Other (please indicate what) _____

2. Which stage of the climate adaptation process were/are you involved in (circle all that apply)?
 - a) Vulnerability assessment
 - b) Risk assessment
 - c) Climate adaptation action plan
 - d) Other (indicate): _____

3. Please estimate what your level of involvement (your amount of activity) is/was in this role (s).
 - a) Low activity (involved in less than 25% of the process)
 - b) Moderate activity (involved in 50-75% of the process)
 - c) High activity (involved in 75% + of the process)

4. How much influence in decision making power in the climate change collaborative would you say you have? Please indicate on the slider.

No power or influence									All power or influence
1	2	3	4	5	6	7	8	9	10

5. How long have you been involved in the climate adaptation collaborative process (from the vulnerability assessments onwards)?
 - d) 0-1 years
 - e) 2-3 years
 - f) 4+ years

Case 3: Tantramar

The following questions will examine your role in the collaborative climate change adaptation efforts in Southeast New Brunswick. Please answer to the best of your ability.

1. What type of stakeholder do/did you represent in the Tantramar Climate Change Adaptation Collaborative? (check all that apply)
 - a) A First Nations group
 - b) A non-governmental organization
 - c) A government actor (from any level of government)
 - d) A private, for-profit organization
 - e) An educational institution
 - f) Not representing a stakeholder- a general citizen
 - g) Other (please indicate what) _____

2. Which part of the Tantramar Climate Change Adaptation Collaborative process are you involved with or participate(d) in? (circle all that apply)
 - a) Workshop
 - b) Public participation/outreach event
 - c) In regular TCCAC meetings
 - d) TCCAC working group
 - e) Other (indicate): _____

3. Please estimate what your level of involvement (your amount of activity) is/was in this role (s).
 - a) Low activity (involved in less than 25% of the process)
 - b) Moderate activity (involved in 50-75% of the process)
 - c) High activity (involved in 75% + of the process)

4. How much influence in decision making power in the climate change collaborative would you say you have? Please indicate on the slider.

No										All	
power or										power or	
influence										influence	
1	2	3	4	5	6	7	8	9	10		

5. How long have you been involved in the climate adaptation collaborative process (from the vulnerability assessments onwards)?

- a) 0-1 years
- b) 2-3 years
- c) 4+ years

Section 2: Investigating collaborative qualities and outcomes

A) Collaborative qualities

Qualities can be described as key features of the process (such as trust, or learning) that define people’s interactions while collaborating. There is a lack of research on what types of qualities influence the outcomes of collaboration. This section will ask you to select a maximum of 5-7 qualities from a list in which you believe were both present and important in completing goals related to the climate adaptation process which you were/are apart of. These answers you select will then be used in questions for the rest of the survey.

6. Please select 5-7 qualities from the following list based on which ones you think were the most important in the collaborative process that you participated in.

- Deliberation
- Diverse views represented
- Relationship building
- Negotiation
- Commitment
- Power sharing
- Inclusiveness of everyone
- Social capital: The combination of elements of trust, reciprocity, and cooperation
- Shared decision making
- Shared understanding
- Joint goals created
- Different knowledge types used
- Openness
- Acquiring new knowledge
- Active involvement
- Transparency
- Dialogue
- Shared problem solving
- Social learning: Learning by doing with others
- Dependency on one another
- Trust building
- Compromise with others
- Empathy
- Building respect
- Honesty
- A sense of shared identity
- Shared awareness (i.e. everyone is on the same page in what is happening in the process)

B) Outcomes of collaborating

Outcomes are things that have come about immediately from the collaborative process in developing vulnerability assessments and/or climate adaptation plans for addressing climate change related issues. Please answer each question to the best of your ability based on your experience with collaborating in these contexts.

7. Please select 5-7 outcomes from the following list based on which ones you think came about from your work in the climate adaptation planning process that you participated in

- Social learning: Collective learning from communicating with others about climate change issues
- Social capital: Increase in the combined elements of trust, reciprocity, and cooperation
- Implementation of plans
- More creative solutions established
- The development of management or adaptation plans
- Being able persist and respond to the uncertainties of climate change
- Gaining a shared understanding
- Collective action
- Higher quality efforts and solutions
- Stakeholder empowerment
- Improvement in decision making ability and managing problems
- Conflict resolution
- More inclination to participate in the collaborative initiatives
- New partnerships with others
- Win-win outcomes (benefits for both humans and the environment OR benefits for all the members collaborating)
- Formal or informal agreements (e.g. new guidelines)
- A greater appreciation of issues
- A benefit to the environment
- A benefit to society
- Power sharing
- Creation of policy
- Small wins (i.e. immediate positive improvements)

**Qualtrics will insert selected qualities into next set of questions for each of the 5-7 selected outcomes.*

For example:

8. For [insert outcome], please select the qualities that you think contributed to this outcome. If you don't think a quality was connected to an outcome, please select "none related to outcome".

Example: Select all (if any) qualities that you think influenced the outcome [implementation].

Note: cannot select others if already selected "none related"

- Trust
- Deliberation
- Shared understanding
- None related

Thank you for your time.

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Appendix 3-2: Interview informed consent and interview script

Part A: Informed consent form for interviews

Date: April 23, 2018

Project title: Dissecting collaboration in environmental management and governance: examining qualities, outcomes, and relationships

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Student Principal Investigator (SPI): Alison Feist, Master of Sustainability candidate
Department: Environmental Sustainability Research Centre (ESRC)
Brock University
Email: af16pq@brocku.ca

Invitation

You are invited to participate in a study that involves research. The purpose of this study is to explore the process of collaboration in environmental management and governance, with a focus on climate change adaptation. It will examine how collaboration works to influence certain outcomes. This will be done through exploring the process and its outcomes found from past research in three case studies to explore how they occur and come about in practice.

What's Involved

You are invited to participate in an in-depth, semi-structured interview. The goal of the interview is to get an in depth understanding of your perceptions of how the collaborative process occurred and what the results of this process were, based on findings from the questionnaire which has been completed by participants involved in the [name of case] collaborative group efforts. The purpose of this is to reflect on your involvement in collaboration in a conversation with the researcher to explore how the process has played out.

The interview will begin by asking you some general and contextual questions about what type of participant you are representing in the process and what perspectives you bring/brought to it. The researcher will proceed to have a conversation with you about the characteristics (collaborative qualities) identified by participants which may have led to those outcomes. These

“characteristics” relate to current research findings indicating that we need to know more about how characteristics of the process (e.g. trust and learning) work together to influence more positive outcomes. After discussing these characteristics, you will be then asked to reflect on some outcomes that were identified by your collaborative group members in the questionnaire. Finally, we will go back to the characteristics of interest and have a conversation about how they may have come about in the process together, and (may have) influenced the outcomes that we discuss. As a semi-structured interview, the researcher will have a set of key questions, and then ask you more questions as they arise based on the conversation to gain a more in depth understanding. The researcher will audio record your answers alongside taking notes to ensure they do not miss anything that you say. Participation will take approximately sixty minutes of your time on a pre-arranged day.

Potential Benefits and Risks

Possible benefits of participation include the opportunity to reflect on your participation in the collaborative process and how you have interacted with others to work towards solutions, as well as the opportunity to learn about the findings by the researcher which could provide additional insight into the effectiveness of your collaborative initiative and relationship of the process to the outcomes. There also may be risk associated with participation, such the disclosure of your opinion on the process and outcomes of the collaboration, however your personal information will be kept confidential. Another risk is that a general name the collaborative group will be disclosed, however your name will still not be used. Given that the collaborative group is smaller, it may be easy to identify participants regardless, however your name and personal information will be kept confidential and a pseudonym with a general role title will be used for both presenting the results and for storing audio and interview files. The results will only disclose the type of representative that you are in the process, in order to maintain your confidentiality and minimize this risk.

Confidentiality

The information you provide will be kept confidential. Your name will not appear in any thesis or report resulting from this study; however, with your permission, anonymous quotations may be used. Shortly after the interview is completed, I will send you a copy of the transcript to give you an opportunity to confirm the accuracy of our conversation and to add or clarify any points that you wish. You will be given two weeks to do so and provide any additional information that you wish to clarify with the researcher. If I do not hear from you after these two weeks I will request via email again that you either confirm your data or do not wish for it to be used in the analysis.

Additionally, these data will be kept confidential, and with your permission, useable for potential future analysis by the thesis student’s supervisor.

Data collected during this study will be stored under password protection on the researcher’s laptop, and will only be accessible by the thesis student and supervisor and if necessary, the two committee members. Written notes will be locked in a cabinet in the master’s student’s office.

Data will be kept preceding the study for potential use by the supervisor as a component of a larger research area of interest by the supervisor. The information found could be potentially used as a secondary data source, with your permission (you can indicate this below). The data would be used as a supporting data source for studying other types of collaborative contexts or contribute to future studies relating perceptions of the process and outcomes of collaboration in environmental management, governance. Using variables such as qualities and outcomes will contribute to this larger area of study and help us ask more questions surrounding how collaborative processes can be understood to a greater extent and how they work best in different contexts and at different scales. Should you wish for your responses to be used as secondary data, your data will be kept under password protection indefinitely after the study for potential use. Should you not wish for your responses to be used as secondary data, the data will be destroyed immediately after the research project is officially complete. Any printed data will be paper shredded and any data on the laptop will be destroyed and permanently deleted. Should you choose to withdraw from the study at any time, data will be destroyed immediately and not used in any current or future research.

Voluntary Participation

Participation in this study is voluntary. If you wish, you may decline to answer any questions or participate in any component of the study. Further, you may decide to withdraw from this study at any time and may do so without any penalty or loss of benefits to which you are entitled.

Publication of Results

Results of this study may be published in professional journals and presented at conferences. To ensure confidentiality and protect your identity, your name will be published as a pseudonym identified by a general role title when reporting results in any form. Feedback about the results of this study will be available from Alison Feist, who can be contacted at af16pq@brocku.ca once the study has been completed.

Contact Information and Ethics Clearance

If you have any questions about this study or require further information, please contact Dr. Ryan Plummer or Alison Feist using the contact information provided above. This study has been reviewed and received through the Research Ethics Board at Brock University [file # 17-007]. If you have any comments or concerns about your rights as a research participant, please contact the Research Ethics Office at (905) 688-5550 Ext. 3035, reb@brocku.ca

Thank you for your assistance in this project. Please keep a copy of this form for your records.

CONSENT FORM

I agree to participate in this study described above. I have made this decision based on the information I have read in the Information-Consent Letter. I have had the opportunity to receive any additional details I wanted about the study and understand that I may ask questions in the future. I understand that I may withdraw this consent at any time.

Name: _____

Signature: _____

Date: _____

With your permission, we would like to keep your contact information for the purpose of contacting you for potential future studies. Please indicate whether you permit your contact information to be kept for this purpose.

- Yes
- No

With your permission, we would also like to keep your responses for potential use as secondary data for future studies, in which your identity will still be kept confidential. Please indicate whether you would like this to be kept or not.

- I permit my responses to be kept indefinitely after the study is completed and used as secondary data for use in future research studies which further examine collaborative environmental management and governance processes by the student's supervisor.
- I would not like my responses to be kept or used as secondary data in future studies which further examine collaborative environmental management and governance processes (data will be destroyed immediately after the study is completed).

Part B: Semi-structured interview script

Thank you again for your willingness to participate in this interview. I would like to remind you about your right to informed consent. You do not have to answer any questions that you do not want to, and you have the right to withdraw at any time [ask if they agree with everything; have copy of form at hand for any other questions they have]. With your permission as well, I will be audio recording this interview alongside my note taking to ensure that I do not miss anything important.

If you are alright with everything, I wanted to give you a quick reminder about what my study is about. I am examining how the process of collaboration occurs and how it influences outcomes, in a practical environmental context. There are 3 things I am interested in for this: qualities, outcomes (defined here as results), and relationships between qualities and outcomes. Each of these three elements will help in giving me (as well as groups such as yours) a better understanding as to how collaboration works towards more positive outcomes in the context of climate adaptation. As a key informant and someone who is highly involved with [name of collaborative case], I would like to ask you questions based upon the findings from the questionnaires in order to get a better

understanding of how your collaborative group works. I will describe and clarify what I mean by these elements in more detail to you prior to the questions I ask about them. The interview should last for about forty minutes. Do you have any other questions before we begin?

Begin Recording

Section 1: Introduction

1. Could you tell me about your role and responsibilities with [name of case] and you climate change adaptation planning efforts here in New Brunswick?
 - Ask about contextual elements: size, background, evolution of the process (i.e. from a vulnerability assessment to developing climate mitigation/adaptation plans)

Section 2: Qualities, Outcomes, and Relationships

I would like to now ask you some questions based upon the findings from the questionnaire filled out by other collaborating actors in your group. (this can be in terms of the vulnerability assessment or the climate adaptation planning more generally).

Qualities:

There is a lack of research on what types of qualities (or features- such as trust or relationships) are present in collaboration and influence results of collaboration. I would like to ask you about the qualities in which people from [insert case study name/region] have identified as being important and present in the process they participated in.

***Bring a set of cards listing the qualities and outcomes that each respective case study has identified to show/give a visual to key informant**

Here I have the top qualities and top outcomes selected by your group- these were each the ones which were selected most frequently both individually and in relation to each other (influencing each other).

2. If we first look at these qualities selected by the group who completed the questionnaire, could you reflect on how exactly some of these occurred in any or all of your climate change adaptation processes.

Prompts:

- Going through each of these qualities, how were these occurred or were expressed in the process?
- Do you have any examples of ways which you've seen this quality expressed by the group?
- In what ways do you think acquiring new knowledge was evident throughout your meetings? Any specific methods used in the meetings which helped with this? How do you think this was one of the most important qualities to people?

- How were diverse perspectives evident in the group's meetings? How was this seen as such an important quality by group members?
- Ask this for other qualities too
- How were these expressed as key characteristics in the process?

Results (Outcomes):

Now that I have a better understanding of how these qualities may have occurred, I would like to now ask you about results the group has achieved at this point in the climate adaptation planning process. Results are things that have come about immediately from the collaborative process for addressing the issues that you did. I would like to ask you about your thoughts on what these results were to you.

[Show them cards listing the results that people in their collaborative group selected, with the qualities that each were matched with].

3. Now I would like to look at this list of outcomes (results). Going through each of these outcomes, how did these come about (occur) from the collaborative process?

Prompts:

- In what ways do you think [did people take from this process/feel that/attain] develop/gain/adopt/realize (list each outcome)
- Do you have any examples of how x result may have been realized by the group?
- In what ways do you think that people had a greater appreciation of issues after collaborating on the CCCVA/Risk Assessment/Climate Adaptation Plan? How do you think this is seen as such an important result?
- In what ways do you think that social learning (people learning through their interactions with one another) was seen as an important outcome in the group's collaboration?

Relationships:

Now that we have discussed how some of these qualities and outcomes have come about, I wanted to have a conversation about how these are related or linked to one another.

[Show network diagram and use/ explain as a speaking point]

4. How do you think some of these relationships occurred?

Prompts:

- If we first look at the "stronger" relationships (bolder lines on diagram), How did you see x quality influence x outcomes while you collaborated and achieved results as a group?
- Can you think of any examples where you saw this quality being important and influential in getting to this outcome?

- Do you think there were any other qualities which were essential to achieving this outcome? How?
 - One quality which seems to be very influential from your process was (for example) acquiring new knowledge, influencing (a greater appreciation of issues, development of plans, and gaining a shared understanding). How do you think this happened when you think about the group meetings and things you have achieved as a group?
 - Which of these relationships, in your opinion, were most obviously occurring and how?
5. Finally, do you have any more comments or insights to add about how [name of case] worked after we discussed these relationships further?

I would like to thank you for your time, I appreciate your insightful answers. I will transcribe this interview into a word document and send this to you within two weeks of today, for you to look over and ensure that you conveyed everything the way you wanted to. Once you confirm this with me, I will proceed to use this interview data for my analysis.

Stop Recording